# SECTION ECE ENGINE CONTROL SYSTEM C

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# **BASIC INSPECTION** DIAGNOSIS AND REPAIR WORK FLOW

## Work Flow



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INFOID:000000005441633 EC **OVERALL SEQUENCE** Inspection start 1. Get information for symptom Get the detailed information about symptom from the customer. 2. Check DTC\*1 Check DTC\*1 Print out  $DTC^{*1}$  and freeze frame data<sup>\*2</sup> (or, write it down). Check related service bulletins. Symptom is described. Symptom is not described. Symptom is described. DTC\*1 is detected. DTC\*1 is detected. DTC\*1 is not detected. 4. Confirm the symptom 3. Confirm the symptom Try to confirm the symptom described by the Try to confirm the symptom described by the customer. customer. Also study the normal operation and fail safe Also study the normal operation and fail safe related to the symptom related to the symptom. 5. Perform DTC CONFIRMATION PROCEDURE 6. Perform BASIC INSPECTION With CONSULT-III Without CONSULT-III 9. Detect malfunctioning 7. Perform "SPEC" in system by Symptom Within the "DATA MONITOR" mode SP value Table Out of the SP value 8. Detect malfunctioning part by **TROUBLE DIAGNOSIS** Malfunctioning part - SPECIFICATION VALUE is not detected. Malfunctioning part 10. Detect malfunctioning part by is detected. **Diagnosis Procedure** 11. Repair or replace the malfunctioning part 12. Final check DTC\*1 is detected. Symptom remains. Make sure that the symptom is not detected. Perform DTC Confirmation Procedure again, and then make sure that the malfunction can be repaired securely. DTC\*1 is not detected. Symptom does not remain. **INSPECTION END** \*1: Include 1st trip DTC. \*2: Include 1st trip freeze frame data. JMBTA0078GB

#### DETAILED FLOW



< BASIC INSPECTION >

## **1**.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the "Diagnostic Work Sheet". (Refer to <u>EC-9</u>, "<u>Diagnostic Work</u> <u>Sheet</u>".)

>> GO TO 2.

## 2.CHECK DTC

- 1. Check DTC.
- 2. Perform the following procedure if DTC is displayed.
- Record DTC and freeze frame data. (Print them out with CONSULT-III or GST.)
- Erase DTC. (Refer to EC-82, "Diagnosis Description".)
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to <u>EC-454</u>, "Symptom Table".)
- 3. Check related service bulletins for information.

Is any symptom described and is any DTC 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-458</u>, "<u>Description</u>" and <u>EC-439</u>, "Fail Safe".

Diagnosis Work Sheet is useful to verify the incident.

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

#### >> GO TO 5.

#### **4.**CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.

Also study the normal operation and fail safe related to the symptom. Refer to <u>EC-458</u>, "<u>Description</u>" and <u>EC-439</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-441, "DTC Inspection Priority Chart"</u> and determine trouble diagnosis order.

NOTE:

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

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

#### Is DTC detected?

YES >> GO TO 10.

NO >> Check according to <u>EC-442, "DTC Index"</u>.

**6.**PERFORM BASIC INSPECTION

Perform EC-11, "BASIC INSPECTION : Special Repair Requirement".

Do you have CONSULT-III?

## DIAGNOSIS AND REPAIR WORK FLOW

| DIAGNOSIS AND REPAIR WORK FLOW   |    |
|--|----|
| < BASIC INSPECTION > [QR25DE]  |    |
| YES >> GO TO 7.<br>NO >> GO TO 9.  | А  |
| 7.PERFORM SPEC IN DATA MONITOR MODE  |    |
| With CONSULT-III<br>Make sure that "MAS A/F SE-B1", "B/FUEL SCHDL" and "A/F ALPHA-B1" are within the SP value using CON-<br>SULT-III in "SPEC" of "DATA MONITOR" mode. Refer to <u>EC-105, "Component Function Check"</u> .  | EC |
| <u>Is the measurement value within the SP value?</u><br>YES >> GO TO 9.  | С  |
| NO >> GO TO 8.   |    |
| 8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE   | D  |
| Detect malfunctioning part according to <u>EC-106, "Diagnosis Procedure"</u> .<br><u>Is malfunctioning part detected?</u>  |    |
| YES >> GO TO 11.   | Ε  |
| NO >> GO TO 9.   |    |
| 9.DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE  | F  |
| Detect malfunctioning system according to <u>EC-454. "Symptom Table"</u> based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.   |    |
| >> GO TO 10.   | G  |
| 10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE  |    |
| Inspect according to Diagnosis Procedure of the system.<br>NOTE:   | Н  |
| The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-45, "Circuit Inspection"</u> .   | I  |
| Is malfunctioning part detected?   |    |
| <ul> <li>YES &gt;&gt; GO TO 11.</li> <li>NO &gt;&gt; Monitor input data from related sensors or check the voltage of related ECM terminals using CON-<br/>SULT-III. Refer to <u>EC-405. "Reference Value"</u>.</li> </ul>  | J  |
| 11. REPAIR OR REPLACE THE MALFUNCTIONING PART  | Κ  |
| <ol> <li>Repair or replace the malfunctioning part.</li> <li>Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.</li> </ol>  | I  |
| <ol> <li>Check DTC. If DTC is displayed, erase it. Refer to <u>EC-82, "Diagnosis Description"</u>.</li> </ol>  |    |
| >> GO TO 12.   | M  |
| 12.FINAL CHECK   |    |
| When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then make sure that the malfunction have been repaired securely. When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.                                       | Ν  |
| <u>Is DTC detected and does symptom remain?</u><br>YES-1 >> DTC is detected: GO TO 10.   | 0  |
| <ul> <li>YES-2 &gt;&gt; Symptom remains: GO TO 6.</li> <li>NO &gt;&gt; Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM. (Refer to <u>EC-82, "Diagnosis Description"</u>.) If the completion of SRT is needed, drive vehicle under the specific DRIVING PATTERN in <u>EC-445, "How to Set SRT Code"</u>.</li> </ul> | Ρ  |
| Diagnostic Work Sheet  |    |
| DESCRIPTION  |    |

## DIAGNOSIS AND REPAIR WORK FLOW

#### < BASIC INSPECTION >

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 one on the WORKSHEET SAMPLE in order to organize all the information for troubleshooting. Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

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

## WORKSHEET SAMPLE

| Customer nan   | ne MR/MS   | Model & Year  | VIN  |  |
|--|--|---|--|--|
| Engine # Trans. Mileage  |  | Mileage   |  |  |
| Incident Date  |  | Manuf. Date   | In Service Date                            |  |
| Fuel and fuel  | filler cap   | Vehicle ran out of fuel causing misfire     Fuel filler cap was left off or incorrectly | / screwed on.                              |  |
|  | ☐ Startability                                     | Impossible to start   | nrottle position<br>I by throttle position |  |
| Symptoms   | 🗌 Idling   | ☐ No fast idle ☐ Unstable ☐ H<br>☐ Others [   | High idle ☐ Low idle<br>]                  |  |
| 5 1  | Driveability                                       | Stumble Surge Knock Intake backfire Exhaust backfi Others [                             | Lack of power<br>re<br>]                   |  |
|  | Engine stall                                       | At the time of start While idling<br>While accelerating While dece                      | lerating                                   |  |
| Incident occur   | rrence   | U Just after delivery Recently  |  |  |
| Frequency  |  | ☐ All the time ☐ Under certain conditions ☐ Sometimes                                   |  |  |
| Weather conditions   |  | Not affected  |  |  |
|  | Weather  | 🗌 Fine 🗌 Raining 🗌 Snowing  | Others [ ]                                 |  |
|  | Temperature  | Hot Warm Cool   | ] Cold 🗌 Humid °F                          |  |
|  | Cold During warm-up After warm-up                  |   | After warm-up                              |  |
| Engine condit  | Engine speed L _ L _ L _ L _ L _ L _ L _ L _ L _ L |   | 4,000 6,000 8,000 rpm                      |  |
| Road conditions In town In suburbs Highway Off road (up/down)  |  | hway 🗌 Off road (up/down)   |  |  |
| Image: Not affected         Image: At starting         Image: At starting |  | ing<br>ng (RH/LH)   |  |  |
| 0         10         20         30         40         50         60         M           Malfunction indicator lamp                 Not turned on   |  |   |  |  |

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

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MTBL0017

[QR25DE]

< 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. Lift up the vehicle.
- Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine until engine coolant temperature indicator points the middle of gauge. Ensure engine stays below 1,500 rpm.
- 5. Run engine at about 2,500 rpm for about 2 minutes under no load.
- 6. Make sure that no DTC is displayed with CONSULT-III or GST.

Is any DTC detected?

YES >> GO TO 2.

NO >> GO TO 3.

2.REPAIR OR REPLACE

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

| >> GO TO 3<br><b>3.</b> CHECK TARGET IDLE SPEED   | J |
|---|---|
| <ol> <li>Run engine at about 2,500 rpm for about 2 minutes under no load.</li> <li>Rev engine two or three times under no load, then run engine at idle speed for about 1 minute.</li> <li>Shift the selector lever to N position with engine running.</li> </ol> | K |
| <ol> <li>Check idle speed.</li> <li>For procedure, refer to <u>EC-14, "IDLE SPEED : Special Repair Requirement"</u>.</li> <li>For specification, refer to <u>EC-470, "Idle Speed"</u>.</li> <li>CAUTION:</li> </ol>   | L |
| <ul> <li>Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.</li> <li>5. Shift the selector lever to P position.</li> </ul>                                   | Μ |
| Is the inspection result normal?<br>YES >> GO TO 9.<br>NO >> GO TO 4.   | Ν |
| 4. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING  |   |
| <ol> <li>Turn ignition switch OFF.</li> <li>Perform <u>EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"</u>.</li> </ol>  | 0 |
| >> GO TO 5.   | Ρ |
| 5.PERFORM IDLE AIR VOLUME LEARNING  |   |
| Perform EC-16, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".   |   |
| Is Idle Air Volume Learning carried out successfully?   |   |

YES >> GO TO 6.

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

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< BASIC INSPECTION >

## **6.**CHECK TARGET IDLE SPEED AGAIN

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine until engine coolant temperature.
- 2. Shift the selector lever to N position with engine running.

Check idle speed.
 For procedure, refer to <u>EC-14</u>, "IDLE <u>SPEED</u>: <u>Special Repair Requirement</u>".
 For specification, refer to <u>EC-470</u>, "Idle <u>Speed</u>".
 CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

4. Shift the selector lever to P position.

Is the inspection result normal?

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

7.DETECT MALFUNCTIONING PART

Check the Following.

- Check camshaft position sensor (PHASE) and circuit. Refer to <u>EC-255, "DTC Logic"</u>.
- Check crankshaft position sensor (POS) and circuit. Refer to EC-251. "DTC Logic".

Is the inspection result normal?

YES >> GO TO 8.

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

8. CHECK ECM FUNCTION

Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)

>> GO TO 4.

**9.**CHECK IGNITION TIMING

- 1. Run engine at idle.
- 2. Shift the selector lever to N position with engine running.
- Check ignition timing with a timing light. For procedure, refer to <u>EC-14. "IGNITION TIMING : Special Repair Requirement"</u>. For specification, refer to <u>EC-470. "Ignition Timing"</u>. CAUTION: Never lacks the selector lower in the N position for a long period of time.

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

4. Shift the selector lever to P position.

Is the inspection result normal?

YES >> GO TO 17. NO >> GO TO 10.

NO >> GO 10 10.

**10.** PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

1. Turn ignition switch OFF.

2. Perform EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 11.

**11.** PERFORM IDLE AIR VOLUME LEARNING

Perform EC-16, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 12.

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

**12.**CHECK TARGET IDLE SPEED AGAIN

| < BASIC INSPECTION >  | [QR25DE]                          |
|---|-----------------------------------|
| 1. Activate "INSPECTION MODE 1" (HBC-104) to start engine, and warm up engine ur  | •                                 |
| <ol> <li>temperature.</li> <li>Shift the selector lever to N position with engine running.</li> </ol>   | A                                 |
| 3. Check idle speed.  |                                   |
| For procedure, refer to <u>EC-14, "IDLE SPEED : Special Repair Requirement"</u> .<br>For specification, refer to <u>EC-470, "Idle Speed"</u> .                | EC                                |
| CAUTION:  |                                   |
| Never leave the selector lever in the N position for a long period of time. In the engine operates but electricity cannot be generated.                       | e N position, the                 |
| 4. Shift the selector lever to P position.  |                                   |
| <u>Is the inspection result normal?</u><br>YES >> GO TO 13.   | D                                 |
| NO >> GO TO 15.   | D                                 |
| 13. CHECK IGNITION TIMING AGAIN   |                                   |
| 1. Run engine at idle.  | E                                 |
| 2. Shift the selector lever to N position with engine running.  |                                   |
| <ol> <li>Check ignition timing with a timing light.</li> <li>For procedure, refer to <u>EC-14</u>, "IGNITION TIMING : Special Repair Requirement".</li> </ol> | F                                 |
| For specification, refer to EC-470. "Ignition Timing".  |                                   |
| CAUTION:<br>Never leave the selector lever in the N position for a long period of time. In the  | e N position, the G               |
| engine operates but electricity cannot be generated.  | • • • •                           |
| <ol> <li>Shift the selector lever to P position.</li> <li>Is the inspection result normal?</li> </ol>   |                                   |
| YES $>>$ GO TO 17.  | Н                                 |
| NO >> GO TO 14.   |                                   |
| 14. CHECK TIMING CHAIN INSTALLATION   | I                                 |
| Check timing chain installation. Refer to EM-51, "Removal and Installation".  |                                   |
| Is the inspection result normal?  | J                                 |
| YES >> GO TO 15.<br>NO >> Repair the timing chain installation. Then GO TO 4.   | 0                                 |
| 15. DETECT MALFUNCTIONING PART  |                                   |
| Check the following.  | K                                 |
| <ul> <li>Check camshaft position sensor (PHASE) and circuit. Refer to <u>EC-255, "DTC Logic"</u>.</li> </ul>  |                                   |
| <ul> <li>Check crankshaft position sensor (POS) and circuit. Refer to <u>EC-251, "DTC Logic"</u>.<br/>Is the inspection result normal?</li> </ul>             | L                                 |
| YES >> GO TO 16.  |                                   |
| NO >> Repair or replace. Then GO TO 4.  | Μ                                 |
| 16.CHECK ECM FUNCTION   | 141                               |
| Substitute another known-good ECM to check ECM function. (ECM may be the cause of an is a rare case.)   | n incident, but this $\mathbb{N}$ |
| >> GO TO 4.   |                                   |
| 17.INSPECTION END   | 0                                 |
| If ECM is replaced during this BASIC INSPECTION procedure, go to EC-14, "ADDITIONAL REPLACING CONTROL UNIT : Special Repair Requirement".                     | SERVICE WHEN                      |
|   |                                   |

#### >> INSPECTION END ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

< BASIC INSPECTION >

## ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description

When replacing ECM, this procedure must be performed.

## ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement

**1.**PERFORM VIN REGISTRATION

Refer to EC-14, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 2.

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-14, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 3.

 $\mathbf{3}.$ PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-14, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : 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

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INFOID:000000005441640

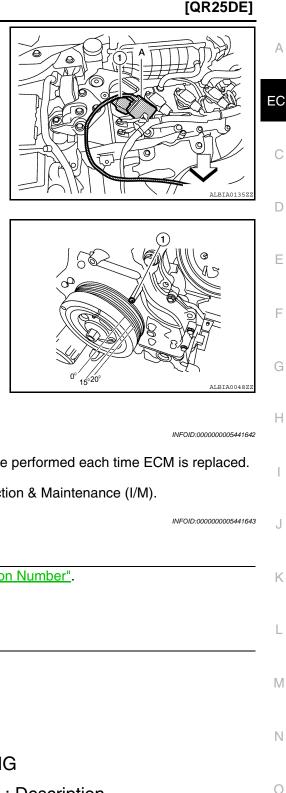
2010 Altima HEV

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INFOID:000000005441638

#### < BASIC INSPECTION >

- 1. Attach timing light to No. 1 igniton coil (1) wire as shown.
  - A : Timing light



- 2. Check ignition timing.
  - 1 : Timing indicator
  - >> INSPECTION END

VIN REGISTRATION VIN REGISTRATION : Description

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

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

## **VIN REGISTRATION : Special Repair Requirement**

| 1.CHECK VIN  |   |
|--|---|
| Check the VIN of the vehicle and note it. Refer to GI-21, "Identification Number". | K |
| >> GO TO 2.<br>2.PERFORM VIN REGISTRATION  | L |
| With CONSULT-III   |   |

Turn ignition switch ON.

2. Select "VIN REGISTRATION" in "WORK SUPPORT" mode.

3. Follow the instruction of CONSULT-III display.

>> END THROTTLE VALVE CLOSED POSITION LEARNING

THROTTLE VALVE CLOSED POSITION LEARNING : Description

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

## THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement

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INFOID:000000005441644

## **1**.START

1. Make sure that accelerator pedal is fully released.

#### < BASIC INSPECTION >

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

#### >> END 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 each engine idle speed within the specific range. It must be performed under any of the following conditions:

- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

## IDLE AIR VOLUME LEARNING : Special Repair Requirement

## 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 12.9V (At idle)
- Engine coolant temperature: 70 100°C (158 212°F)
- Selector lever: N position
- Vehicle speed: Stopped
- Transmission: Warmed-up (Drive vehicle for 10 minutes.)

Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 4.

2. IDLE AIR VOLUME LEARNING

#### With CONSULT-III

- 1. Perform Throttle Valve Closed Position Learning. Refer to <u>EC-15, "THROTTLE VALVE CLOSED POSI-</u> <u>TION LEARNING : Special Repair Requirement"</u>.
- 2. Turn ignition switch ON (READY).
- 3. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
- 4. Touch "START" and wait 20 seconds.

Is "CMPLT" displayed on CONSULT-III screen?

YES >> GO TO 3.

NO >> GO TO 6.

**3.**CHECK IDLE SPEED AND IGNITION TIMING

1. Rev up the engine two or three times.

Check idle speed and ignition timing are within the specifications. Refer to <u>EC-470, "Idle Speed"</u> and <u>EC-470, "Ignition Timing"</u>.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

**4.**IDLE AIR VOLUME LEARNING

# Without CONSULT-III NOTE:

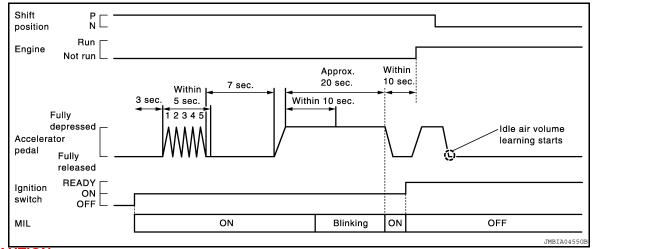
- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- 1. Lift up the vehicle.
- 2. Perform Throttle Valve Closed Position Learning. Refer to <u>EC-15. "THROTTLE VALVE CLOSED POSI-</u> <u>TION LEARNING : Special Repair Requirement"</u>.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.

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#### < BASIC INSPECTION >

- Repeat the following procedure quickly five times within 5 seconds. 5.
- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.
- Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops 6. blinking and turned ON.
- Fully release the accelerator pedal and turn ignition switch ON (READY). 7.
- Depress the accelerator pedal and keep it to start engine within 10 seconds after the MIL turned ON. 8.
- Shift the selector lever to N position with engine running. 9.
- 10. Fully release the accelerator pedal.
- 11. Wait 1 minute.



#### CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

- 12. Shift the selector lever to P position.
- 13. Depress the accelerator pedal and keep it.
- 14. Shift the selector lever to N position with engine running.
- 15. Check idle speed and ignition timing are within the specifications. Refer to EC-470, "Idle Speed" and EC-470, "Ignition Timing". CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the Κ engine operates but electricity cannot be generated.

16. Shift the selector lever to P position.

>> GO TO 5.

**5.**CHECK IDLE SPEED AND IGNITION TIMING

1. Depress the accelerator pedal and keep it.

Shift the selector lever to N position with engine running. 2.

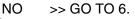
 Check idle speed and ignition timing are within the specifications. Refer to <u>EC-470. "Idle Speed"</u> and <u>EC-</u> 470, "Ignition Timing". Ν CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

Shift the selector lever to P position.

Is the inspection result normal?

YES >> INSPECTION END



**O.**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?

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< BASIC INSPECTION >

#### YES >> GO TO 7. NO >> Repair or replace malfunctioning part.

## 7. DETECT MALFUNCTIONING PART-II

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

It is useful to perform "TROUBLE DIAGNOSIS - SPECIFICATION VALUE". Refer to <u>EC-105, "Description"</u>. If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:

- Engine stalls.
- Erroneous idle.

>> INSPECTION END MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description

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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:000000005441649

## **1**.START

#### With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine 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".

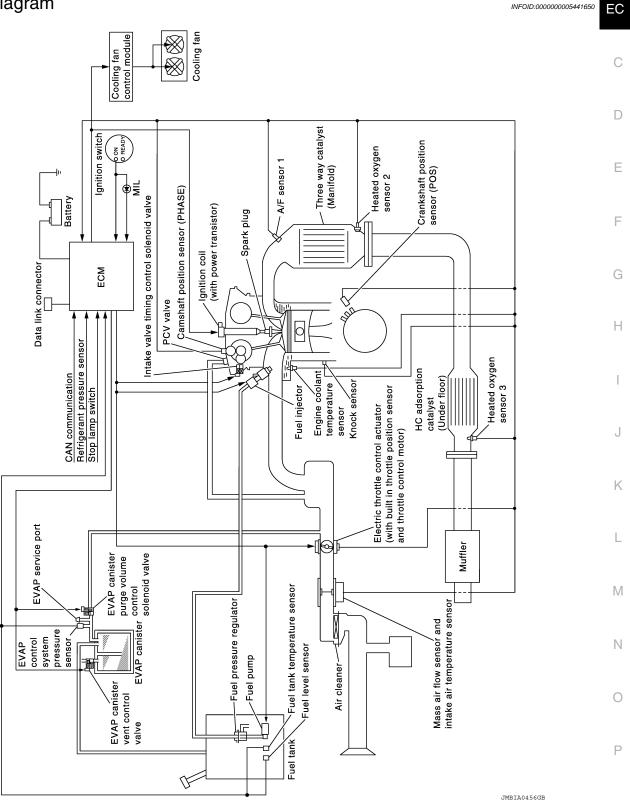
#### With GST

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF.
- 3. Disconnect mass air flow sensor harness connector.
- 4. Turn ignition switch ON (READY).
- 5. Depress the accelerator pedal to start engine, then keep engine running for at least 5 seconds.
- 6. Turn ignition switch OFF and reconnect mass air flow sensor harness connector.
- 7. Select Service \$03 with GST. Make sure DTC P0102 is detected.
- 8. Select Service \$04 with GST to erase the DTC P0102.

>> END

# FUNCTION DIAGNOSIS ENGINE CONTROL SYSTEM

System Diagram



## System Description

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

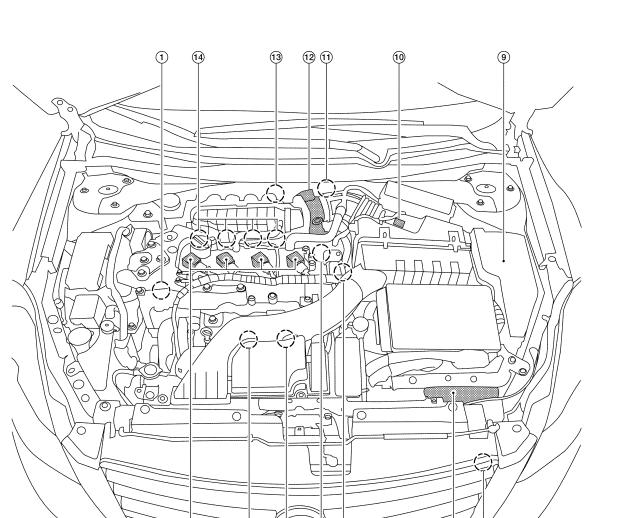
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[QR25DE]

#### < FUNCTION DIAGNOSIS >

## **Component Parts Location**



- 1. Intake valve timing control solenoid 2. valve
- 4. Air fuel ratio (A/F) sensor 1
- 7. ECM
- 10. Mass air flow sensor (with intake temperature sensor)
- 13. EVAP canister purge volume control 14. Fuel injector solenoid valve
- Ignition coil (with power transistor) and spark plug

5 6

- 5. Camshaft position sensor (PHASE)
- 8. Refrigerant pressure sensor

4

11. EVAP service port

3

2

- Knock sensor, Crankshaft position sensor (POS)
  - Engine coolant temperature sensor

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9. IPDM E/R

6.

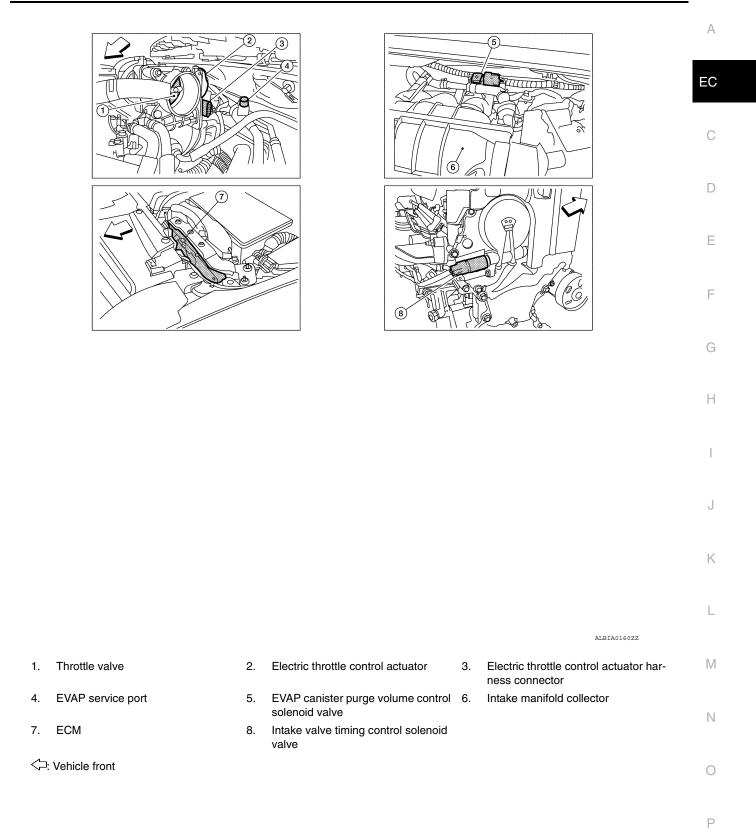
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12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)

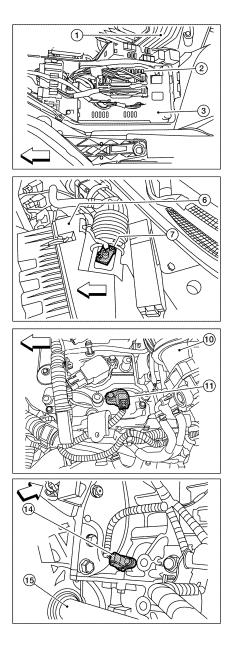
#### < FUNCTION DIAGNOSIS >

## [QR25DE]



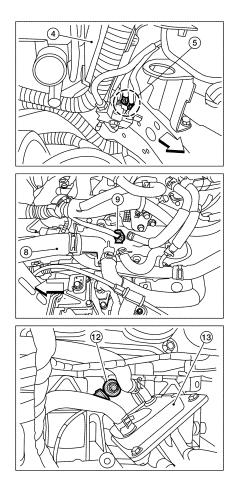
Revision: September 2009

#### < FUNCTION DIAGNOSIS >



- 1. Air cleaner assembly
- 4. EPS control unit (view with air cleaner assembly removed)
- 7. Mass air flow sensor (with intake temperature sensor)
- 10. Intake manifold collector
- 13. Engine oil cooler
- C: Vehicle front

- 2. Fuel pump fuse
- 5. Engine grounds
- 8. Upper radiator hose
- 11. Camshaft position sensor (PHASE)
- 14. Crankshaft position sensor (POS)

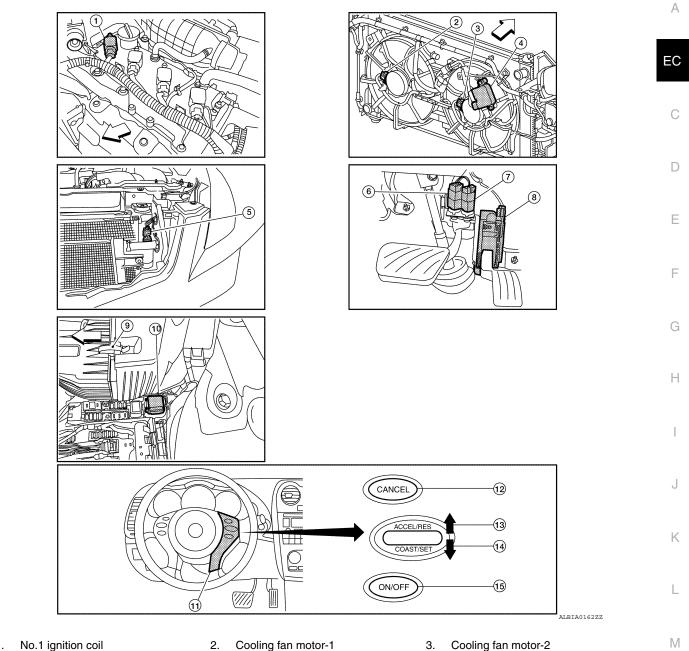


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- 3. IPDM E/R
- 6. Air cleaner assembly
- 9. Engine coolant temperature sensor
- 12. Knock sensor
- 15. Drive shaft RH

#### < FUNCTION DIAGNOSIS >

## [QR25DE]

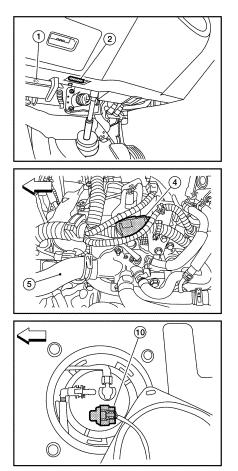


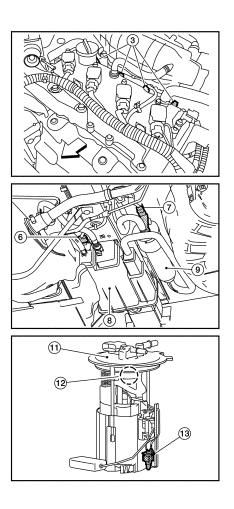
- 1.
- Cooling fan control module 4.
- 7. ASCD brake switch
- 10. Cooling fan relay-1
- 13. RESUME/ACCELERATE switch
- C: Vehicle front

- Cooling fan motor-1
- Refrigerant pressure sensor 5.
- 8. Accelerator pedal position sensor
- 11. ASCD steering switch
- 14. SET/COAST switch
- Cooling fan motor-2 З.
- 6. Stop lamp switch
- 9. Air cleaner assembly
- 12. CANSEC switch
- 15. MAIN switch

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- Hood opener handle 1.
- Condenser-2 4.
- 7. EVAP canister vent control valve
- 10. Fuel level sensor unit and fuel pump 11. Fuel pump assembly harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
- 13. Fuel tank temperature sensor
- $\triangleleft$ : Vehicle front

- Data link connector 2.
- 5. Upper radiator hose
- 8. EVAP canister (MAIN)



- Fuel injector harness connector З.
- 6. EVAP control system pressure sensor
- EVAP canister (SUB) 9.
- 12. Fuel pressure regulator

#### < FUNCTION DIAGNOSIS >

#### [QR25DE]

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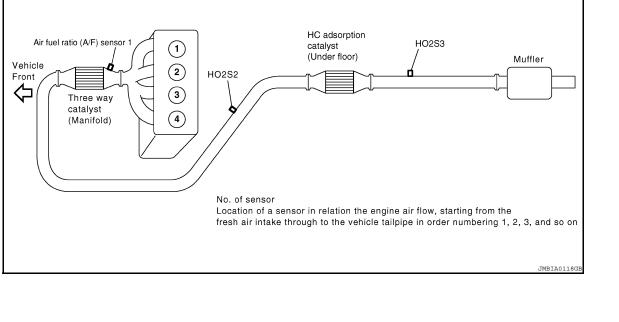
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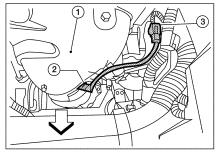
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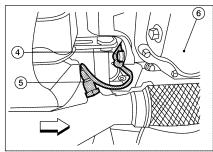
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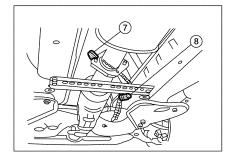
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- 1. Exhaust manifold cover
- 4. Heated oxygen sensor 2 harness connector
- 7. Heated oxygen sensor 3
- 2. Air fuel ratio (A/F) sensor 1
- 5. Heated oxygen sensor 2
- 8. Heated oxygen sensor 3 harness connector

C: Vehicle front

## **Component Description**

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| Component           | Reference             |
|---------------------|-----------------------|
| A/F sensor 1        | EC-179. "Description" |
| A/F sensor 1 heater | EC-130, "Description" |

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Ν З. Air fuel ratio (A/F) sensor 1 harness connector Oil pan 6.

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#### < FUNCTION DIAGNOSIS >

| Component   | Reference                   |
|---|-----------------------------|
| ASCD brake switch                                 | EC-345, "Description"       |
| ASCD steering switch                              | EC-342, "Description"       |
| Camshaft position sensor (PHASE)                  | EC-255, "Description"       |
| Crankshaft position sensor (POS)                  | EC-251, "Description"       |
| Cooling fan motor                                 | EC-382, "Description"       |
| Electric throttle control actuator                | EC-365, "Description"       |
| Engine coolant temperature sensor                 | EC-166, "Description"       |
| EVAP canister purge volume control solenoid valve | EC-268, "Description"       |
| EVAP canister vent control valve                  | EC-276, "Description"       |
| EVAP control system pressure sensor               | EC-284, "Description"       |
| Fuel injector                                     | EC-237, "Description"       |
| Fuel level sensor                                 | EC-304, "Description"       |
| Fuel pump   | EC-386, "Description"       |
| Fuel tank temperature sensor                      | EC-231, "Description"       |
| Heated oxygen sensor 2                            | EC-195, "Description"       |
| Heated oxygen sensor 2 heater                     | EC-133, "Description"       |
| Heated oxygen sensor 3                            | EC-212, "Description"       |
| Heated oxygen sensor 3 heater                     | EC-137, "Description"       |
| Ignition signal                                   | EC-390, "Description"       |
| Intake air temperature sensor                     | EC-161, "Description"       |
| Intake valve timing control solenoid valve        | EC-74, "System Description" |
| Knock sensor                                      | EC-249, "Description"       |
| Mass air flow sensor                              | EC-144, "Description"       |
| PCV valve   | EC-401, "Description"       |
| Refrigerant pressure sensor                       | EC-402, "Description"       |
| Stop lamp switch                                  | EC-353, "Description"       |
| Throttle control motor                            | EC-362, "Description"       |
| Throttle control motor relay                      | EC-356, "Description"       |
| Throttle position sensor                          | EC-169, "Description"       |

#### < FUNCTION DIAGNOSIS >

# MULTIPORT FUEL INJECTION SYSTEM

## System Diagram

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|---|---|
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| 1 |   |
|   |   |

INFOID:000000005441654

[QR25DE]

| Crankshaft position sensor (POS)  | Engine speed & Piston position  |       |                                |               |  |
|-----------------------------------|---|-------|--------------------------------|---------------|--|
| Camshaft position sensor (PHASE)  |   |       |                                |               |  |
| Mass air flow sensor              | Amount of intake air  | •     |                                |               |  |
| Intake air temperature sensor     | Intake air temperature  | •     |                                |               |  |
| Engine coolant temperature sensor | Engine coolant temperature  | •     |                                |               |  |
| Air fuel ratio (A/F) sensor 1     | Density of oxygen in exhaust gas  | •     |                                |               |  |
| Throttle position sensor          | Throttle position   | •     |                                |               |  |
| Battery                           | Battery voltage   | •     | Fuel injection & mixture ratio |               |  |
| Knock sensor                      | Engine knocking condition   | ► ECM | control                        | Fuel injector |  |
| Heated oxygen sensor 2*           | Density of oxygen in exhaust gas  | •     |                                |               |  |
| Brake ECU                         | Vehicle speed   | ▶     |                                |               |  |
|                                   | Vehicle speed<br>Accelerator pedal position<br>Shift position   |       |                                |               |  |
|                                   | Engine operation command<br>/ Engine start request<br>Engine idle request<br>Fuel cut request<br>Engine power request |       |                                |               |  |
| Hybrid vehicle control ECU        | Engine speed request etc.   | •     |                                |               |  |
|                                   | e engine system under normal conditions   | •     |                                |               |  |
| This signal is sent through CA    | N communication line.   |       |                                | JMBIA0457GB   |  |

## System Description

INFOID:000000005441655

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

| Sensor                            | Input Signal to ECM   | ECM function    | Actuator      |   |
|-----------------------------------|---|-----------------|---------------|---|
| Crankshaft position sensor (POS)  | Engine speed  |                 |               | _ |
| 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   | 1               |               |   |
| Battery                           | Battery voltage   | Fuel injection  |               |   |
| Knock sensor                      | Engine knocking condition   | & mixture ratio | Fuel injector |   |
| Heated oxygen sensor 2*1          | Density of oxygen in exhaust gas  | control         |               |   |
| Brake ECU                         | Vehicle speed*2   | -               |               |   |
|                                   | Vehicle speed*2   | -               |               |   |
|                                   | Accelerator pedal position*2  | -               |               |   |
| Hybrid vehicle control ECU        | Shift position* <sup>2</sup>  | -               |               |   |
|                                   | Engine operation command* <sup>2</sup><br>(Engine start request, Engine idle re-<br>quest, Fuel cut request, Engine power<br>request, Engine speed request, etc.) |                 |               |   |

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

**EC-27** 

#### < FUNCTION DIAGNOSIS >

[QR25DE]

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

#### SYSTEM DESCRIPTION

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

#### VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

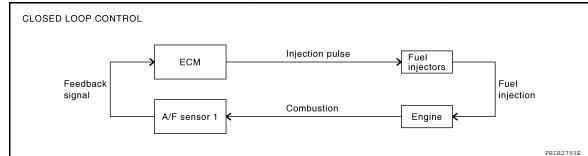
#### <Fuel increase>

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

<Fuel decrease>

- During deceleration
- During high engine speed operation

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



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses A/F sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about A/F sensor 1, refer to <u>EC-179</u>, "<u>DTC Logic</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 (manifold). Even if the switching characteristics of A/F sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

Open Loop Control

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

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

#### MIXTURE RATIO SELF-LEARNING CONTROL

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

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#### 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.

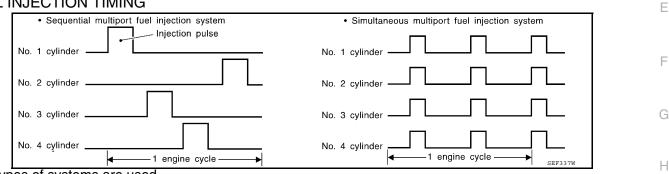
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"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 long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

#### FUEL INJECTION TIMING



Two types of systems are used.

- Sequential Multiport Fuel Injection System Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.
- Simultaneous Multiport Fuel Injection System
  Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals
  of the same width are simultaneously transmitted from the ECM.
  The four injectors will then receive the signals two times for each engine cycle.
  This system is used 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 receiving the fuel cut request signal from hybrid vehicle control ECU.

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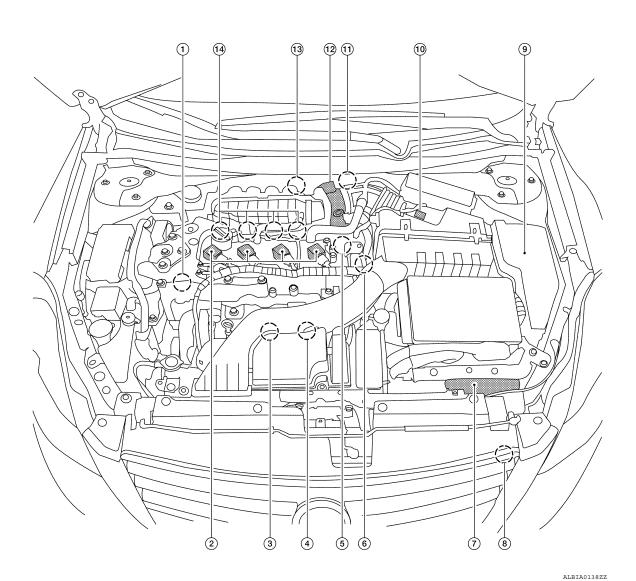
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## **Component Parts Location**



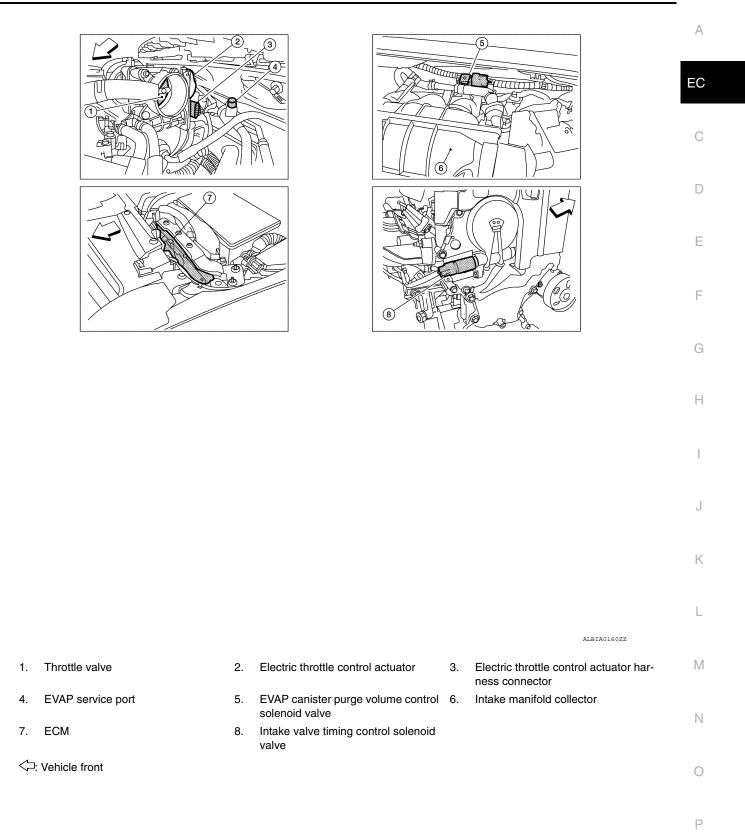
- 1. Intake valve timing control solenoid 2. valve
- 4. Air fuel ratio (A/F) sensor 1
- 7. ECM
- 10. Mass air flow sensor (with intake temperature sensor)
- 13. EVAP canister purge volume control 14. Fuel injector solenoid valve
- Ignition coil (with power transistor) and spark plug
- 5. Camshaft position sensor (PHASE)
- 8. Refrigerant pressure sensor
- 11. EVAP service port
- Knock sensor, Crankshaft position sensor (POS)
  - Engine coolant temperature sensor
- 9. IPDM E/R

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12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)

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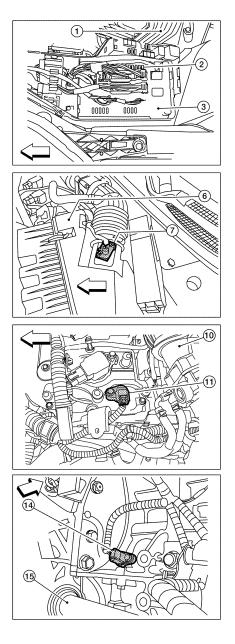
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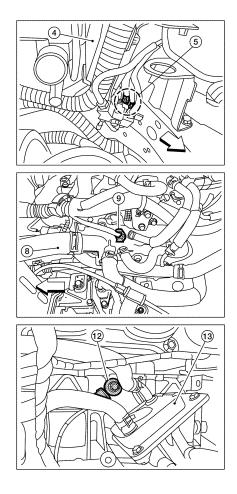
## **MULTIPORT FUEL INJECTION SYSTEM**

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- 1. Air cleaner assembly
- 4. EPS control unit (view with air cleaner assembly removed)
- 7. Mass air flow sensor (with intake temperature sensor)
- 10. Intake manifold collector
- 13. Engine oil cooler
- C: Vehicle front

- 2. Fuel pump fuse
- 5. Engine grounds
- 8. Upper radiator hose
- 11. Camshaft position sensor (PHASE)
- 14. Crankshaft position sensor (POS)

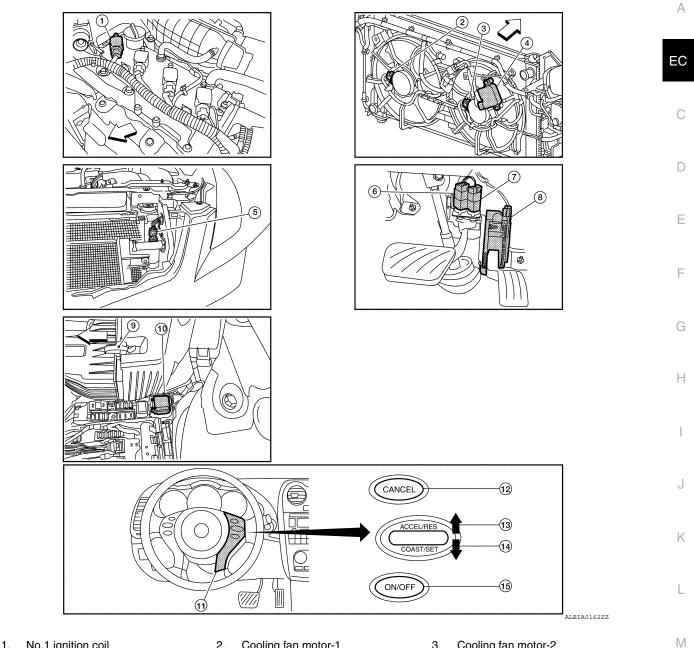


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- 3. IPDM E/R
- 6. Air cleaner assembly
- 9. Engine coolant temperature sensor
- 12. Knock sensor
- 15. Drive shaft RH

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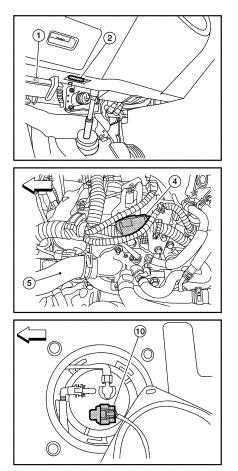
- No.1 ignition coil 1.
- Cooling fan control module 4.
- 7. ASCD brake switch
- 10. Cooling fan relay-1
- 13. RESUME/ACCELERATE switch
- C: Vehicle front

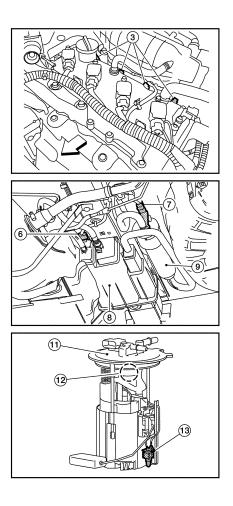
- 2. Cooling fan motor-1
- Refrigerant pressure sensor 5.
- 8. Accelerator pedal position sensor
- ASCD steering switch 11.
- 14. SET/COAST switch
- Cooling fan motor-2 З.
- 6. Stop lamp switch
- 9. Air cleaner assembly
- 12. CANSEC switch
- 15. MAIN switch

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- Hood opener handle 1.
- Condenser-2 4.
- 7. EVAP canister vent control valve
- 10. Fuel level sensor unit and fuel pump 11. Fuel pump assembly harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
- 13. Fuel tank temperature sensor
- : Vehicle front

- Data link connector 2.
- 5. Upper radiator hose
- 8. EVAP canister (MAIN)



- Fuel injector harness connector З.
- 6. EVAP control system pressure sensor
- EVAP canister (SUB) 9.
- 12. Fuel pressure regulator

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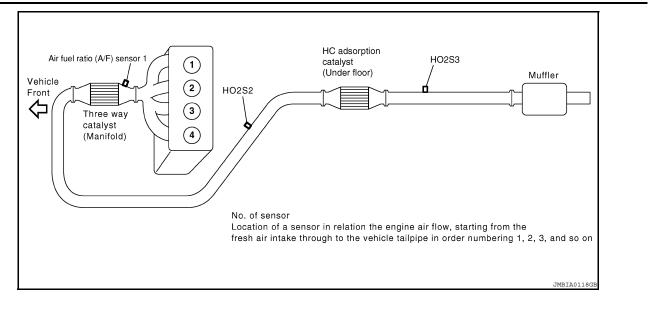
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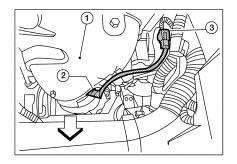
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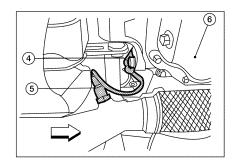
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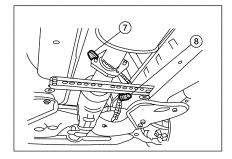




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connector Oil pan



- 1. Exhaust manifold cover
- 4. Heated oxygen sensor 2 harness connector
- 7. Heated oxygen sensor 3
- 2. Air fuel ratio (A/F) sensor 1
- 5. Heated oxygen sensor 2
- 8. Heated oxygen sensor 3 harness connector

C: Vehicle front

## **Component Description**

INFOID:000000005441657

| Component                        | Reference             |
|----------------------------------|-----------------------|
| A/F sensor 1                     | EC-179, "Description" |
| Camshaft position sensor (PHASE) | EC-255, "Description" |

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Air fuel ratio (A/F) sensor 1 harness

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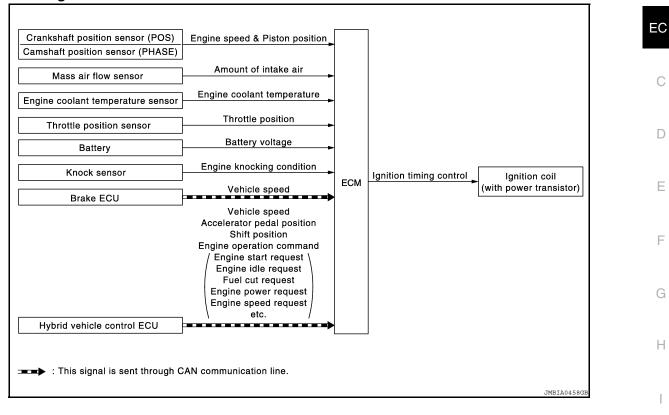
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| Component                         | Reference             |
|-----------------------------------|-----------------------|
| Crankshaft position sensor (POS)  | EC-251, "Description" |
| Engine coolant temperature sensor | EC-166, "Description" |
| Fuel injector                     | EC-237, "Description" |
| Heated oxygen sensor 2            | EC-133, "Description" |
| Intake air temperature sensor     | EC-161, "Description" |
| Knock sensor                      | EC-249, "Description" |
| Mass air flow sensor              | EC-144, "Description" |
| Throttle position sensor          | EC-169, "Description" |
| Vehicle speed sensor              | EC-310, "Description" |

#### < FUNCTION DIAGNOSIS >

# **ELECTRIC IGNITION SYSTEM**

### System Diagram



### System Description

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

| Sensor                            | Input Signal to ECM   | ECM function                                    | Actuator                                   |
|-----------------------------------|---|---|--|
| Crankshaft position sensor (POS)  | Engine speed  |   |  |
| 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   | _   |  |
| Battery                           | Battery voltage   | _   |  |
| Knock sensor                      | Engine knocking   |   | Institute and (with new or transie         |
| Brake ECU                         | Vehicle speed*  | <ul> <li>Ignition timing<br/>control</li> </ul> | Ignition coil (with power transis-<br>tor) |
|                                   | Vehicle speed*  | _   | ,  |
|                                   | Accelerator pedal position*   |   |  |
|                                   | Shift position*   |   |  |
| Hybrid vehicle control ECU        | Engine operation command*<br>(Engine start request, Engine idle<br>request, Fuel cut request, Engine<br>power request, Engine speed re-<br>quest, etc.) |   |  |

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

SYSTEM DESCRIPTION Firing order: 1 - 3 - 4 - 2

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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.

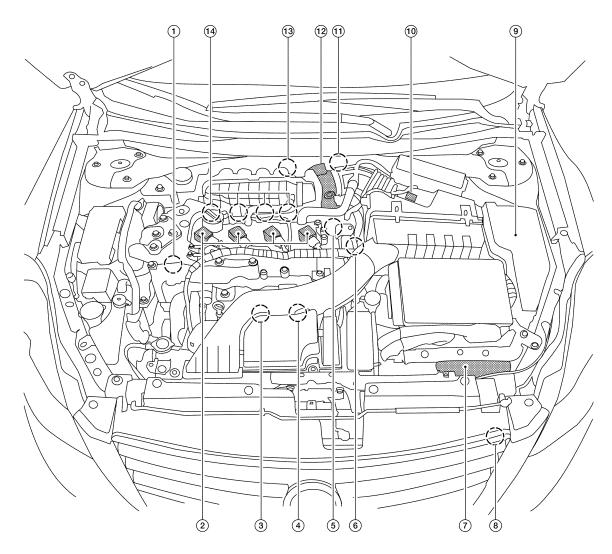
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- 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 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**

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### **ELECTRIC IGNITION SYSTEM**

Ignition coil (with power transistor)

#### [QR25DE]

1. Intake valve timing control solenoid valve

Mass air flow sensor (with intake

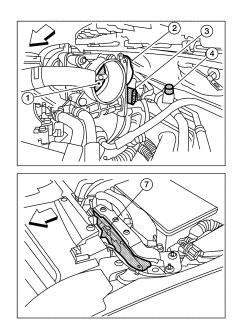
valve and spark plug Air fuel ratio (A/F) sensor 1 5. Camshaft posit

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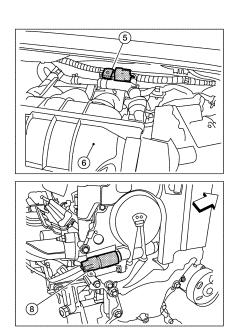
- Camshaft position sensor (PHASE)
   Refrigerant pressure sensor
  - 11. EVAP service port
- Knock sensor, Crankshaft position sensor (POS)

Engine coolant temperature sensor

- Engine coo
   IPDM E/R
- 12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)



13. EVAP canister purge volume control 14. Fuel injector



1. Throttle valve

- 4. EVAP service port
- 7. ECM
- C: Vehicle front

**Revision: September 2009** 

Intake valve timing control solenoid

Electric throttle control actuator

solenoid valve

valve

EVAP canister purge volume control 6.

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Electric throttle control actuator har-

ness connector

Intake manifold collector

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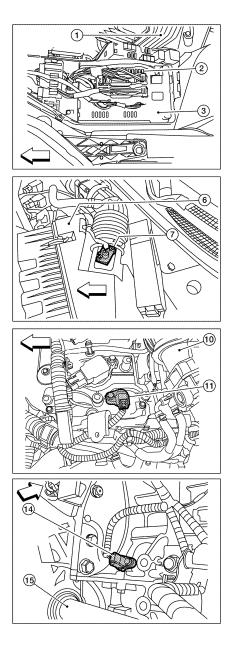
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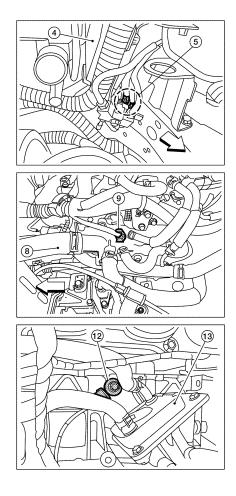
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#### < FUNCTION DIAGNOSIS >



- 1. Air cleaner assembly
- 4. EPS control unit (view with air cleaner assembly removed)
- 7. Mass air flow sensor (with intake temperature sensor)
- 10. Intake manifold collector
- 13. Engine oil cooler
- C: Vehicle front

- 2. Fuel pump fuse
- 5. Engine grounds
- 8. Upper radiator hose
- 11. Camshaft position sensor (PHASE)
- 14. Crankshaft position sensor (POS)

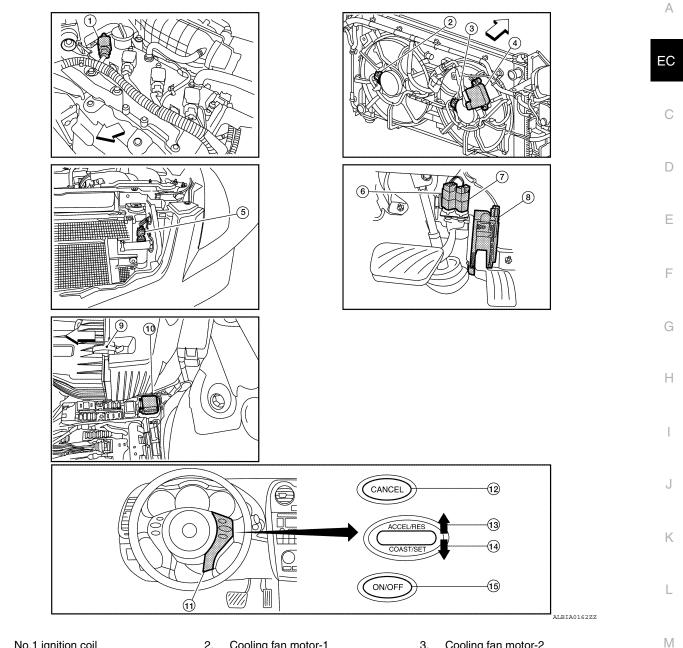


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- 3. IPDM E/R
- 6. Air cleaner assembly
- 9. Engine coolant temperature sensor
- 12. Knock sensor
- 15. Drive shaft RH

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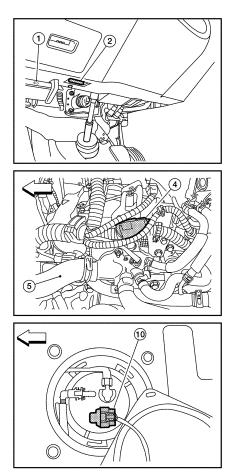


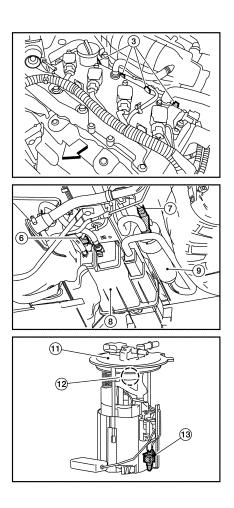
- No.1 ignition coil 1.
- Cooling fan control module 4.
- 7. ASCD brake switch
- 10. Cooling fan relay-1
- 13. RESUME/ACCELERATE switch
- C: Vehicle front

- 2. Cooling fan motor-1
- Refrigerant pressure sensor 5.
- 8. Accelerator pedal position sensor
- 11. ASCD steering switch
- 14. SET/COAST switch
- Cooling fan motor-2 З.
- 6. Stop lamp switch
- 9. Air cleaner assembly
- 12. CANSEC switch
- 15. MAIN switch

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- Hood opener handle 1.
- Condenser-2 4.
- 7. EVAP canister vent control valve
- 10. Fuel level sensor unit and fuel pump 11. Fuel pump assembly harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
- 13. Fuel tank temperature sensor
- : Vehicle front

- Data link connector 2.
- 5. Upper radiator hose
- 8. EVAP canister (MAIN)



- Fuel injector harness connector З.
- 6. EVAP control system pressure sensor
- EVAP canister (SUB) 9.
- 12. Fuel pressure regulator

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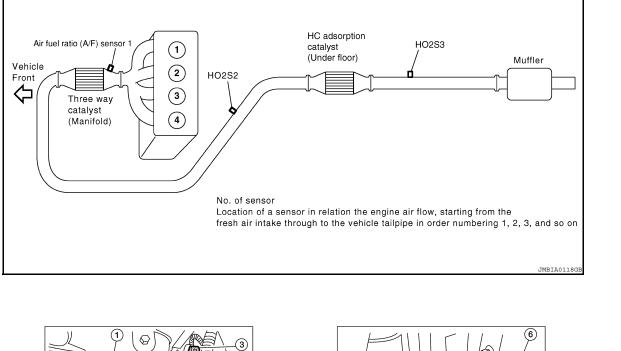
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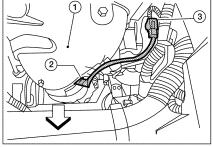
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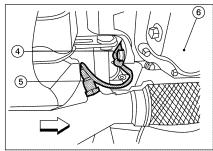
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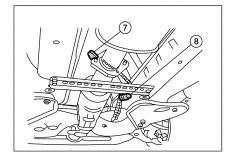




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connector Oil pan



- 1. Exhaust manifold cover
- 4. Heated oxygen sensor 2 harness connector
- 7. Heated oxygen sensor 3
- 2. Air fuel ratio (A/F) sensor 1
- 5. Heated oxygen sensor 2
- 8. Heated oxygen sensor 3 harness connector

C: Vehicle front

### **Component Description**

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Air fuel ratio (A/F) sensor 1 harness

| Component                        | Reference             |
|----------------------------------|-----------------------|
| Camshaft position sensor (PHASE) | EC-255. "Description" |
| Crankshaft position sensor (POS) | EC-251, "Description" |

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| Component                         | Reference             |
|-----------------------------------|-----------------------|
| Engine coolant temperature sensor | EC-166, "Description" |
| Ignition signal                   | EC-390, "Description" |
| Knock sensor                      | EC-249, "Description" |
| Mass air flow sensor              | EC-144, "Description" |
| Throttle position sensor          | EC-169, "Description" |
| Vehicle speed sensor              | EC-310, "Description" |

#### < FUNCTION DIAGNOSIS >

# AUTOMATIC SPEED CONTROL DEVICE (ASCD)

### System Diagram

| Stop lamp switch       | Brake pedal operation       | •      | CRUISE/SET lamp operation                    | Combination |
|------------------------|-----------------------------|--------|--|-------------|
| ASCD brake switch      | Brake pedal operation       | -      |  | meter       |
| Accelerator pedal      | Accelerator pedal operation | -      | Torque request                               |             |
| Position sensor        |                             | HV ECU |  | MG2         |
| nsmission range switch | Gear position               | •      |  |             |
| MG ECU                 | MG2 speed                   |        |  |             |
|                        | ☐ Brake pedal operation     |        | ASCD request                                 |             |
| Brake ECU              |                             | •      |  |             |
| Ctop lown owitch       | Brake pedal operation       |        |  |             |
| Stop lamp switch       |                             | ]      | Vehicle speed                                |             |
| ASCD brake switch      | Brake pedal operation       | -      | Engine power request<br>Engine speed request |             |
|                        | ASCD steering switch        | ЕСМ    | <b>4</b>                                     |             |
| SCD steering switch    | operation                   |        |  | Electric    |
| Brake ECU              | Vehicle speed               | -      | Operation                                    | control     |
| Diako E00              |                             | 1      |  | actuator    |

### System Description

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

| Input                             |                                |        | ECU Output       |                |                                    | out |           |                                 |  |
|-----------------------------------|--------------------------------|--------|------------------|----------------|------------------------------------|-----|-----------|---------------------------------|--|
| Sensor                            | Signal                         |        |                  | ECO            | Signal                             |     |           | Actuator                        |  |
| Stop lamp switch                  | Brake pedal operation          |        |                  |                | CRUISE lamp operation*             |     |           | Combina-                        |  |
| ASCD brake switch                 | Brake pedal operation          |        |                  |                | SET lamp operati                   | on* |           | tion meter                      |  |
| Accelerator pedal position sensor | Accelerator pedal opera        | ition  |                  |                |                                    |     |           |                                 |  |
| Transmission range switch         | Gear position                  | Hybrid |                  |                | Torque request MG<br>ECU Operation |     |           | MG1<br>MG2                      |  |
| MG ECU                            | MG2 speed                      |        |                  | vehicle        |                                    |     |           |                                 |  |
| Brake ECU                         | Brake pedal operation*         |        |                  | control<br>ECU |                                    |     |           |                                 |  |
| Stop lamp switch                  | Brake pedal operation          |        |                  |                | Vahiele eneed*                     |     |           |                                 |  |
| ASCD brake switch                 | Brake pedal operation          |        |                  |                | Vehicle speed*<br>Engine power     | FOM |           | Electric                        |  |
| ASCD steering switch              | ASCD steering switch operation | ECM    | ASCD<br>request* |                | request*<br>Engine speed           | ECM | Operation | throttle<br>control<br>actuator |  |
| Brake ECU                         | Vehicle speed*                 |        |                  |                | request*                           |     |           |                                 |  |

\*: This signal is sent through CAN communication line.

#### BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.

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



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ECM controls throttle angle of electric throttle control actuator to regulate engine speed. The ASCD operation status is indicated by two indicators (CRUISE and SET on the information display) on the combination meter. If any malfunction occurs in ASCD system, SET indicator blinks and ASCD control is deactivated.

#### NOTE:

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

#### SET OPERATION

Press MAIN switch. (CRUISE is indicated on the information display.)

When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH), press SET/COAST switch. (Then SET is indicated on the information display.)

#### ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system. And then ASCD will keep the new set speed.

#### CANCEL OPERATION

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

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

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

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

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

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

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

#### COAST OPERATION

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

#### **RESUME OPERATION**

When the RESUME/ACCELERATE switch is pressed after 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
- Selector lever is in other than P and N positions
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (89 MPH)

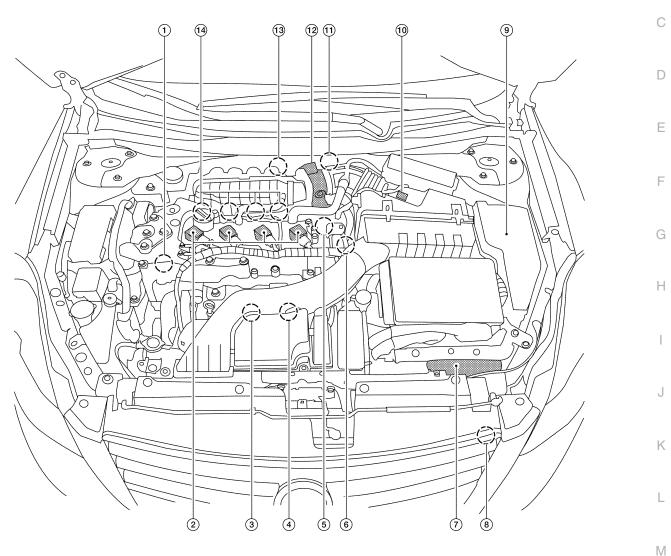
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### **Component Parts Location**

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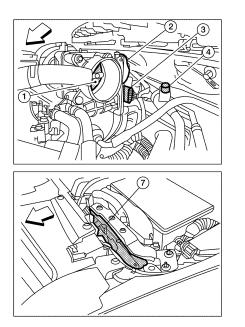
- 1. Intake valve timing control solenoid 2. valve
- 4. Air fuel ratio (A/F) sensor 1
- 7. ECM
- 10. Mass air flow sensor (with intake temperature sensor)
- 13. EVAP canister purge volume control 14. Fuel injector solenoid valve
- Ignition coil (with power transistor) and spark plug
- 5. Camshaft position sensor (PHASE)
- 8. Refrigerant pressure sensor
- 11. EVAP service port
- Knock sensor, Crankshaft position sensor (POS)
  Engine coolant temperature sensor
  IPDM E/R
  Electric throttle control actuator (with built in throttle position sensor and throttle control motor)

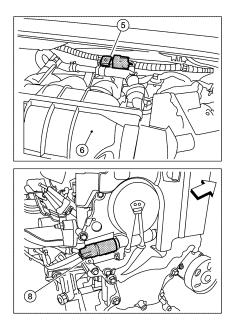
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- 1. Throttle valve
- 4. EVAP service port
- 7. ECM
- C: Vehicle front

- 2. Electric throttle control actuator
- 5. EVAP canister purge volume control 6. solenoid valve
- 8. Intake valve timing control solenoid valve
- 3. Electric throttle control actuator harness connector
  - Intake manifold collector

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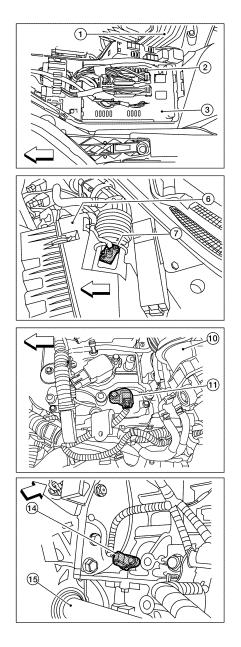
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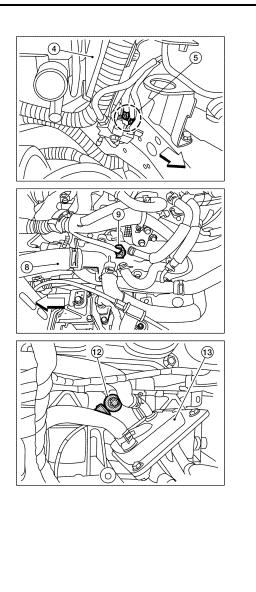
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- 1. Air cleaner assembly
- EPS control unit (view with air cleaner assembly removed)
- 7. Mass air flow sensor (with intake temperature sensor)
- 10. Intake manifold collector
- 13. Engine oil cooler
- C: Vehicle front

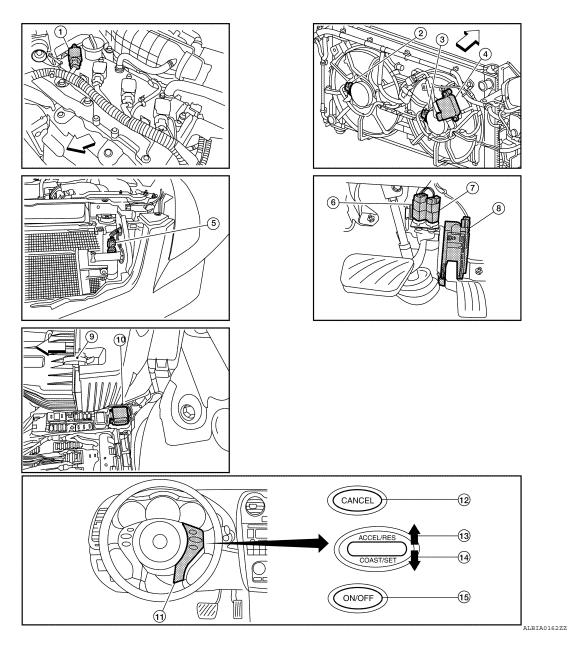
- 2. Fuel pump fuse
- 5. Engine grounds
- 8. Upper radiator hose
- 11. Camshaft position sensor (PHASE)
- 14. Crankshaft position sensor (POS)



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| 3.  | IPDM E/R                          | M      |
|-----|-----------------------------------|--------|
| 6.  | Air cleaner assembly              |        |
|     |                                   | N      |
| 9.  | Engine coolant temperature sensor | IN     |
|     |                                   |        |
| 12. | Knock sensor                      | $\cap$ |
| 15. | Drive shaft RH                    | 0      |
|     |                                   |        |

#### < FUNCTION DIAGNOSIS >



- 1. No.1 ignition coil
- 4. Cooling fan control module
- 7. ASCD brake switch
- 10. Cooling fan relay-1
- 13. RESUME/ACCELERATE switch
- C: Vehicle front

- 2. Cooling fan motor-1
- 5. Refrigerant pressure sensor
- 8. Accelerator pedal position sensor
- 11. ASCD steering switch
- 14. SET/COAST switch
- 3. Cooling fan motor-2
- 6. Stop lamp switch
- 9. Air cleaner assembly
- 12. CANSEC switch
- 15. MAIN switch

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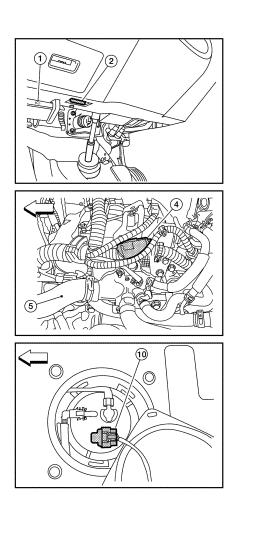
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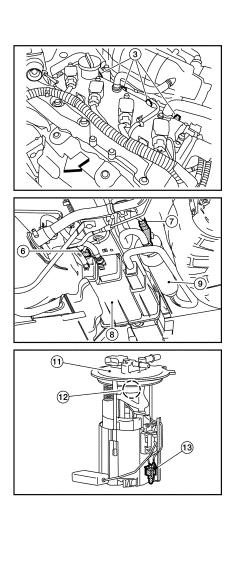
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- ALBIA0173ZZ
- Μ Fuel injector harness connector З. 6. EVAP control system pressure sen-
- sor
- 9. EVAP canister (SUB)
- 12. Fuel pressure regulator

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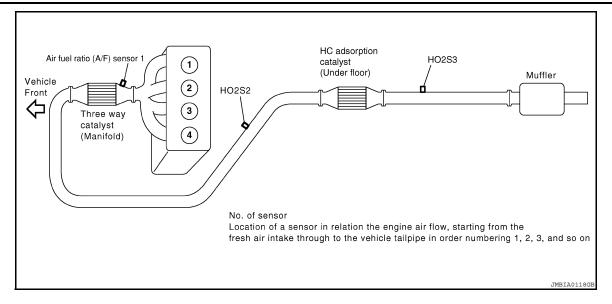
Ρ

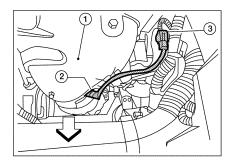
- Hood opener handle 1.
- Condenser-2 4.
- 7. EVAP canister vent control valve
- 10. Fuel level sensor unit and fuel pump 11. Fuel pump assembly harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
- 13. Fuel tank temperature sensor
- : Vehicle front

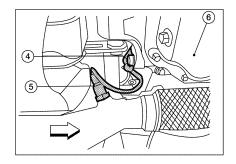
- 2. Data link connector
- 5. Upper radiator hose
- 8. EVAP canister (MAIN)

#### < FUNCTION DIAGNOSIS >







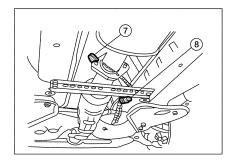


З.

6.

connector

Oil pan



- 1. Exhaust manifold cover
- 4. Heated oxygen sensor 2 harness connector
- 7. Heated oxygen sensor 3
- 2. Air fuel ratio (A/F) sensor 1
- 5. Heated oxygen sensor 2
- 8. Heated oxygen sensor 3 harness connector

C: Vehicle front

### **Component Description**

INFOID:000000005441665

ALBIA0272ZZ

Air fuel ratio (A/F) sensor 1 harness

| Component            | Reference                                     |  |  |
|----------------------|---|--|--|
| ASCD steering switch | EC-342, "Description"                         |  |  |
| ASCD brake switch    | HBC-460, "Description", EC-345, "Description" |  |  |

**Revision: September 2009** 



2010 Altima HEV

#### < FUNCTION DIAGNOSIS >

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| Component                          | Reference   |    |
|------------------------------------|---|----|
| Stop lamp switch                   | HBC-465, "Description", EC-353, "Description"           | А  |
| Electric throttle control actuator | EC-365, "Description"                                   |    |
| MG1, MG2                           | HBC-39, "MG1 AND MG2 MAIN CONTROL : System Description" | EC |
| ASCD indicator                     | HBC-566. "Description"                                  |    |

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### 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.

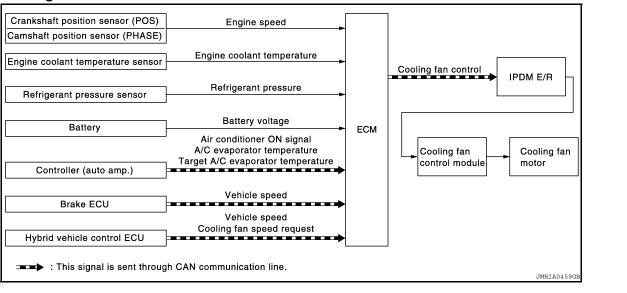
Refer to LAN-28. "CAN Communication Signal Chart", about CAN communication for detail.

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#### < FUNCTION DIAGNOSIS >

# COOLING FAN CONTROL

### System Diagram



### System Description

INPUT/OUTPUT SIGNAL CHART

| Sensor   | Input signal to ECM                | ECM function | Actuator                        |
|--|------------------------------------|--------------|---------------------------------|
| Crankshaft position sensor (POS)<br>Camshaft position sensor (PHASE) | Engine speed                       |              |                                 |
| Engine coolant temperature sensor                                    | Engine coolant temperature         | _            |                                 |
| Refrigerant pressure sensor  | Refrigerant pressure               | _            |                                 |
| Battery  | Battery voltage                    | _            | IPDM E/R                        |
| Controller (auto amp.)   | Air conditioner ON signal*         | Cooling fan  | Cooling fan control module<br>↓ |
|  | A/C evaporator temperature*        | - control    |                                 |
|  | Target A/C evaporator temperature* | _            | Cooling fan motor               |
| Brake ECU  | Vehicle speed*                     |              |                                 |
| Hybrid yobiolo control FCU   | Vehicle speed*                     |              |                                 |
| Hybrid vehicle control ECU   | Cooling fan speed request*         | _            |                                 |

\*: This signal is sent to ECM through 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, A/C evaporator temperature and cooling fan speed request from hybrid vehicle control ECU.

Cooling fan control signal is sent to IPDM E/R from ECM by CAN communication line. Then, IPDM E/R sends ON/OFF pulse duty signal to cooling fan control module. Corresponding to this ON/OFF pulse duty signal, cooling fan control module gives cooling fan motor operating voltage to cooling fan motors. Cooling fan speed is controlled by duty cycle of cooling fan motor operating voltage sent from cooling fan control module.

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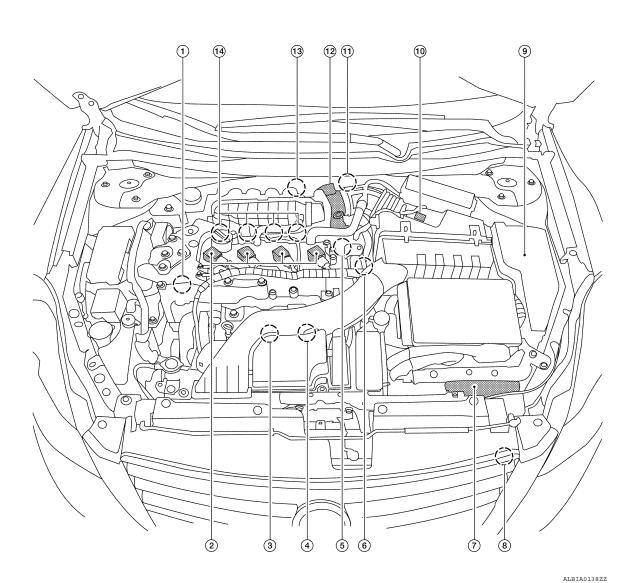
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#### < FUNCTION DIAGNOSIS >

### **Component Parts Location**

[QR25DE]



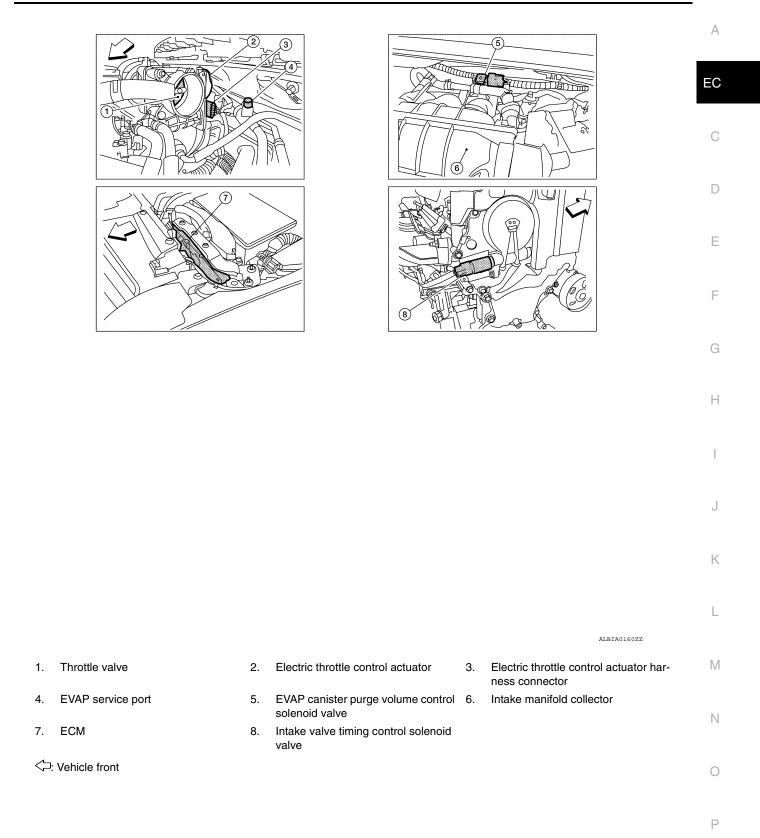
- 1. Intake valve timing control solenoid 2. valve
- 4. Air fuel ratio (A/F) sensor 1
- 7. ECM
- 10. Mass air flow sensor (with intake temperature sensor)
- 13. EVAP canister purge volume control 14. Fuel injector solenoid valve
- Ignition coil (with power transistor) and spark plug
- 5. Camshaft position sensor (PHASE)
- 8. Refrigerant pressure sensor
- 11. EVAP service port
- Knock sensor, Crankshaft position sensor (POS)
  - Engine coolant temperature sensor
- 9. IPDM E/R

6.

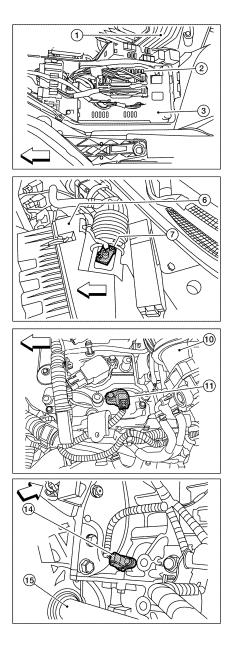
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)

#### < FUNCTION DIAGNOSIS >

### [QR25DE]

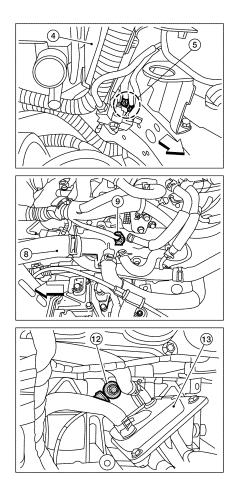


#### < FUNCTION DIAGNOSIS >



- 1. Air cleaner assembly
- 4. EPS control unit (view with air cleaner assembly removed)
- 7. Mass air flow sensor (with intake temperature sensor)
- 10. Intake manifold collector
- 13. Engine oil cooler
- C: Vehicle front

- 2. Fuel pump fuse
- 5. Engine grounds
- 8. Upper radiator hose
- 11. Camshaft position sensor (PHASE)
- 14. Crankshaft position sensor (POS)

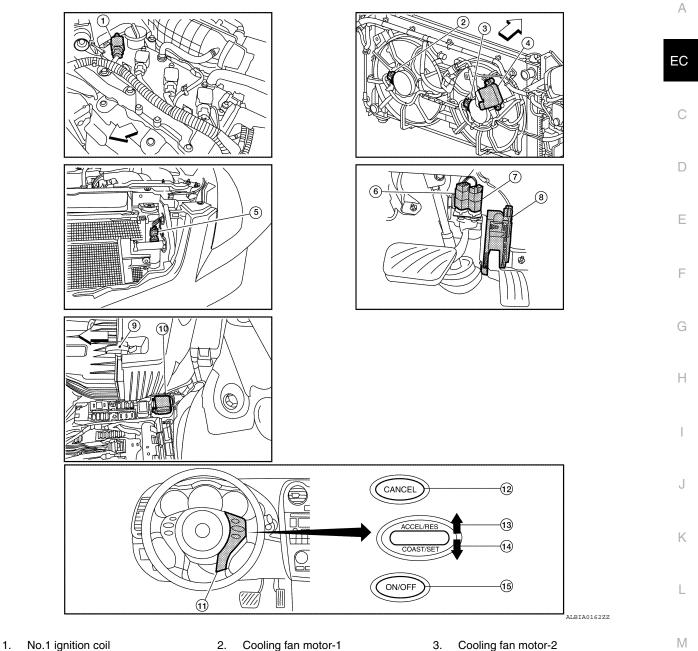


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- 3. IPDM E/R
- 6. Air cleaner assembly
- 9. Engine coolant temperature sensor
- 12. Knock sensor
- 15. Drive shaft RH

#### < FUNCTION DIAGNOSIS >

### [QR25DE]



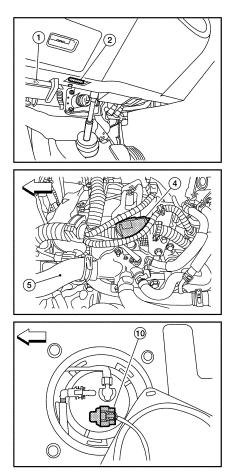
- 4. Cooling fan control module
- 7. ASCD brake switch
- 10. Cooling fan relay-1
- 13. RESUME/ACCELERATE switch
- C: Vehicle front

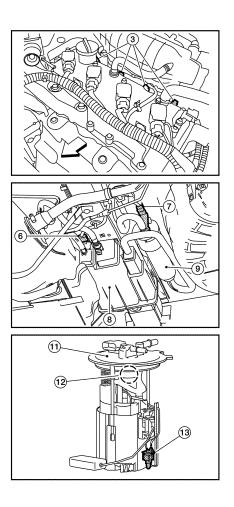
- 5. Refrigerant pressure sensor
- 8. Accelerator pedal position sensor
- 11. ASCD steering switch
- 14. SET/COAST switch
- 6. Stop lamp switch
- 9. Air cleaner assembly
- 12. CANSEC switch
- 15. MAIN switch

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- Hood opener handle 1.
- Condenser-2 4.
- 7. EVAP canister vent control valve
- 10. Fuel level sensor unit and fuel pump 11. Fuel pump assembly harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
- 13. Fuel tank temperature sensor
- $\triangleleft$ : Vehicle front

- Data link connector 2.
- 5. Upper radiator hose
- 8. EVAP canister (MAIN)



- Fuel injector harness connector 3.
- 6. EVAP control system pressure sensor
- EVAP canister (SUB) 9.
- 12. Fuel pressure regulator

#### < FUNCTION DIAGNOSIS >

#### [QR25DE]

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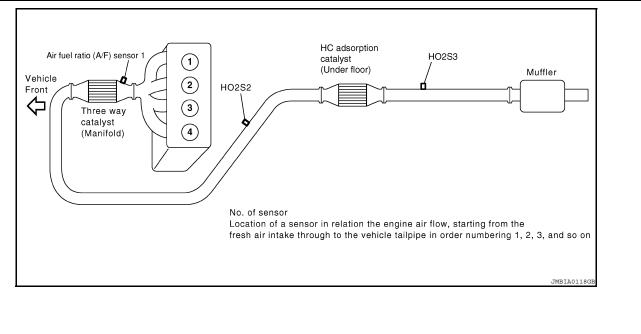
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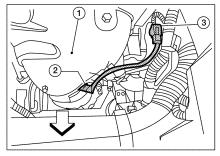
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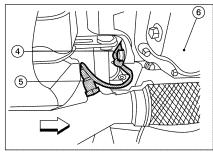
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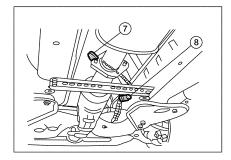
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- 1. Exhaust manifold cover
- 4. Heated oxygen sensor 2 harness connector
- 7. Heated oxygen sensor 3
- 2. Air fuel ratio (A/F) sensor 1
- 5. Heated oxygen sensor 2
- 8. Heated oxygen sensor 3 harness connector

C: Vehicle front

### **Component Description**

INFOID:000000005441670

| Component                        | Reference             |
|----------------------------------|-----------------------|
| Camshaft position sensor (PHASE) | EC-255. "Description" |
| Crankshaft position sensor (POS) | EC-251, "Description" |



2010 Altima HEV

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- ALBIA0272ZZ
- Air fuel ratio (A/F) sensor 1 harness connector
   Oil pan

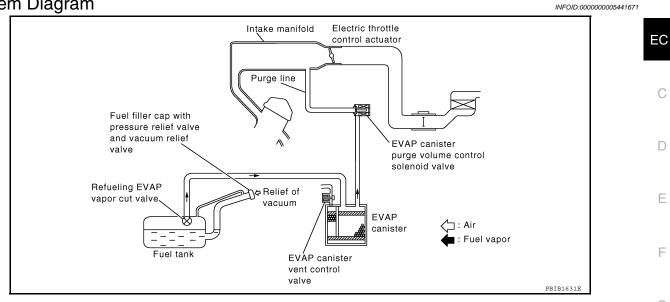
#### < FUNCTION DIAGNOSIS >

| Component                         | Reference             |
|-----------------------------------|-----------------------|
| Cooling fan control module        | EC-382, "Description" |
| Cooling fan motor                 | EC-382, "Description" |
| Engine coolant temperature sensor | EC-166, "Description" |
| Refrigerant pressure sensor       | EC-402, "Description" |

#### < FUNCTION DIAGNOSIS >

# **EVAPORATIVE EMISSION SYSTEM**

### System Diagram



EVAPORATIVE EMISSION LINE DRAWING

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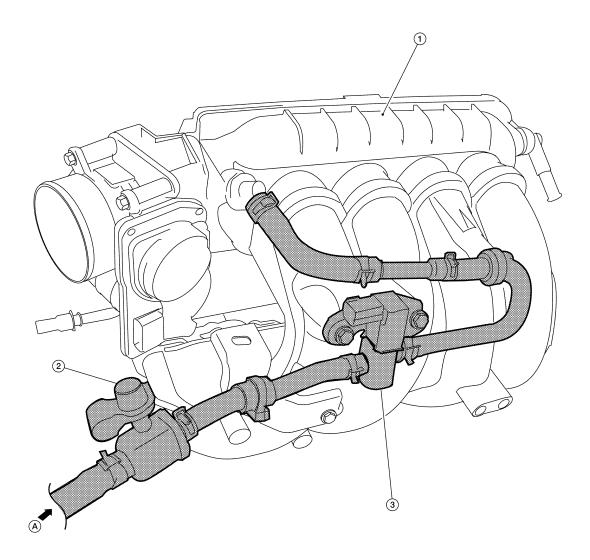
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[QR25DE]



Intake manifold collector

2. EVAP service port

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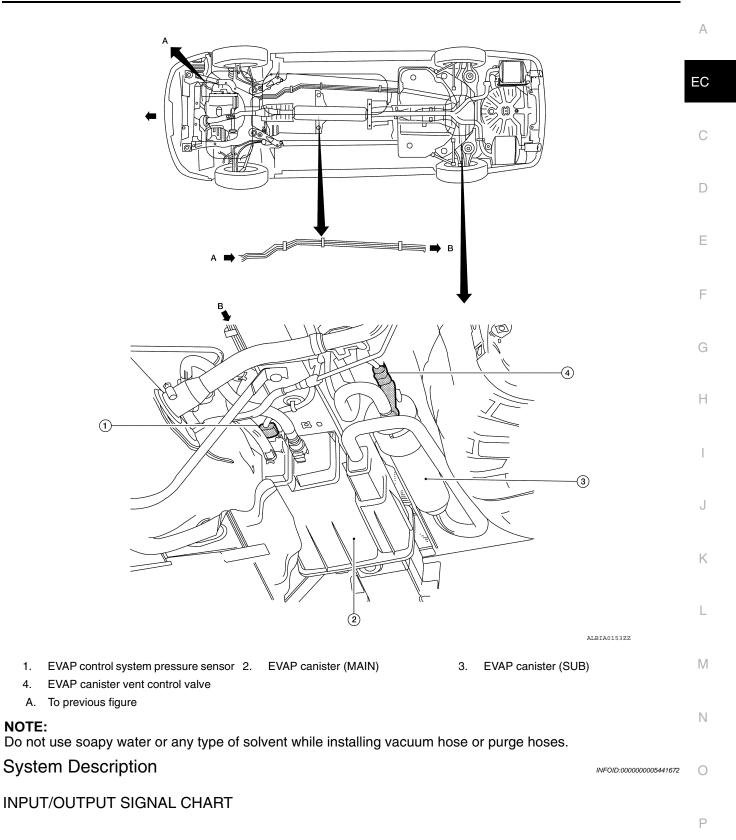
A. From next figure

1.

3. EVAP canister purge volume control solenoid valve

< FUNCTION DIAGNOSIS >

[QR25DE]



#### < FUNCTION DIAGNOSIS >

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

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

#### SYSTEM DESCRIPTION

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

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

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

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

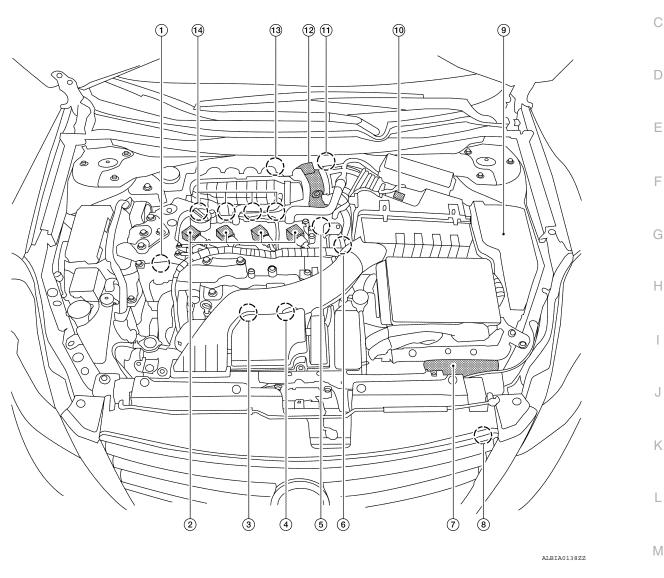
#### < FUNCTION DIAGNOSIS >

### **Component Parts Location**

## [QR25DE]

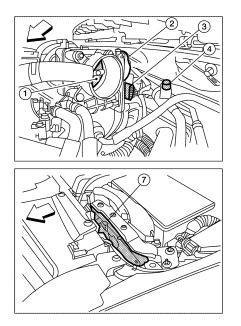
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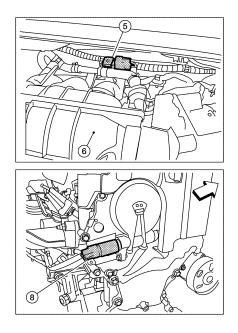
EC



- 1. Intake valve timing control solenoid 2. valve
- 4. Air fuel ratio (A/F) sensor 1
- 7. ECM
- 10. Mass air flow sensor (with intake temperature sensor)
- 13. EVAP canister purge volume control 14. Fuel injector solenoid valve
- Ignition coil (with power transistor) and spark plug
- 5. Camshaft position sensor (PHASE)
- 8. Refrigerant pressure sensor
- 11. EVAP service port
- 3. Knock sensor, Crankshaft position sensor (POS)
  6. Engine coolant temperature sensor
  9. IPDM E/R
  12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
  - Ρ

#### < FUNCTION DIAGNOSIS >





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- 1. Throttle valve
- 4. EVAP service port
- 7. ECM
- C: Vehicle front

- 2. Electric throttle control actuator
- 5. EVAP canister purge volume control 6. solenoid valve
- 8. Intake valve timing control solenoid valve
- 3. Electric throttle control actuator harness connector
  - Intake manifold collector

#### < FUNCTION DIAGNOSIS >

### [QR25DE]

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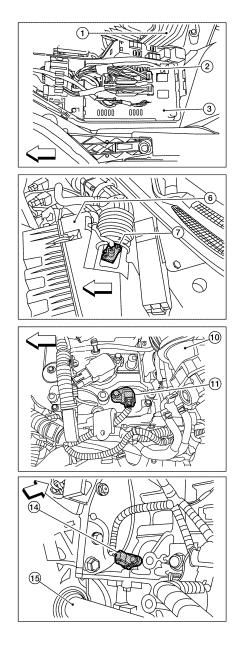
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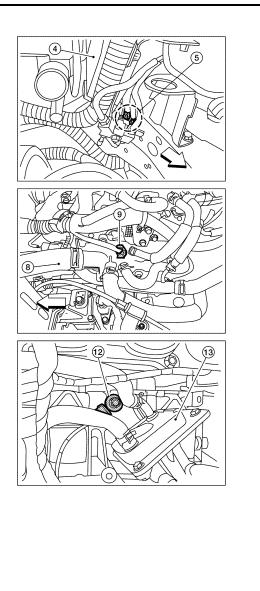
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- 1. Air cleaner assembly
- EPS control unit (view with air cleaner assembly removed)
- 7. Mass air flow sensor (with intake temperature sensor)
- 10. Intake manifold collector
- 13. Engine oil cooler
- C: Vehicle front

- 2. Fuel pump fuse
- 5. Engine grounds
- 8. Upper radiator hose
- 11. Camshaft position sensor (PHASE)
- 14. Crankshaft position sensor (POS)



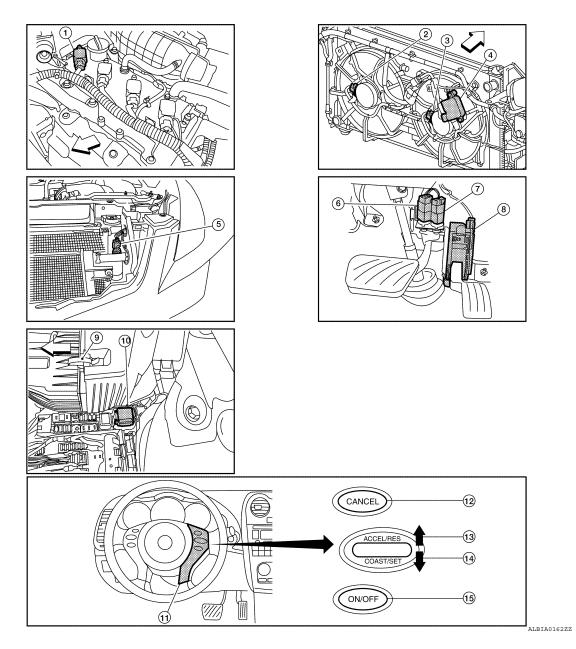
ALBIA0161ZZ

| 3.<br>6. | IPDM E/R<br>Air cleaner assembly  | Μ |
|----------|-----------------------------------|---|
| 9.       | Engine coolant temperature sensor | Ν |
|          | Knock sensor<br>Drive shaft RH    | 0 |

2010 Altima HEV

#### < FUNCTION DIAGNOSIS >

[QR25DE]



- 1. No.1 ignition coil
- 4. Cooling fan control module
- 7. ASCD brake switch
- 10. Cooling fan relay-1
- 13. RESUME/ACCELERATE switch
- C: Vehicle front

- 2. Cooling fan motor-1
- 5. Refrigerant pressure sensor
- 8. Accelerator pedal position sensor
- 11. ASCD steering switch
- 14. SET/COAST switch
- 3. Cooling fan motor-2
- 6. Stop lamp switch
- 9. Air cleaner assembly
- 12. CANSEC switch
- 15. MAIN switch

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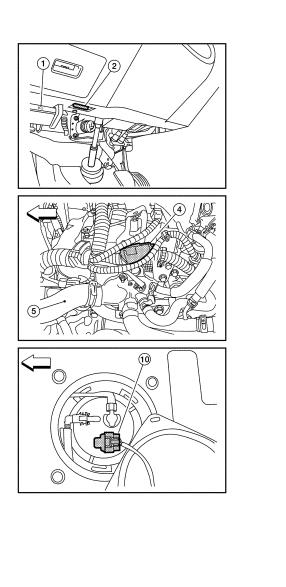
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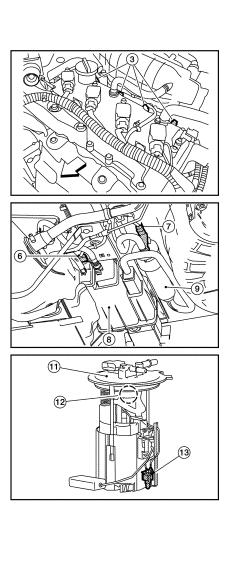
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- ALBIA0173ZZ
- Μ Fuel injector harness connector З. 6. EVAP control system pressure sensor
  - EVAP canister (SUB)
- 12. Fuel pressure regulator

9.

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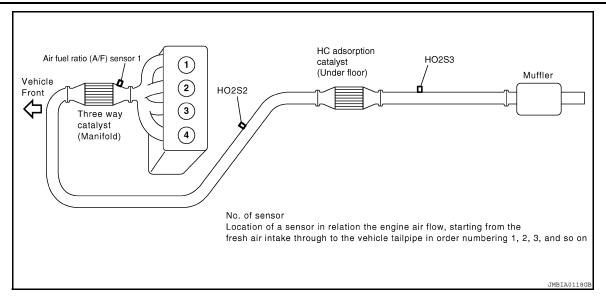
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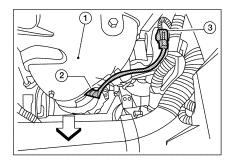
- Hood opener handle 1.
- Condenser-2 4.
- 7. EVAP canister vent control valve
- 10. Fuel level sensor unit and fuel pump 11. Fuel pump assembly harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
- 13. Fuel tank temperature sensor
- : Vehicle front

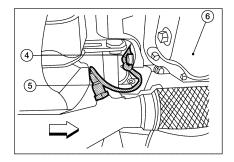
- 2. Data link connector
- 5. Upper radiator hose
- 8. EVAP canister (MAIN)

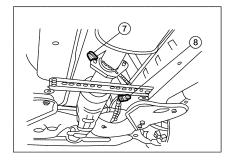
#### < FUNCTION DIAGNOSIS >











- 1. Exhaust manifold cover
- 4. Heated oxygen sensor 2 harness connector
- 7. Heated oxygen sensor 3
- 2. Air fuel ratio (A/F) sensor 1
- 5. Heated oxygen sensor 2
- 8. Heated oxygen sensor 3 harness connector

- ALBIA0272ZZ
- 3. Air fuel ratio (A/F) sensor 1 harness connector
- 6. Oil pan

C: Vehicle front

### **Component Description**

INFOID:000000005441674

| Component                        | Reference             |
|----------------------------------|-----------------------|
| A/F sensor 1                     | EC-179, "Description" |
| Camshaft position sensor (PHASE) | EC-255, "Description" |

Revision: September 2009

2010 Altima HEV

## **EVAPORATIVE EMISSION SYSTEM**

## < FUNCTION DIAGNOSIS >

[QR25DE]

| Component   | Reference             |    |
|---|-----------------------|----|
| Crankshaft position sensor (POS)                  | EC-251, "Description" | A  |
| Engine coolant temperature sensor                 | EC-166, "Description" |    |
| EVAP canister purge volume control solenoid valve | EC-268. "Description" | EC |
| EVAP control system pressure sensor               | EC-284, "Description" |    |
| Fuel tank temperature sensor                      | EC-231, "Description" |    |
| Mass air flow sensor                              | EC-144, "Description" | С  |
| Throttle position sensor                          | EC-169, "Description" |    |
| Vehicle speed sensor                              | EC-310, "Description" | D  |

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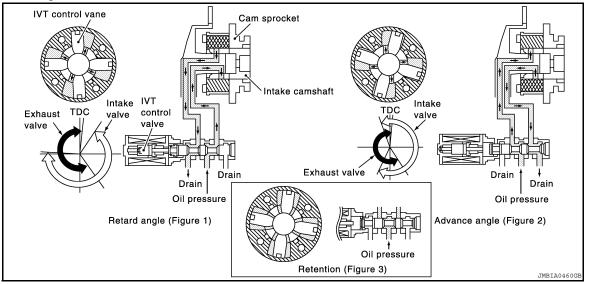
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## < FUNCTION DIAGNOSIS >

## INTAKE VALVE TIMING CONTROL

## System Diagram



## System Description

INFOID:000000005441676

## INPUT/OUTPUT SIGNAL CHART

| Sensor                            | Input signal to ECM                | ECM function                   | Actuator                                   |  |
|-----------------------------------|------------------------------------|--------------------------------|--|--|
| Crankshaft position sensor (POS)  | Engine speed and piston position   |                                |  |  |
| Camshaft position sensor (PHASE)  | - Engine speed and piston position |                                | Intake valve timing control solenoid valve |  |
| Engine coolant temperature sensor | Engine coolant temperature         | Intake valve<br>timing control |  |  |
| Brake ECU                         | Vehicle speed*                     |                                |  |  |
| Hybrid vehicle control ECU        | Vehicle speed*                     | 1                              |  |  |

\*: This signal is sent to the ECM through 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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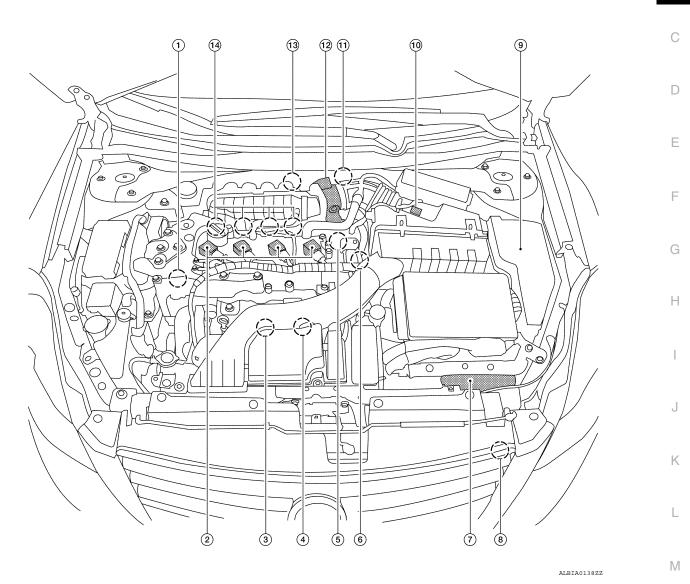
## < FUNCTION DIAGNOSIS >

## Component Parts Location

## [QR25DE]

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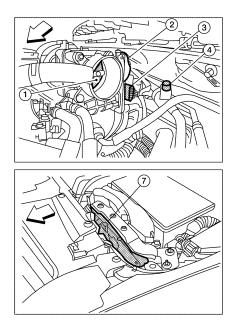
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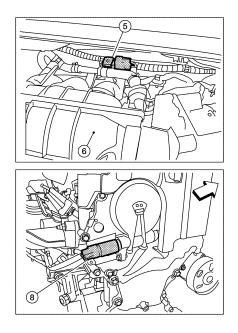


- 1. Intake valve timing control solenoid 2. valve
- 4. Air fuel ratio (A/F) sensor 1
- 7. ECM
- 10. Mass air flow sensor (with intake temperature sensor)
- 13. EVAP canister purge volume control 14. Fuel injector solenoid valve
- Ignition coil (with power transistor) and spark plug
- 5. Camshaft position sensor (PHASE)
- 8. Refrigerant pressure sensor
- 11. EVAP service port
- Knock sensor, Crankshaft position sensor (POS)
   Engine coolant temperature sensor
   IPDM E/R
   Electric throttle control actuator (with built in throttle position sensor and throttle control motor)

Ρ

### < FUNCTION DIAGNOSIS >





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- Throttle valve 1.
- EVAP service port 4.
- 7. ECM
- C: Vehicle front

- 2. Electric throttle control actuator
- 5. EVAP canister purge volume control 6. Intake manifold collector solenoid valve
- 8. Intake valve timing control solenoid valve
- 3. Electric throttle control actuator harness connector

### < FUNCTION DIAGNOSIS >

## [QR25DE]

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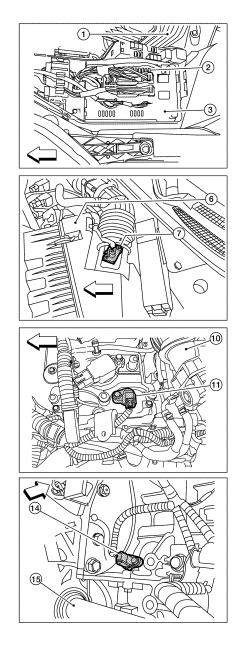
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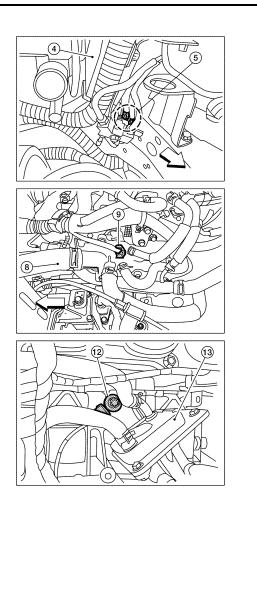
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- 1. Air cleaner assembly
- EPS control unit (view with air cleaner assembly removed)
- 7. Mass air flow sensor (with intake temperature sensor)
- 10. Intake manifold collector
- 13. Engine oil cooler
- C: Vehicle front

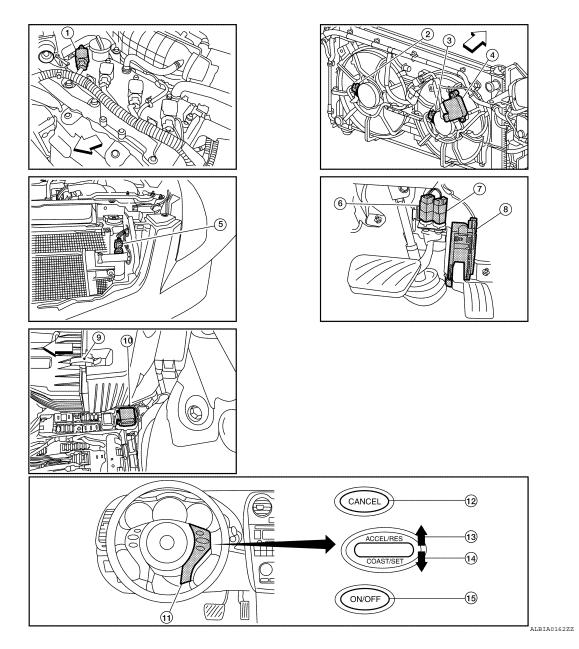
- 2. Fuel pump fuse
- 5. Engine grounds
- 8. Upper radiator hose
- 11. Camshaft position sensor (PHASE)
- 14. Crankshaft position sensor (POS)



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| 3.<br>6. | IPDM E/R<br>Air cleaner assembly  | Μ |
|----------|-----------------------------------|---|
| 9.       | Engine coolant temperature sensor | Ν |
|          | Knock sensor<br>Drive shaft RH    | 0 |

## < FUNCTION DIAGNOSIS >



- 1. No.1 ignition coil
- 4. Cooling fan control module
- 7. ASCD brake switch
- 10. Cooling fan relay-1
- 13. RESUME/ACCELERATE switch
- C: Vehicle front

- 2. Cooling fan motor-1
- 5. Refrigerant pressure sensor
- 8. Accelerator pedal position sensor
- 11. ASCD steering switch
- 14. SET/COAST switch
- 3. Cooling fan motor-2
- 6. Stop lamp switch
- 9. Air cleaner assembly
- 12. CANSEC switch
- 15. MAIN switch

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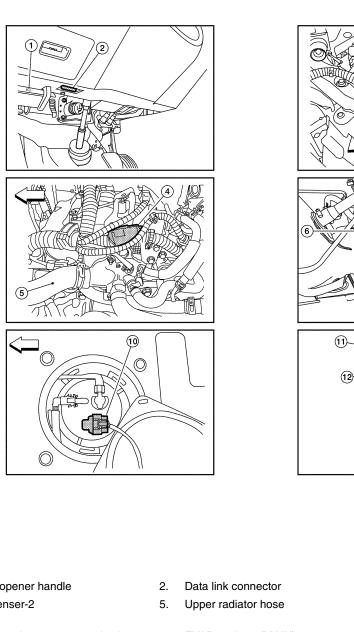
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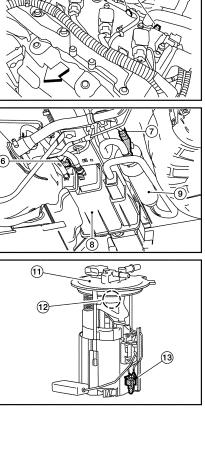
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- Μ Fuel injector harness connector З. 6. EVAP control system pressure sen-
- 9. EVAP canister (SUB)
- 12. Fuel pressure regulator

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- Hood opener handle 1.
- Condenser-2 4.
- 7. EVAP canister vent control valve
- 10. Fuel level sensor unit and fuel pump 11. Fuel pump assembly harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
- 13. Fuel tank temperature sensor
- : Vehicle front

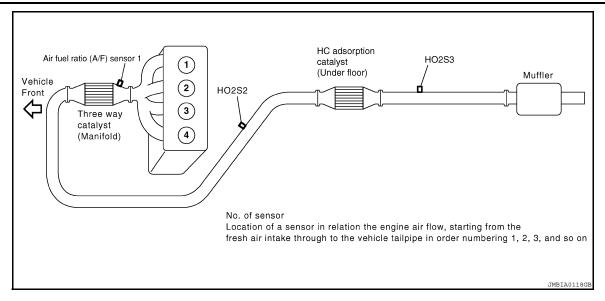
- 8. EVAP canister (MAIN)

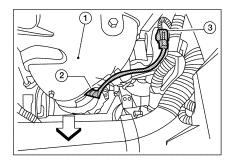
Revision: September 2009

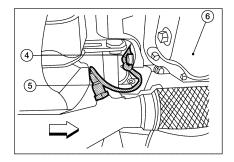
**EC-79** 

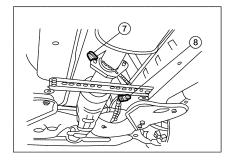
## < FUNCTION DIAGNOSIS >











- 1. Exhaust manifold cover
- 4. Heated oxygen sensor 2 harness connector
- 7. Heated oxygen sensor 3
- 2. Air fuel ratio (A/F) sensor 1
- 5. Heated oxygen sensor 2
- 8. Heated oxygen sensor 3 harness connector

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- 3. Air fuel ratio (A/F) sensor 1 harness connector
- 6. Oil pan

C: Vehicle front

## **Component Description**

INFOID:000000005441678

| Component                        | Reference             |  |  |
|----------------------------------|-----------------------|--|--|
| Camshaft position sensor (PHASE) | EC-255, "Description" |  |  |
| Crankshaft position sensor (POS) | EC-251, "Description" |  |  |

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2010 Altima HEV

## < FUNCTION DIAGNOSIS >

| Component                                  | Reference                   |    |
|--|-----------------------------|----|
| Engine coolant temperature sensor          | EC-166, "Description"       | A  |
| Intake valve timing control solenoid valve | EC-74, "System Description" |    |
| Vehicle speed sensor                       | EC-310, "Description"       | EC |

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## < FUNCTION DIAGNOSIS >

## ON BOARD DIAGNOSTIC (OBD) SYSTEM

## Diagnosis Description

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## INTRODUCTION

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

| Emission-related diagnostic information           | Diagnostic service                                      |  |  |
|---|---|--|--|
| Diagnostic Trouble Code (DTC)                     | Service \$03 of SAE J1979                               |  |  |
| Freeze Frame data                                 | Service \$02 of SAE J1979                               |  |  |
| System Readiness Test (SRT) code                  | Service \$01 of SAE J1979                               |  |  |
| 1st Trip Diagnostic Trouble Code (1st Trip DTC)   | Service \$07 of SAE J1979                               |  |  |
| 1st Trip Freeze Frame data                        |   |  |  |
| Test values and Test limits                       | Service \$06 of SAE J1979                               |  |  |
| Calibration ID                                    | Service \$09 of SAE J1979                               |  |  |
| Permanent Diagnostic Trouble Code (Permanent DTC) | Service \$0A <sup>*1, *2</sup> of SAE J1979/ISO 15031-5 |  |  |

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

\*: Although HL32 models do not support Service \$0A, it is shown on GST screen.

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

×: Applicable —: Not applicable

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

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

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to <u>EC-439</u>. <u>"Fail Safe"</u>.)

### TWO TRIP DETECTION LOGIC

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not light up 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 lights up. The MIL lights up 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 light up or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

|   |          |                |          |                |           | If If                  |                        |                 |
|---|----------|----------------|----------|----------------|-----------|------------------------|------------------------|-----------------|
|   | MIL      |                |          |                | DTC       |                        | 1st trip DTC           |                 |
| Items   | 1st trip |                | 2nd trip |                | 1 of trip | Our al turin           | 1 of trip              | 2nd trip        |
| Kenio   | Blinking | Lighting<br>up | Blinking | Lighting<br>up |           | 2nd trip<br>displaying | 1st trip<br>displaying | display-<br>ing |
| Misfire (Possible three way catalyst<br>damage) — DTC: P0300 - P0304 is<br>being detected | ×        | _              | _        | _              | _         | _                      | ×                      | _               |
| Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected       | _        | _              | ×        | _              | _         | ×                      | _                      | _               |
| One trip detection diagnoses (Re-<br>fer to <u>EC-442, "DTC Index"</u> .)                 | _        | ×              | _        | _              | ×         | _                      | _                      | _               |
| Except above  | —        | —              | _        | ×              | _         | ×                      | ×                      | _               |

< FUNCTION DIAGNOSIS >

## DTC AND FREEZE FRAME DATA

### 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 reoccur, the 1st trip DTC will not be displayed.

If a malfunction is detected during the 1st trip, the 1st trip DTC is stored 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 stored 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.

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

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

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

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to <u>EC-7, "Work Flow"</u>. Then perform DTC CONFIRMA-TION PROCEDURE or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

### Freeze Frame Data and 1st Trip Freeze Frame Data

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

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

| Priority |                          | Items  | - |
|----------|--------------------------|--|---|
| 1        | Freeze frame data        | Misfire — DTC: P0300 - P0304<br>Fuel Injection System Function — DTC: P0171, P0172 | M |
| 2        |                          | Except the above items   | - |
| 3        | 1st trip freeze frame of | lata   | N |

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored 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. Procedures for clearing the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".

How to Read DTC and 1st Trip DTC

With CONSULT-III
 With GST

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

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

### No Tools

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

These DTCs are controlled by NISSAN.

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

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

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

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

How to Erase DTC and 1st Trip DTC

## With CONSULT-III

### NOTE:

If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.

- 1. Select "ENGINE" with CONSULT-III.
- 2. Select "SELF-DIAG RESULT".
- 3. Touch "ERASE". (DTC in ECM will be erased.)

### With GST

The emission-related diagnostic information in the ECM can be erased by selecting Service \$04 with GST. **NOTE:** 

If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.

1. Select Service \$04 with GST (Generic Scan Tool).

No Tools

### NOTE:

If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.

- 1. Erase DTC in ECM. Refer to HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
- If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.
- The following data are cleared when the ECM memory is erased.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

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

## SYSTEM READINESS TEST (SRT) CODE

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

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

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

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

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

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### NOTE:

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

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

### NOTE:

If 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 Item

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

| SRT item<br>(CONSULT-III indication) | Required self-diagnostic items to set the SRT to "CMPLT" | Corresponding DTC<br>No. |
|--------------------------------------|--|--------------------------|
| CATALYST                             | Three way catalyst function                              | P0420                    |
|                                      | HC adsorption catalyst function                          | P2423                    |
| EVAP SYSTEM                          | EVAP control system purge flow monitoring                | P0441                    |
|                                      | EVAP control system                                      | P0456                    |
| HO2S                                 | Air fuel ratio sensor 1                                  | P0133                    |
|                                      | Heated oxygen sensor 2                                   | P0137                    |
|                                      | Heated oxygen sensor 2                                   | P0138                    |
|                                      | Heated oxygen sensor 2                                   | P0139                    |
|                                      | Heated oxygen sensor 3                                   | P0143                    |
|                                      | Heated oxygen sensor 3                                   | P0144                    |
|                                      | Heated oxygen sensor 3                                   | P0145                    |
| EGR/VVT SYSTEM                       | Intake value timing control function                     | P0011                    |

### SRT Set Timing

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

|             |             |                   |  | Example |              |                           |  |
|-------------|-------------|-------------------|--|---------|--------------|---------------------------|--|
| Self-diagno | osis result | Diagnosis         | $\begin{array}{c} \mbox{Ignition cycle} \\ \leftarrow \mbox{ON} \rightarrow \mbox{OFF} \ \leftarrow \mbox{OP} \ \to$ |         |              |                           |  |
| 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<br>(Consecutive<br>NG) |  |
|             |             | (1st trip)<br>DTC | 1st trip DTC   | _       | 1st trip DTC | DTC<br>(= MIL ON)         |  |
|             |             | SRT of EGR        | "INCMP"  | "INCMP" | "INCMP"      | "CMPLT"                   |  |

### < FUNCTION DIAGNOSIS >

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 showed 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 showed 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 showed 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 one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

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

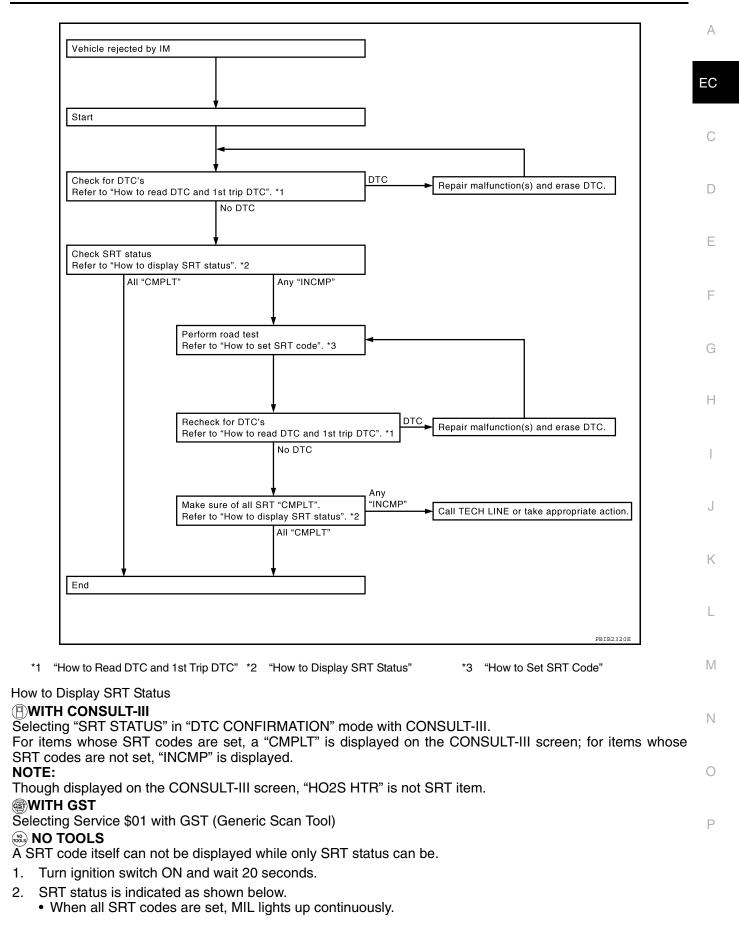
SRT can be set as "CMPLT" together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates "CMPLT".

### SRT Service Procedure

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

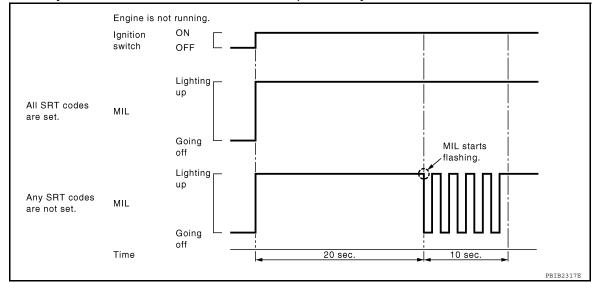
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• When any SRT codes are not set, MIL will flash periodically for 10 seconds.



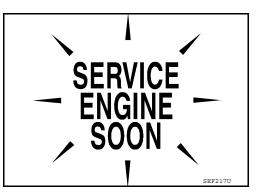
## MALFUNCTION INDICATOR LAMP (MIL)

### Description

The MIL is located on the instrument panel.

- The MIL will light up when the ignition switch is turned ON. This is a bulb check. If the MIL does not light up, refer to <u>EC-395</u>, "Component Function Check".
- 2. When the ignition switch is turned ON (READY), the MIL should go off.

If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.



### On Board Diagnostic System Function

The on board diagnostic system has the following three functions.

| Diagnostic Test<br>Mode | Ignition switch | Function                | Explanation of Function  |
|-------------------------|-----------------|-------------------------|--|
| Mode I                  | ON              | BULB CHECK              | This function checks the MIL bulb for damage (blown, open cir-<br>cuit, etc.).<br>If the MIL does not come on, check MIL circuit.<br>When any SRT codes are not set, MIL may flash. For the details,<br>refer to "How to Display SRT Status".  |
|                         | ON (READY)      | MALFUNCTION WARNING     | <ul> <li>This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected.</li> <li>The following malfunctions will light up or blink the MIL in the 1st trip.</li> <li>Misfire (Possible three way catalyst damage)</li> <li>One trip detection diagnoses</li> </ul> |
| Mode II                 | ON              | SELF-DIAGNOSTIC RESULTS | This function allows DTCs and 1st trip DTCs to be read.  |

Diagnostic Test Mode I — Bulb Check

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to <u>EC-</u><u>395. "Component Function Check"</u>.

Diagnostic Test Mode I — Malfunction Warning

### < FUNCTION DIAGNOSIS >

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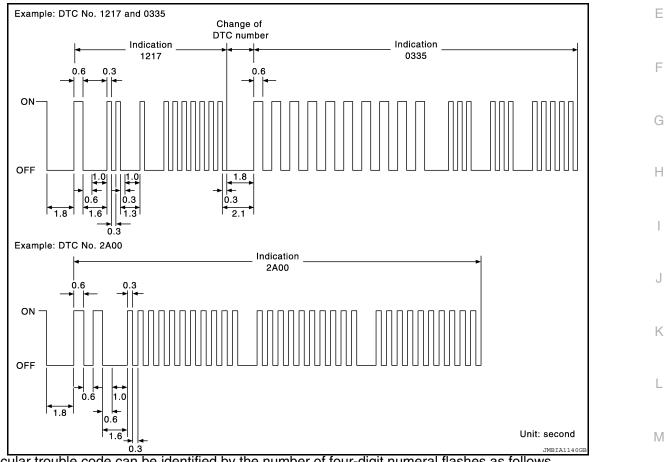
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| MIL | Condition                         | А |
|-----|-----------------------------------|---|
| ON  | When the malfunction is detected. |   |
| OFF | No malfunction.                   |   |

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

### Diagnostic Test Mode II — Self-diagnostic Results

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



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

| Number  | 0  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Α  | В  | С  | D  | E  | F  | Ν |
|---------|----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|---|
| 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-second) - OFF (0.6-second) cycle.

The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second 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-second OFF.

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See <u>EC-442, "DTC Index"</u>)

How to Switch Diagnostic Test Mode

NOTE:

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

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### < FUNCTION DIAGNOSIS >

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

### • Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF. HOW TO SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

- 1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- 2. Repeat the following procedure quickly five times within 5 seconds.
- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.
- 3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL starts blinking.

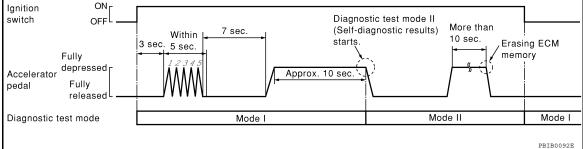
### NOTE:

# Do not release the accelerator pedal for 10 seconds if MIL may start blinking on the halfway of this 10 seconds. This blinking is displaying SRT status and is continued for another 10 seconds.

 Fully release the accelerator pedal. ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).
 NOTE:

#### NUIE: Wait until the same DTC (or

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



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

- Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to "HOW TO SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)".
- 2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
- The emission-related diagnostic information has been erased from the backup memory in the ECM. 3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

## OBD System Operation Chart

Relationship Between MIL, 1st Trip DTC, DTC and Detectable Items

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on.
- The MIL will go 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.

### Summary Chart

| Items                                  | Fuel Injection System | Misfire                       | Other          |
|--|-----------------------|-------------------------------|----------------|
| MIL (goes off)                         | 3 (pattern B)         | 3 (pattern B)                 | 3 (pattern B)  |
| DTC, Freeze Frame Data (no<br>display) | 80 (pattern C)        | 80 (pattern C)                | 40 (pattern A) |
| 1st Trip DTC (clear)                   | 1 (pattern C), *1     | 1 (pattern C), * <sup>1</sup> | 1 (pattern B)  |
| 1st Trip Freeze Frame Data<br>(clear)  | *1, *2                | *1, *2                        | 1 (pattern B)  |

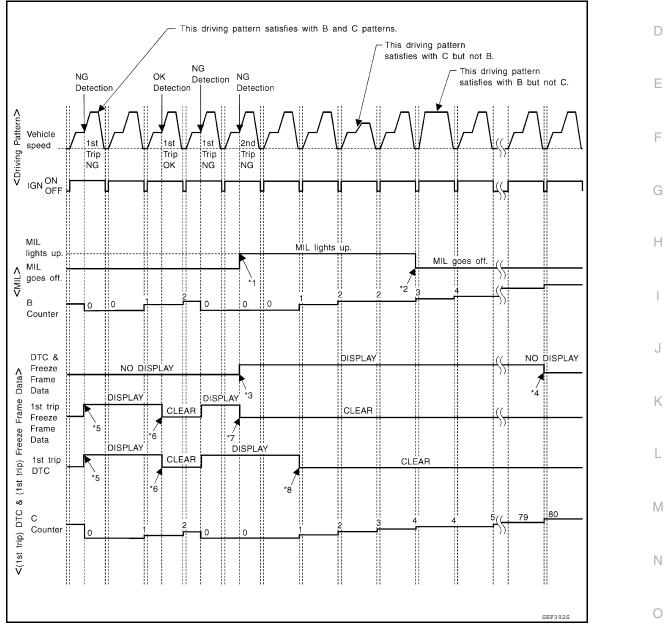
### < FUNCTION DIAGNOSIS >

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

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

- \*1: Clear timing is at the moment OK is detected.
- \*2: Clear timing is when the same malfunction is detected in the 2nd trip.

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



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

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## < FUNCTION DIAGNOSIS >

- \*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.)
- \*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
  - \*6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

[QR25DE]

- \*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.
- \*8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

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

Driving pattern B means the vehicle operation as follows:

All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunction.
- The MIL will go off when the B counter reaches 3. (\*2 in "OBD SYSTEM OPERATION CHART")

<Driving Pattern C>

Driving pattern C means the vehicle operation as follows:

The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data)  $\pm$ 375 rpm

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

- Engine coolant temperature (T) condition:
- When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).
- 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).

Example:

If the stored freeze frame data is as follows:

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:

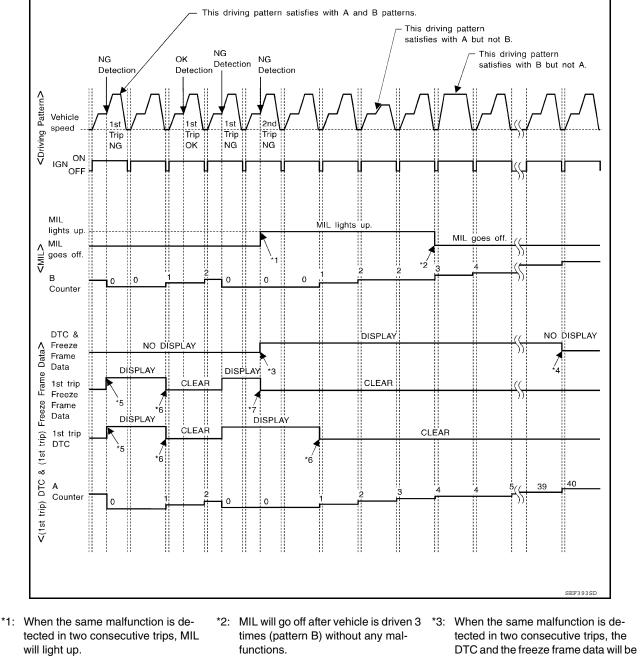
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

- The C counter will be cleared when the malfunction is detected regardless of vehicle conditions above.
- The C counter will be counted up when vehicle conditions above is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

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

### < FUNCTION DIAGNOSIS >

#### This driving pattern satisfies with A and B patterns This driving pattern satisfies with A but not B. NG This driving pattern NG OK Detection satisfies with B but not A. Detection Detection



- \*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- \*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.
- \*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- stored in ECM.
- \*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

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

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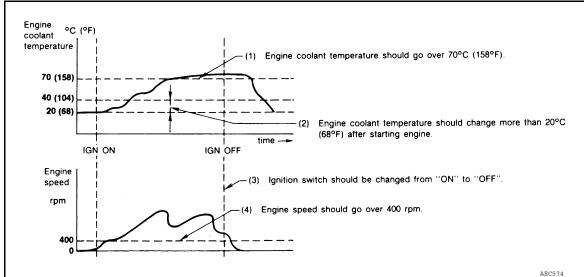
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## < FUNCTION DIAGNOSIS >

## <Driving Pattern A>



- The A counter will be cleared when the malfunction is detected regardless of (1) (4).
- The A counter will be counted up when (1) (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

### <Driving Pattern B>

Driving pattern B means the vehicle operation as follows:

All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will go off when the B counter reaches 3 (\*2 in OBD SYSTEM OPERATION CHART).

## CONSULT-III Function

INFOID:000000005441680

## FUNCTION

| Diagnostic test mode    | Function  |
|-------------------------|---|
| Work support            | This mode enables a technician to adjust some devices faster and more accurately by following the in-<br>dications on the CONSULT-III unit. |
| Self-Diagnostic Results | Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*     |
| Data Monitor            | Input/Output data in the ECM can be read.   |
| 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/result can be confirmed.  |
| Function Test           | This mode is used to inform customers when their vehicle condition 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

## ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

## < FUNCTION DIAGNOSIS >

## [QR25DE]

|                                |        |   | DIAGNOSTIC TEST MODE |                           |                   |                |                 |                             | A  |        |
|--------------------------------|--------|---|----------------------|---------------------------|-------------------|----------------|-----------------|-----------------------------|----|--------|
|                                |        |   |                      |                           | AGNOSTIC<br>SULTS | DATA           |                 | DTC 8<br>CONFIR             |    |        |
| Item                           |        | WORK<br>SUPPORT                                   | DTC*1                | FREEZE<br>FRAME<br>DATA*2 | MONI-<br>TOR      | ACTIVE<br>TEST | SRT STA-<br>TUS | DTC<br>WORK<br>SUP-<br>PORT | EC |        |
|                                |        | Crankshaft position sensor (POS)                  |                      | ×                         | ×                 | ×              |                 |                             |    | - C    |
|                                |        | Camshaft position sensor (PHASE)                  |                      | ×                         | ×                 | ×              |                 |                             |    | _      |
|                                |        | Mass air flow sensor                              |                      | ×                         |                   | ×              |                 |                             |    | D      |
|                                |        | Engine coolant temperature sensor                 |                      | ×                         | ×                 | ×              | ×               |                             |    | _      |
|                                |        | A/F sensor 1                                      |                      | ×                         |                   | ×              |                 | ×                           | ×  |        |
| S                              |        | Heated oxygen sensor 2                            |                      | ×                         |                   | ×              |                 | ×                           | ×  | - E    |
| <b>RT</b> :                    |        | Heated oxygen sensor 3                            |                      | ×                         |                   | ×              |                 | ×                           |    | _      |
| ΤΡ¢                            |        | Vehicle speed sensor                              |                      | ×                         | ×                 | ×              |                 |                             |    | -<br>F |
| ENGINE CONTROL COMPONENT PARTS |        | Accelerator pedal position sensor                 |                      |                           |                   | ×              |                 |                             |    |        |
| PON                            |        | Throttle position sensor                          |                      | ×                         | ×                 | ×              |                 |                             |    | _      |
| NO I                           | 5      | Fuel tank temperature sensor                      |                      | ×                         |                   | ×              | ×               |                             |    | G      |
|                                | INPUT  | EVAP control system pressure sensor               |                      | ×                         |                   | ×              |                 |                             |    | _      |
| TRO                            |        | Intake air temperature sensor                     |                      | ×                         | ×                 | ×              |                 |                             |    | -      |
| NON                            |        | Knock sensor                                      |                      | ×                         |                   |                |                 |                             |    | _ '    |
| Щ                              |        | Refrigerant pressure sensor                       |                      |                           |                   | ×              |                 |                             |    | _      |
|                                |        | Air conditioner switch                            |                      |                           |                   | ×              |                 |                             |    | -      |
| Ξ                              |        | Transmission range switch                         |                      |                           |                   | ×              |                 |                             |    | _      |
|                                |        | Stop lamp switch                                  |                      | ×                         |                   | ×              |                 |                             |    | -      |
|                                |        | Battery voltage                                   |                      |                           |                   | ×              |                 |                             |    | _ J    |
|                                |        | Fuel level sensor                                 |                      | ×                         |                   | ×              |                 |                             |    | _      |
|                                |        | ASCD steering switch                              |                      | ×                         |                   | ×              |                 |                             |    | - K    |
|                                |        | ASCD brake switch                                 |                      | ×                         |                   | ×              |                 |                             |    | _      |
|                                |        | Fuel injector                                     |                      | ×                         |                   | ×              | ×               |                             |    | _      |
|                                |        | Power transistor (Ignition timing)                |                      |                           |                   | ×              | ×               |                             |    | - L    |
| TS                             |        | Throttle control motor relay                      |                      | ×                         |                   | ×              |                 |                             |    | _      |
| PAR                            |        | Throttle control motor                            |                      | ×                         |                   |                |                 |                             |    | N      |
| ENGINE COTNROL COMPONENT PARTS |        | EVAP canister purge volume control solenoid valve |                      | ×                         |                   | ×              | ×               |                             | ×  |        |
| PPO I                          | ⊢      | Fuel pump relay                                   | ×                    |                           |                   | ×              | ×               |                             |    | N      |
| S<br>S                         | OUTPUT | Cooling fan                                       |                      | ×                         |                   | ×              | ×               |                             |    | _      |
|                                | No     | A/F sensor 1 heater                               |                      | ×                         |                   | ×              |                 | ×* <sup>3</sup>             |    | -      |
| TNR                            |        | Heated oxygen sensor 2 heater                     |                      | ×                         |                   | ×              |                 | ×* <sup>3</sup>             |    | - C    |
| S<br>III                       |        | Heated oxygen sensor 3 heater                     |                      | ×                         |                   | ×              |                 | ×* <sup>3</sup>             |    | -      |
| GINI                           |        | EVAP canister vent control valve                  | ×                    | ×                         |                   | ×              | ×               |                             |    | P      |
| EN                             |        | Intake valve timing control solenoid valve        |                      | ×                         |                   | ×              | ×               |                             |    | _      |
|                                |        | Calculated load value                             |                      |                           | ×                 | ×              |                 |                             |    | _      |

X: Applicable

\*1: This item includes 1st trip DTCs.

### < FUNCTION DIAGNOSIS >

\*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-III screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to <u>EC-82</u>, "<u>Diagnosis Description</u>".
\*3: Always "CMPLT" is displayed.

## INSPECTION PROCEDURE Refer to CONSULT-III Operators Manual.

## WORK SUPPORT MODE

Work Item

| WORK ITEM                         | CONDITION   | USAGE  |
|-----------------------------------|---|--|
| FUEL PRESSURE RELEASE*1           | <ul> <li>SELECTOR LEVER IS N POSITION WITH ENGINE RUN-<br/>NING.</li> <li>FUEL PUMP WILL STOP BY TOUCHING "START".</li> </ul>   | When releasing fuel pressure from fuel line            |
| IDLE AIR VOL LEARN                | <ul> <li>IGNITION SWITCH ON (READY)</li> <li>THE IDLE AIR VOLUME THAT KEEPS THE ENGINE<br/>WITHIN THE SPECIFIED RANGE IS MEMORIZED IN<br/>ECM.</li> </ul>   | When learning the idle air volume                      |
| SELF-LEARNING CONT                | • THE COEFFICIENT OF SELF-LEARNING CONTROL<br>MIXTURE RATIO RETURNS TO THE ORIGINAL COEF-<br>FICIENT.   | When clearing mixture ratio self-<br>learning value    |
| EVAP SYSTEM CLOSE                 | CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN<br>ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE<br>FOLLOWING CONDITIONS.<br>IGN SW ON<br>ENGINE NOT RUNNING<br>AMBIENT TEMPERATURE IS ABOVE 0°C (32°F).<br>NO VACUUM AND NO HIGH PRESSURE IN EVAP SYS-<br>TEM<br>FUEL TANK TEMP. IS MORE THAN 0°C (32°F).<br>WITHIN 10 MINUTES AFTER STARTING "EVAP SYS-<br>TEM CLOSE"<br>WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE"<br>UNDER THE CONDITION EXCEPT ABOVE, CONSULT-<br>III WILL DISCONTINUE IT AND DISPLAY APPROPRI-<br>ATE INSTRUCTION.<br>NOTE:<br>WHEN STARTING ENGINE, CONSULT-III MAY DIS-<br>PLAY "BATTERY VOLTAGE IS LOW. CHARGE BAT-<br>TERY", EVEN IN USING CHARGED BATTERY. | When detecting EVAP vapor leak<br>point of EVAP system |
| VIN REGISTRATION                  | • IN THIS MODE, VIN IS REGISTERED IN ECM.   | When registering VIN in ECM                            |
| TARGET IDLE RPM ADJ* <sup>2</sup> | INSPECTION MODE     IDLE CONDITION  | When setting target idle speed                         |
| TARGET IGN TIM ADJ*2              | INSPECTION MODE     IDLE CONDITION  | When adjusting target ignition tim-<br>ing             |

\*1: If this function is performed, a certain DTC may be detected.

\*2: This function is not necessary in the usual service procedure.

## SELF-DIAG RESULTS MODE

Self Diagnostic Item Regarding items of DTC and 1st trip DTC, refer to <u>EC-442, "DTC Index"</u>.)

Freeze Frame Data and 1st Trip Freeze Frame Data

## < FUNCTION DIAGNOSIS >

## [QR25DE]

| Freeze frame data<br>item*      | Description   | А  |
|---------------------------------|---|----|
| DIAG TROUBLE<br>CODE<br>[PXXXX] | The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to<br><u>EC-442, "DTC Index"</u> .)   | EC |
| FUEL SYS-B1                     | <ul> <li>"Fuel injection system status" at the moment a malfunction is detected is displayed.</li> <li>One mode in the following is displayed.<br/>Mode2: Open loop due to detected system malfunction<br/>Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment)<br/>Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control<br/>Mode5: Open loop - has not yet satisfied condition to go to closed loop</li> </ul> | С  |
| CAL/LD VALUE [%]                | The calculated load value at the moment a malfunction is detected is displayed.   | D  |
| COOLANT TEMP [°C]<br>or [°F]    | The engine coolant temperature at the moment a malfunction is detected is displayed.  | Е  |
| L-FUEL TRM-B1 [%]               | <ul> <li>"Long-term fuel trim" at the moment a malfunction is detected is displayed.</li> <li>The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.</li> </ul>   | F  |
| S-FUEL TRM-B1 [%]               | <ul> <li>"Short-term fuel trim" at the moment a malfunction is detected is displayed.</li> <li>The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.</li> </ul>  | Г  |
| ENGINE SPEED [rpm]              | The engine speed at the moment a malfunction is detected is displayed.  | G  |
| VEHICL SPEED<br>[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.  | H  |
| B/FUEL SCHDL<br>[msec]          | The base fuel schedule at the moment a malfunction is detected is displayed.  |    |
| INT/A TEMP SE [°C]<br>or [°F]   | The intake air temperature at the moment a malfunction is detected is displayed.  | I  |
| FUEL SYS-B2                     |   | J  |
| L-FUEL TRM-B2 [%]               |   | •  |
| S-FUEL TRM-B2 [%]               | These items displayed but are not applicable to this model.   |    |
| INT MANI PRES [kPa]             |   | Κ  |
| COMBUST CONDI-<br>TION          | e as these of 1st trip freeze frame data  |    |

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

## DATA MONITOR MODE

### Monitored Item

Μ

| ×: App | licable |
|--------|---------|
|--------|---------|

| Monitored item | Unit | Description   | Remarks  |   |
|----------------|------|---|--|---|
| ENG SPEED      | rpm  | <ul> <li>Indicates the engine speed computed from the<br/>signal of the crankshaft position sensor (POS)<br/>and camshaft position sensor (PHASE).</li> </ul> | <ul> <li>Accuracy becomes poor if engine<br/>speed drops below the idle rpm.</li> <li>If the signal is interrupted while<br/>the engine is running, an abnor-<br/>mal value may be indicated.</li> </ul> | C |
| MAS A/F SE-B1  | v    | The signal voltage of the mass air flow sensor is displayed.  | <ul> <li>When the engine is stopped, a certain value is indicated.</li> <li>When engine is running specification range is indicated in "SPEC".</li> </ul>  | Ρ |
| B/FUEL SCHDL   | ms   | "Base fuel schedule" indicates the fuel injection<br>pulse width programmed into ECM, prior to any<br>learned on board correction.                            | When engine is running specifica-<br>tion range is indicated in "SPEC".  |   |

## < FUNCTION DIAGNOSIS >

## [QR25DE]

| Monitored item             | Unit        | Description   | Remarks  |
|----------------------------|-------------|---|--|
| A/F ALPHA-B1               | %           | The mean value of the air-fuel ratio feedback cor-<br>rection factor per cycle is indicated.  | <ul> <li>When the engine is stopped, a certain value is indicated.</li> <li>When engine is running specification range is indicated in "SPEC".</li> <li>This data also includes the data for the air-fuel ratio learning control.</li> </ul> |
| COOLAN TEMP/S              | °C or °F    | • The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.  | • When the engine coolant temper-<br>ature sensor is open or short-cir-<br>cuited, ECM enters fail-safe<br>mode. The engine coolant tem-<br>perature determined by the ECM<br>is displayed.  |
| 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.  |  |
| HO2S2 (B1)                 | V           | • The signal voltage of the heated oxygen sensor 2 is displayed.  |  |
| HO2S3(B1)                  | V           | • The signal voltage of the heated oxygen sensor 3 is displayed.  |  |
| HO2S2 MNTR(B1)             | RICH/LEAN   | <ul> <li>Display of heated oxygen sensor 2 signal:<br/>RICH: means the amount of oxygen after three<br/>way catalyst is relatively small.<br/>LEAN: means the amount of oxygen after three<br/>way catalyst is relatively large.</li> </ul> | • When the engine is stopped, a certain value is indicated.  |
| VHCL SPEED SE              | km/h or mph | • The vehicle speed computed from the vehicle speed signal sent from brake ECU is displayed.  |  |
| BATTERY VOLT               | V           | • The power supply voltage of ECM is displayed.   |  |
| TP SEN 1-B1<br>TP SEN 2-B1 | v           | The throttle position sensor signal voltage is dis-<br>played.  | • TP SEN 2-B1 signal is converted<br>by ECM internally. Thus, it differs<br>from ECM terminal voltage signal.  |
| FUEL T/TMP SE              | °C or °F    | • The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.   |  |
| INT/A TEMP SE              | °C or °F    | • The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.  |  |
| EVAP SYS PRES              | V           | • The signal voltage of EVAP control system pres-<br>sure sensor is displayed.  |  |
| FUEL LEVEL SE              | V           | • The signal voltage of the fuel level sensor is displayed.   |  |
| START SIGNAL               | ON/OFF      | <ul> <li>Indicates start signal status [ON/OFF] computed<br/>by the ECM according to the input signals.</li> </ul>  | • After starting the engine, [OFF] is displayed regardless of the starter signal.  |
| CLSD THL POS               | ON/OFF      | • Indicates idle position [ON/OFF] computed by ECM according to the engine power request signal.  |  |
| AIR COND SIG               | ON/OFF      | • Indicates [ON/OFF] condition of the air condition-<br>er switch as determined by the air conditioner sig-<br>nal.   |  |
| P/N POSI SW                | ON/OFF      | <ul> <li>Indicates [ON/OFF] condition from the park/neu-<br/>tral position (PNP) signal.</li> </ul>   |  |
| PW/ST SIGNAL               | ON/OFF      | <ul><li> Always OFF is displayed.</li><li> This item is not efficient for L32 models.</li></ul>   |  |

## < FUNCTION DIAGNOSIS >

| Monitored item | Unit        | Description   | Remarks  |
|----------------|-------------|---|--|
| LOAD SIGNAL    | ON/OFF      | <ul> <li>Indicates [ON/OFF] condition from the electrical<br/>load signal.</li> <li>ON: Rear window defogger switch is ON and/or<br/>lighting switch is in 2nd position.</li> <li>OFF: Both rear window defogger switch and light-<br/>ing switch are OFF.</li> </ul> |  |
| IGNITION SW    | ON/OFF      | Indicates [ON/OFF] condition from ignition switch signal.   |  |
| HEATER FAN SW  | ON/OFF      | Indicates [ON/OFF] condition from the blower fan switch signal.   |  |
| BRAKE SW       | ON/OFF      | Indicates [ON/OFF] condition from the stop lamp switch signal.  |  |
| INJ PULSE-B1   | msec        | Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.  | • When the engine is stopped, a certain computed value is indicated. |
| IGN TIMING     | BTDC        | Indicates the ignition timing computed by ECM according to the input signals.   | When the engine is stopped, a certain value is indicated.            |
| CAL/LD VALUE   | %           | "Calculated load value" indicates the value of the current air flow divided by peak air flow.   |  |
| MASS AIRFLOW   | g⋅m/s       | Indicates the mass air flow computed by ECM ac-<br>cording to the signal voltage of the mass air flow<br>sensor.  |  |
| PURG VOL C/V   | %           | <ul> <li>Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals.</li> <li>The opening becomes larger as the value increases.</li> </ul>   |  |
| INT/V TIM(B1)  | °CA         | <ul> <li>Indicates [°CA] of intake camshaft advance an-<br/>gle.</li> </ul>   |  |
| INT/V SOL(B1)  | %           | <ul> <li>The control value of the intake valve timing control 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>  |  |
| FUEL PUMP RLY  | ON/OFF      | <ul> <li>Indicates the fuel pump relay control condition<br/>determined by ECM according to the input sig-<br/>nals.</li> </ul>   |  |
| VENT CONT/V    | ON/OFF      | <ul> <li>The control condition of the EVAP canister vent<br/>control valve (determined by ECM according to<br/>the input signals) is indicated.</li> <li>ON: Closed</li> <li>OFF: Open</li> </ul>   |  |
| THRTL RELAY    | ON/OFF      | <ul> <li>Indicates the throttle control motor relay control<br/>condition determined by the ECM according to<br/>the input signals.</li> </ul>  |  |
| HO2S2 HTR (B1) | ON/OFF      | • Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.   |  |
| HO2S3 HTR(B1)  | ON/OFF      | Indicates [ON/OFF] condition of heated oxygen<br>sensor 3 heater determined by ECM according to<br>the input signals.   |  |
| VEHICLE SPEED  | km/h or mph | • The vehicle speed computed from the vehicle speed signal sent from HV ECU is displayed.   |  |

## < FUNCTION DIAGNOSIS >

## [QR25DE]

| Monitored item | Unit        | Description  | Remarks |
|----------------|-------------|--|---------|
| IDL A/V LEARN  | YET/CMPLT   | <ul> <li>Display the condition of Idle Air Volume Learning<br/>YET: Idle air volume learning has not been per-<br/>formed yet.</li> <li>CMPLT: Idle air volume learning has already<br/>been performed successfully.</li> </ul>                          |         |
| TRVL AFTER MIL | km or mile  | Distance traveled while MIL is activated.  |         |
| 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>  |         |
| AC PRESS SEN   | V           | • The signal voltage from the refrigerant pressure sensor is displayed.  |         |
| VHCL SPEED SE  | km/h or mph | • The vehicle speed computed from the vehicle speed signal sent from brake ECU is displayed.   |         |
| SET VHCL SPD   | km/h or mph | The preset vehicle speed is displayed.   |         |
| MAIN SW        | ON/OFF      | <ul> <li>Indicates [ON/OFF] condition from MAIN switch signal.</li> </ul>  |         |
| CANCEL SW      | ON/OFF      | <ul> <li>Indicates [ON/OFF] condition from CANCEL<br/>switch signal.</li> </ul>  |         |
| RESUME/ACC SW  | ON/OFF      | <ul> <li>Indicates [ON/OFF] condition from RESUME/AC-<br/>CELERATE switch signal.</li> </ul>   |         |
| SET SW         | ON/OFF      | <ul> <li>Indicates [ON/OFF] condition from SET/COAST<br/>switch signal.</li> </ul>   |         |
| BRAKE SW1      | ON/OFF      | <ul> <li>Indicates [ON/OFF] condition from ASCD brake<br/>switch signal.</li> </ul>  |         |
| BRAKE SW2      | ON/OFF      | Indicates [ON/OFF] condition of stop lamp switch signal.   |         |
| VHCL SPD CUT   | NON/CUT     | <ul> <li>Indicates the vehicle cruise condition.<br/>NON: Vehicle speed is maintained at the ASCD<br/>set speed.<br/>CUT: Vehicle speed decreased to excessively<br/>low compared with the ASCD set speed, and<br/>ASCD operation is cut off.</li> </ul> |         |
| LO SPEED CUT   | NON/CUT     | <ul> <li>Indicates the vehicle cruise condition.<br/>NON: Vehicle speed is maintained at the ASCD<br/>set speed.<br/>CUT: Vehicle speed decreased to excessively<br/>low, and ASCD operation is cut off.</li> </ul>                                      |         |
| AT OD MONITOR  | ON/OFF      | <ul><li> Always OFF is displayed.</li><li> This item displayed but is not applicable to this module.</li></ul>   | odel.   |
| AT OD CANCEL   | ON/OFF      | <ul><li> Always OFF is displayed.</li><li> This item displayed but is not applicable to this module.</li></ul>   | odel.   |
| CRUISE LAMP    | ON/OFF      | <ul> <li>Indicates request condition of CRUISE indicator<br/>determined by the ECM according to the input<br/>signals.</li> </ul>  |         |
| SET LAMP       | ON/OFF      | <ul><li>Always OFF is displayed.</li><li>This item displayed but is not applicable to this module.</li></ul>   | odel.   |
| A/F ADJ-B1     | _           | • Indicates the correction of factor stored in ECM.<br>The factor is calculated from the difference be-<br>tween the target air-fuel ratio stored in ECM and<br>the air-fuel ratio calculated from A/F sensor 1 sig-<br>nal.                             |         |
| FAN DUTY       | %           | <ul> <li>Indicates a command value for cooling fan. The<br/>value is calculated by ECM based on input sig-<br/>nals.</li> </ul>  |         |

### < FUNCTION DIAGNOSIS >

| Monitored item                  | Unit        | Description  | Remarks |
|---------------------------------|-------------|--|---------|
| ACCEL PEDAL POSI                | %           | <ul> <li>Indicates the accelerator pedal opening value<br/>sent from HV ECU.</li> <li>The opening becomes larger as the value in-<br/>creases</li> </ul>   |         |
| ENG POWER RQST                  | kW          | <ul> <li>Indicates engine power request value sent from<br/>HV ECU.</li> </ul>   |         |
| ENG SPEED RQST                  | rpm         | <ul> <li>Indicates engine speed request signal sent from<br/>HV ECU.</li> </ul>  |         |
| CATALYST TEMP-B1                | °C or °F    | <ul> <li>Indicates the catalyst temperature computed by<br/>ECM according to the input signals.</li> </ul>   |         |
| ENG START RQST                  | YES/NO      | <ul> <li>Indicates [YES/NO] condition of engine start re-<br/>quest signal sent from HV ECU.</li> </ul>  |         |
| ENG IDLE RQST                   | YES/NO      | <ul> <li>Indicates [YES/NO] condition of engine idle re-<br/>quest signal sent from HV ECU.</li> </ul>   |         |
| ENG F/C RQST                    | YES/NO      | <ul> <li>Indicates [YES/NO] condition of fuel cut request<br/>signal sent from HV ECU.</li> </ul>  |         |
| EVAP LEAK DIAG                  | YET/CMPLT   | <ul> <li>Indicates the condition of EVAP leak diagnosis.<br/>YET: EVAP leak diagnosis has not been per-<br/>formed yet.<br/>CMPLT: EVAP leak diagnosis has been per-<br/>formed 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>                         |         |
| ENG START DIAG                  | YET/CMPLT   | <ul> <li>Indicates the condition of engine does not start<br/>diagnosis.</li> <li>YET: Diagnosis has not been performed yet.</li> <li>CMPLT: Diagnosis has been performed success-<br/>fully.</li> </ul> |         |
| ENG ST DIAG RSLT                | NOTNG/NG    | Indicates engine does not start diagnosis result.  |         |
| HO2 S2 DIAG2 (B1)*              | INCMP/CMPLT | <ul> <li>Indicates DTC P0139 self-diagnosis (slow responce) condition.</li> <li>INCMP: Self-diagnosis is incomplete.</li> <li>CMPLT: Self-diagnosis is complete.</li> </ul>                              |         |
| HO2 S2 DIAG2 (B2)*              | INCMP/CMPLT | <ul> <li>Indicates DTC P0159 self-diagnosis (slow responce) condition.</li> <li>INCMP: Self-diagnosis is incomplete.</li> <li>CMPLT: Self-diagnosis is complete.</li> </ul>                              |         |
| A/F SEN1 DIAG2(B1) <sup>*</sup> | INCMP/CMPLT | <ul> <li>Indicates DTC P0133 self-diagnosis condition.</li> <li>INCMP: Self-diagnosis is incomplete.</li> <li>CMPLT: Self-diagnosis is complete.</li> </ul>  |         |
| A/F SEN1 DIAG2(B2)*             | INCMP/CMPLT | <ul> <li>Indicates DTC P0153 self-diagnosis condition.</li> <li>INCMP: Self-diagnosis is incomplete.</li> <li>CMPLT: Self-diagnosis is complete.</li> </ul>  |         |

### NOTE:

\*: The item is indicated, but not used.

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

### ACTIVE TEST MODE

Test Item

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### < FUNCTION DIAGNOSIS >

## [QR25DE]

| TEST ITEM                           | CONDITION   | JUDGMENT   | CHECK ITEM (REMEDY)   |
|-------------------------------------|---|--|---|
| FUEL INJECTION                      | <ul> <li>Ignition switch: ON (READY)</li> <li>Engine: Return to the original trouble condition</li> <li>Change the amount of fuel injection using CONSULT-III.</li> </ul>   | If trouble symptom disappears, see CHECK ITEM.         | <ul> <li>Harness and connectors</li> <li>Fuel injector</li> <li>Air fuel ratio (A/F) sensor 1</li> </ul>  |
| IGNITION TIMING                     | <ul> <li>Ignition switch: ON (READY)</li> <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 disappears, see CHECK ITEM.         | Perform Idle Air Volume Learn-<br>ing.  |
| POWER BALANCE* <sup>1</sup>         | <ul> <li>Ignition switch: ON (READY)</li> <li>Engine: After warming up</li> <li>Selector lever: P</li> <li>Cut off each fuel 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> |
| ENG COOLANT<br>TEMP                 | <ul> <li>Ignition switch: ON (READY)</li> <li>Engine: Return to the original trouble condition</li> <li>Change the engine coolant temperature using CONSULT-III.</li> </ul>   | If trouble symptom disappears, see CHECK ITEM.         | <ul> <li>Harness and connectors</li> <li>Engine coolant temperature sensor</li> <li>Fuel injector</li> </ul>  |
| FUEL PUMP RELAY*2                   | <ul> <li>Ignition switch: ON</li> <li>Turn the fuel pump relay "ON"<br/>and "OFF" using CONSULT-III<br/>and listen to operating sound.</li> </ul>   | Fuel pump relay makes the operat-<br>ing sound.        | <ul><li>Harness and connectors</li><li>Fuel pump relay</li></ul>  |
| PURG VOL CONT/V                     | <ul> <li>Ignition switch: ON (READY)</li> <li>Engine: After warming up, run engine at 1,500 rpm.</li> <li>Change the EVAP canister purge volume control solenoid valve opening percent using CON-SULT-III.</li> </ul> | Engine speed changes according to the opening percent. | <ul><li>Harness and connectors</li><li>Solenoid valve</li></ul>   |
| FUEL/T TEMP SEN                     | Change the fuel tank temperature  | using CONSULT-III.                                     |   |
| VENT CONTROL/V                      | <ul> <li>Ignition switch: ON (Engine stopped)</li> <li>Turn solenoid valve "ON" and "OFF" with the CONSULT-III and listen to operating sound.</li> </ul>  | Solenoid valve makes an operat-<br>ing sound.          | <ul><li>Harness and connectors</li><li>Solenoid valve</li></ul>   |
| V/T ASSIGN ANGLE                    | <ul> <li>Ignition switch: ON (READY)</li> <li>Engine: Return to the original trouble condition</li> <li>Change intake valve timing using CONSULT-III.</li> </ul>  | If trouble symptom disappears, see CHECK ITEM.         | <ul> <li>Harness and connectors</li> <li>Intake valve timing control sole-<br/>noid valve</li> </ul>  |
| FAN DUTY CON-<br>TROL* <sup>3</sup> | <ul> <li>Ignition switch: ON</li> <li>Change duty ratio using CON-<br/>SULT-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>      |

\*1: This item can be executed for 200 seconds after touch "Test Start". If 200 seconds passed, touch "End", and turn ignition switch OFF. \*2: Leaving fuel pump relay OFF with CONSULT-III while ignition switch is ON (READY) position, a certain DTC may be detected.

\*3: Leaving cooling fan OFF with CONSULT-III while engine is running may cause the engine to overheat.

## DTC & SRT CONFIRMATION MODE

SRT STATUS Mode For details, refer to <u>EC-82, "Diagnosis Description"</u>.

### SRT WORK SUPPORT Mode

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

EC-102

## < FUNCTION DIAGNOSIS >

### DTC WORK SUPPORT Mode

| Test mode          | Test item                | Corresponding DTC No. | Reference page |    |
|--------------------|--------------------------|-----------------------|----------------|----|
| EVAPORATIVE SYSTEM | PURG VOL CN/V P1444      | P0443                 | <u>EC-268</u>  | _  |
| EVAPORATIVE STSTEM | PURG FLOW P0441          | P0441                 | <u>EC-263</u>  | EC |
| A/F SEN1           | A/F SEN1(B1) P1278/P1279 | P0133                 | <u>EC-190</u>  | _  |
| A/F SENT           | A/F SEN1(B1) P1276       | P0130                 | <u>EC-179</u>  | C  |
|                    | HO2S2(B1) P1146          | P0138                 | <u>EC-200</u>  |    |
| HO2S2              | HO2S2(B1) P1147          | P0137                 | <u>EC-195</u>  | _  |
|                    | HO2S2(B1) P0139          | P0139                 | <u>EC-207</u>  | D  |
| ENGINE PERFORMANCE | POOR ENG PWR P1196       | P1196                 | <u>EC-328</u>  | _  |

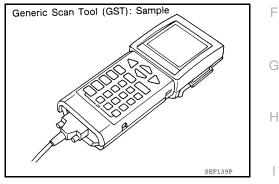
## **Diagnosis Tool Function**

### DESCRIPTION

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

ISO15765-4 is used as the protocol.

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



## FUNCTION

| Diagnostic Service |                  | Function  |
|--------------------|------------------|---|
| Service \$01       | READINESS TESTS  | This diagnostic service gains access to current emission-related data values, including an-<br>alog inputs and outputs, digital inputs and outputs, and system status information.  |
| Service \$02       | (FREEZE DATA)    | This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-442, "DTC Index".  |
| Service \$03       | DTCs             | This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.  |
| Service \$04       | CLEAR DIAG INFO  | <ul> <li>This diagnostic service can clear all emission-related diagnostic information. This includes:</li> <li>Clear number of diagnostic trouble codes (Service \$01)</li> <li>Clear diagnostic trouble codes (Service \$03)</li> <li>Clear trouble code for freeze frame data (Service \$01)</li> <li>Clear freeze frame data (Service \$02)</li> <li>Reset status of system monitoring test (Service \$01)</li> <li>Clear on board monitoring test results (Service \$06 and \$07)</li> </ul> |
| Service \$06       | (ON BOARD TESTS) | This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.  |
| Service \$07       | (ON BOARD TESTS) | This diagnostic service enables the off board test drive to obtain test results for emission-<br>related powertrain components/systems that are continuously monitored during normal<br>driving conditions.   |

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### < FUNCTION DIAGNOSIS >

| Diagnostic Service             |                  | Function   |
|--------------------------------|------------------|--|
| Service \$08                   |                  | <ul> <li>This diagnostic service can close EVAP system in ignition switch ON position (Engine stopped). When this diagnostic service is performed, EVAP canister vent control valve can be closed.</li> <li>In the following conditions, this diagnostic service cannot function.</li> <li>Low ambient temperature</li> <li>Low battery voltage</li> <li>Engine running</li> <li>Ignition switch OFF</li> <li>Low fuel temperature</li> <li>Too much pressure is applied to EVAP system</li> </ul> |
| Service \$09                   | (CALIBRATION ID) | This diagnostic service enables the off-board test device to request specific vehicle infor-<br>mation such as Vehicle Identification Number (VIN) and Calibration IDs.  |
| Service \$0A <sup>*1, *2</sup> | PERMANENT DTCs   | This diagnostic service gains access to permanent DTCs which were stored by ECM.   |

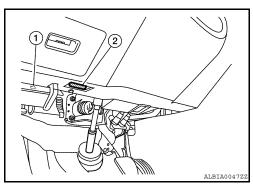
NOTE:

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

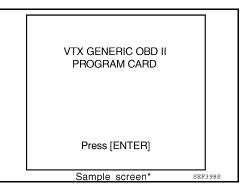
\*: Although HL32 models do not support Service \$0A, it is shown on GST screen.

## INSPECTION PROCEDURE

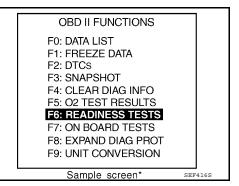
- 1. Turn ignition switch OFF.
- 2. Connect "GST" to data link connector (2), which is located under LH dash panel near the hood opener handle (1).
- 3. Turn ignition switch ON.



 Enter the program according to instruction on the screen or in the operation manual.
 (\*: Regarding GST screens in this section, sample screens are shown.)



 Perform each diagnostic mode according to each service procedure.
 For further information, see the GST Operation Manual of the tool maker.



### Revision: September 2009

### TROUBLE DIAGNOSIS - SPECIFICATION VALUE

### < COMPONENT DIAGNOSIS >

# COMPONENT DIAGNOSIS

## TROUBLE DIAGNOSIS - SPECIFICATION VALUE

## Description

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

MIL. The SP value will be displayed for the following three items:

Make sure that all of the following conditions are satisfied.Vehicle driven distance: More than 5,000 km (3,107 miles)

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)

Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm<sup>2</sup>, 14.25 - 15.12 psi)

• MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

## Component Function Check

## **1**.START

| <ul> <li>Atmospheric temperature: 20 - 30°C (68 - 86°F)</li> <li>Engine coolant temperature: 75 - 95°C (167 - 203°F)</li> <li>Transmission: Warmed-up (After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.)</li> <li>Engine speed: Idle</li> </ul> | I   |
|--|-----|
| >> GO TO 2.  | J   |
| 2.PERFORM "SPEC" OF "DATA MONITOR" MODE  |     |
| With CONSULT-III   | Κ   |
| NOTE:<br>Perform "SPEC" in "DATA MONITOR" mode in maximum scale display.   |     |
| <ol> <li>Lift up the vehicle.</li> <li>Perform <u>EC-11, "BASIC INSPECTION : Special Repair Requirement"</u>.</li> </ol>   | L   |
| 3. Turn ignition switch ON (READY).  |     |
| <ol> <li>Depressed the accelerator pedal and keep it.</li> <li>Shift the selector lever to N position with engine running.</li> </ol>  | M   |
| CAUTION:   | IVI |
| Never leave the selector lever in the N position for a long period of time. In the N position, the   |     |
| <ul> <li>engine operates but electricity cannot be generated.</li> <li>6. Select "B/FUEL SCHDL", "A/F ALPHA-B1" and "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode</li> </ul>  | Ν   |
| with CONSULT-III.  |     |
| <ol> <li>Make sure that monitor items are within the SP value.</li> <li>Shift the selector lever to P position.</li> </ol>   | 0   |
| Is the inspection result normal?   |     |
| YES >> END   |     |
| NO >> Go to <u>EC-106, "Diagnosis Procedure"</u> .   | Ρ   |
|  |     |

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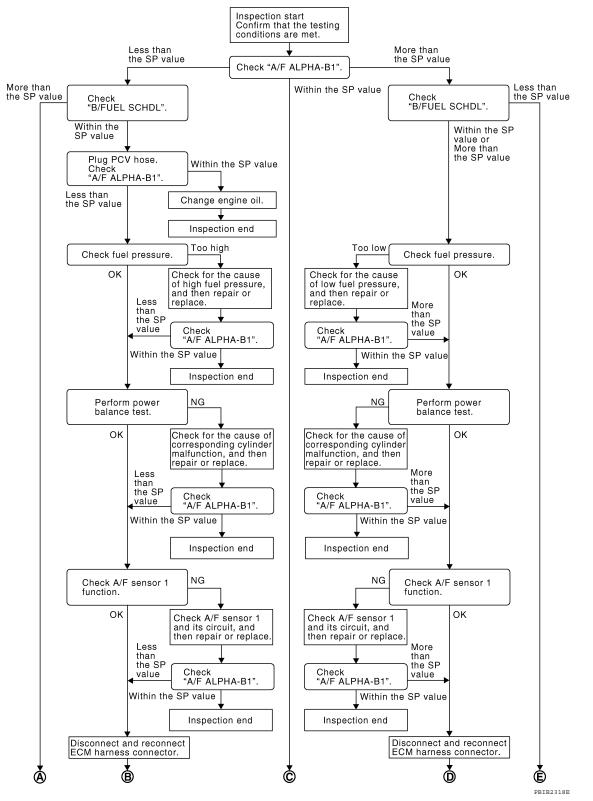
## **TROUBLE DIAGNOSIS - SPECIFICATION VALUE**

## < COMPONENT DIAGNOSIS >

## **Diagnosis** Procedure

[QR25DE]

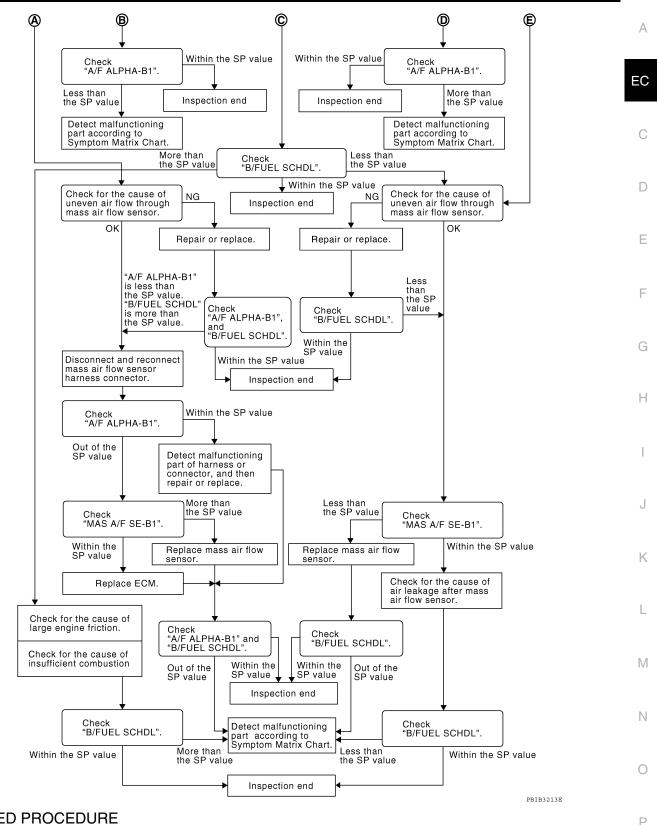
## **OVERALL SEQUENCE**



## **TROUBLE DIAGNOSIS - SPECIFICATION VALUE**

### < COMPONENT DIAGNOSIS >

[QR25DE]



## DETAILED PROCEDURE

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

## (P)With CONSULT-III

- Confirm that the testing conditions are met. Refer to EC-105. "Component Function Check". 1.
- 2. Lift up the vehicle.
- 3. Turn ignition switch ON (READY).
- 4. Depressed the accelerator pedal and keep it.

## **TROUBLE DIAGNOSIS - SPECIFICATION VALUE**

- [QR25DE] < COMPONENT DIAGNOSIS > Shift the selector lever to N position with engine running. 5 **CAUTION:** Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the each indication is 6. within the SP value. NOTE: Check "A/F ALPHA-B1" for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little. Is the measurement value within the SP value? YES >> GO TO 17. NO-1 >> Less than the SP value: GO TO 2. NO-2 >> More than the SP value: GO TO 3. 2.CHECK "B/FUEL SCHDL" Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is 1. within the SP value. 2. Shift the selector lever to P position. Is the measurement value within the SP value? YES >> GO TO 4. NO >> More than the SP value: GO TO 19. 3. CHECK "B/FUEL SCHDL" Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is 1. within the SP value. 2. Shift the selector lever to P position. Is the measurement value within the SP value? YES >> GO TO 6. NO-1 >> More than the SP value: GO TO 6. NO-2 >> Less than the SP value: GO TO 25. 4.CHECK "A/F ALPHA-B1" 1. Turn ignition switch OFF. 2. Disconnect PCV hose, and then plug it. 3. Turn ignition switch ON (READY). 4. Depressed the accelerator pedal and keep it. 5. Shift the selector lever to N position with engine running. CAUTION: Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within 6 the SP value. 7. Shift the selector lever to P position.
- Is the measurement value within the SP value?
- YES >> GO TO 5. NO >> GO TO 6.
- NU >> GUIU6.
- **5.**CHANGE ENGINE OIL
- 1. Turn ignition switch OFF.
- 2. Change engine oil. NOTE:

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

>> INSPECTION END

**6.**CHECK FUEL PRESSURE

| TROUBLE DIAGNOSIS - SPECIFICATION VALUE  |                            |
|--|----------------------------|
| < COMPONENT DIAGNOSIS >  | [QR25DE]                   |
| Check fuel pressure. (Refer to <u>EC-465, "Inspection"</u> .)  | л                          |
| Is the inspection result normal?   | Α                          |
| YES >> GO TO 9.<br>NO-1 >> Fuel pressure is too high: Replace "fuel filter and fuel pump assembly" and then GO   |                            |
| NO-1 >> Fuel pressure is too low: GO TO 7.   | EC                         |
| 7. DETECT MALFUNCTIONING PART  |                            |
| Check fuel hoses and fuel tubes for clogging   | 0                          |
| Is the inspection result normal?   |                            |
| YES >> Replace "fuel filter and fuel pump assembly" and then GO TO 8.<br>NO >> Repair or replace and then GO TO 8.   |                            |
| <b>8.</b> CHECK "A/F ALPHA-B1"   | D                          |
|  |                            |
| <ol> <li>Turn ignition switch ON (READY).</li> <li>Depressed the accelerator pedal and keep it.</li> </ol>   | E                          |
| 3. Shift the selector lever to N position with engine running.   | L                          |
| CAUTION:   |                            |
| Never leave the selector lever in the N position for a long period of time. In the N   | position, the <sub>F</sub> |
| <ul> <li>engine operates but electricity cannot be generated.</li> <li>Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indic</li> </ul> | ation is within            |
| the SP value.  |                            |
| 5. Shift the selector lever to P position.   | (                          |
| Is the measurement value within the SP value?  |                            |
| YES >> INSPECTION END<br>NO >> GO TO 9.  | ŀ                          |
| •  |                            |
| 9. PERFORM POWER BALANCE TEST  |                            |
| <ol> <li>Perform "POWER BALANCE" in "ACTIVE TEST" mode.</li> <li>Make sure that the each cylinder produces a momentary engine speed drop.</li> </ol>                   |                            |
| Is the inspection result normal?   |                            |
| YES >> GO TO 12.   |                            |
| NO $>>$ GO TO 10.  |                            |
| 10. DETECT MALFUNCTIONING PART   |                            |
| Check the following.   |                            |
| 1. Ignition coil and its circuit (Refer to <u>EC-390, "Component Function Check"</u> .)  |                            |
| 2. Fuel injector and its circuit (Refer to EC-237, "Diagnosis Procedure".)   |                            |
| <ol> <li>Intake air leakage</li> <li>Low compression pressure (Refer to <u>EM-22, "Compression Pressure"</u>.)</li> </ol>  |                            |
| Is the inspection result normal?   |                            |
| YES $\rightarrow$ Replace fuel injector and then GO TO 11.   | 1                          |
| NO >> Repair or replace malfunctioning part and then GO TO 11.   |                            |
| <b>11.</b> CHECK "A/F ALPHA-B1"  |                            |
| 1. Turn ignition switch ON (READY).  |                            |
| 2. Depressed the accelerator pedal and keep it.  |                            |
| 3. Shift the selector lever to N position with engine running.   |                            |
| CAUTION:<br>Never leave the selector lever in the N position for a long period of time. In the N   | (<br>nosition the          |
| engine operates but electricity cannot be generated.   | position, the              |
| 4. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indic  | ation is within            |
| the SP value.  |                            |
| 5. Shift the selector lever to P position.   |                            |
| <u>Is the measurement value within the SP value?</u><br>YES >> INSPECTION END  |                            |
| NO $>>$ GO TO 12.  |                            |
| 12. CHECK A/F SENSOR 1 FUNCTION  |                            |
|  |                            |

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- Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1.
- For DTC P0130, refer to <u>EC-179, "DTC Logic"</u>.
- For DTC P0131, refer to EC-183, "DTC Logic"
- For DTC P0132, refer to <u>EC-186, "DTC Logic"</u>.
  For DTC P0133, refer to <u>EC-190, "DTC Logic"</u>.
- For DTC P0133, refer to <u>EC-190, DTC Logic</u>.
   For DTC P2A00, refer to EC-375, "DTC Logic".

Is any DTC detected?

YES >> GO TO 15.

NO >> GO TO 13.

13.CHECK A/F SENSOR 1 CIRCUIT

Perform DIAGNOSTIC PROCEDURE according to corresponding DTC.

>> GO TO 14.

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

- 1. Lift up the vehicle.
- 2. Turn ignition switch ON (READY).
- 3. Depressed the accelerator pedal and keep it.
- 4. Shift the selector lever to N position with engine running.
- CAUTION: Never leave the selector lever in the N position for a long period of time. In the N position, the
- engine operates but electricity cannot be generated.
  5. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the each indication is within the SP value.
- 6. Shift the selector lever to P position.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> GO TO 15.

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

**16.**CHECK "A/F ALPHA-B1"

- 1. Lift up the vehicle.
- 2. Turn ignition switch ON (READY).
- 3. Depressed the accelerator pedal and keep it.
- 4. Shift the selector lever to N position with engine running. CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

- 5. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.
- 6. Shift the selector lever to P position.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to <u>EC-454, "Symptom Table"</u>.

**17.**CHECK "B/FUEL SCHDL"

- 1. Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.
- 2. Shift the selector lever to P position.

Is the measurement value within the SP value?

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

| < COMPONENT DIAGNOSIS >  | [QR25DE]     |
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| NO-2 >> Less than the SP value: GO TO 25.  |              |
| 18. DETECT MALFUNCTIONING PART   | A            |
| <ol> <li>Check for the cause of large engine friction. Refer to the following.</li> <li>Engine oil level is too high</li> <li>Engine oil viscosity</li> <li>Belt tension of power steering, alternator, A/C compressor, etc. is excessive</li> <li>Noise from engine</li> <li>Noise from transmission, etc.</li> <li>Check for the cause of insufficient combustion. Refer to the following.</li> <li>Valve clearance malfunction</li> <li>Intake valve timing control function malfunction</li> </ol>   | EC<br>C<br>D |
| - Camshaft sprocket installation malfunction, etc.   |              |
| >> Repair or replace malfunctioning part, and then GO TO 30.<br><b>19.</b> CHECK INTAKE SYSTEM   | E            |
| <ul><li>Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.</li><li>Crushed air ducts</li><li>Malfunctioning seal of air cleaner element</li></ul>  | F            |
| <ul> <li>Uneven dirt of air cleaner element</li> <li>Improper specification of intake air system</li> <li>Is the inspection result normal?</li> </ul>  | G            |
| YES >> GO TO 21.<br>NO >> Repair or replace malfunctioning part, and then GO TO 20.  | Н            |
| 20.CHECK "A/F ALPHA-B1", AND "B/FUEL SCHDL"  |              |
| <ol> <li>Lift up the vehicle.</li> <li>Turn ignition switch ON (READY).</li> <li>Depressed the accelerator pedal and keep it.</li> <li>Shift the selector lever to N position with engine running.</li> </ol>  | I            |
| <ul> <li>CAUTION:<br/>Never leave the selector lever in the N position for a long period of time. In the N period of time operates but electricity cannot be generated.</li> <li>5. Select "A/F ALPHA-B1" and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and m the each indication is within the SP value.</li> <li>6. Shift the selector lever to P position.</li> </ul>  | •            |
| Is the measurement value within the SP value?  | I            |
| YES >> <b>INSPECTION END</b><br>NO >> "B/FUEL SCHDL" is more, "A/F ALPHA-B1" is less than the SP value: GO TO 21.  | L            |
| 21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR  | 5.4          |
| <ol> <li>Turn ignition switch OFF.</li> <li>Disconnect mass air flow sensor harness connector. Check pin terminal and connector for<br/>then reconnect it again.</li> </ol>  |              |
| >> GO TO 22.   |              |
| 22.CHECK "A/F ALPHA-B1"  | 0            |
| <ol> <li>Lift up the vehicle.</li> <li>Turn ignition switch ON (READY).</li> <li>Depressed the accelerator pedal and keep it.</li> <li>Shift the selector lever to N position with engine running.<br/>CAUTION:</li> </ol>   | P            |
| <ul> <li>Never leave the selector lever in the N position for a long period of time. In the N period of time operates but electricity cannot be generated.</li> <li>5. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication of the select of the sele</li></ul> |              |

- Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within 5. the SP value.
- 6. Shift the selector lever to P position.

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#### Is the measurement value within the SP value?

- YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to <u>EC-144, "DTC</u> <u>Logic"</u>. Then GO TO 29.
- NO >> GO TO 23.

23.CHECK "MAS A/F SE-B1"

- 1. Depressed the accelerator pedal and keep it.
- 2. Shift the selector lever to N position with engine running. CAUTION:
  - Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.
- 3. Select "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.
- 4. Shift the selector lever to P position.
- Is the measurement value within the SP value?

YES >> GO TO 24.

NO >> More than the SP value: Replace mass air flow sensor, and then GO TO 29.

## 24.REPLACE ECM

1. Replace ECM.

2. Go to EC-14, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 29.

### 25. CHECK INTAKE SYSTEM

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

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

Is the inspection result normal?

- YES >> GO TO 27.
- NO >> Repair or replace malfunctioning part, and then GO TO 26.

26. CHECK "B/FUEL SCHDL"

- 1. Lift up the vehicle.
- 2. Turn ignition switch ON (READY).
- 3. Depressed the accelerator pedal and keep it.
- 4. Shift the selector lever to N position with engine running. CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

- 5. Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.
- 6. Shift the selector lever to P position.

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"

- 1. Lift up the vehicle.
- 2. Turn ignition switch ON (READY).
- 3. Depressed the accelerator pedal and keep it.
- 4. Shift the selector lever to N position with engine running. CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

| < COMPONENT DIAGNOSIS > [QR25DE]   |            |
|--|------------|
| 5. Select "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is   |            |
| within the SP value.   | А          |
| 6. Shift the selector lever to P position.   |            |
| Is the measurement value within the SP value?<br>YES >> GO TO 28.  | <b>F</b> 0 |
| YES >> GO TO 28.<br>NO >> Less than the SP value: Replace mass air flow sensor, and then GO TO 30.   | EC         |
| 28. CHECK INTAKE SYSTEM  |            |
|  | С          |
| Check for the cause of air leak after the mass air flow sensor. Refer to the following. <ul> <li>Disconnection, looseness, and cracks in air duct</li> </ul>                           |            |
| Looseness of oil filler cap  |            |
| Disconnection of oil level gauge   | D          |
| Open stuck, breakage, hose disconnection, or cracks of PCV valve     Disconnection or cracks of EVAD purge base, open stuck of EVAD conjector purge values control colonaid            |            |
| <ul> <li>Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid<br/>valve</li> </ul>  | _          |
| Malfunctioning seal of rocker cover gasket   | E          |
| • Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts   |            |
| <ul> <li>Malfunctioning seal of intake air system, etc.</li> </ul>   | F          |
|  | 1          |
| >> GO TO 30.   |            |
| 29. CHECK "A/F ALPHA-B1" AND "B/FUEL SCHDL"  | G          |
| 1. Lift up the vehicle.  |            |
| <ol> <li>Turn ignition switch ON (READY).</li> <li>Depressed the accelerator pedal and keep it.</li> </ol>   |            |
| 4. Shift the selector lever to N position with engine running.   | Н          |
| CAUTION:   |            |
| Never leave the selector lever in the N position for a long period of time. In the N position, the   | 1          |
| <ul> <li>engine operates but electricity cannot be generated.</li> <li>5. Select "A/F ALPHA-B1" and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that</li> </ul>     |            |
| the indication is within the SP value.   |            |
| 6. Shift the selector lever to P position.   | J          |
| Is the measurement value within the SP value?  |            |
| YES >> INSPECTION END  |            |
| NO >> Detect malfunctioning part according to <u>EC-454, "Symptom Table"</u> .   | Κ          |
| <b>30.</b> CHECK "B/FUEL SCHDL"  |            |
| 1. Lift up the vehicle.  | I          |
| 2. Turn ignition switch ON (READY).  |            |
| <ol> <li>Depressed the accelerator pedal and keep it.</li> <li>Shift the selector lever to N position with engine running.</li> </ol>  |            |
| CAUTION:   | M          |
| Never leave the selector lever in the N position for a long period of time. In the N position, the   |            |
| <ul> <li>engine operates but electricity cannot be generated.</li> <li>5. Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and then make sure that the indication is</li> </ul> |            |
| within the SP value.   | Ν          |
| 6. Shift the selector lever to P position.   |            |
| Is the measurement value within the SP value?  | 0          |
| YES >> INSPECTION END  | 0          |
| NO >> Detect malfunctioning part according to <u>EC-454, "Symptom Table"</u> .   |            |
|  | Ρ          |
|  |            |

## POWER SUPPLY AND GROUND CIRCUIT

### Diagnosis Procedure

### **1.**INSPECTION START

- 1. Turn ignition switch ON (READY).
- 2. Depress accelerator pedal.

#### Is engine running?

YES >> GO TO 8. NO >> GO TO 2.

## 2.CHECK ECM POWER SUPPLY CIRCUIT-I

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

| ECM       |          | Ground | Voltage         |
|-----------|----------|--------|-----------------|
| Connector | Terminal | Ground | voltage         |
| E10       | 93       | Ground | Battery voltage |

Is the inspection result normal?

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

**3.** DETECT MALFUNCTIONING PART

Check the following.

IPDM E/R harness connector E18

- 10A fuse (No. 35)
- Harness for open or short between ECM and fuse

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

4.CHECK GROUND CONNECTION-I

- 1. Turn ignition switch OFF.
- 2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace ground connection.

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

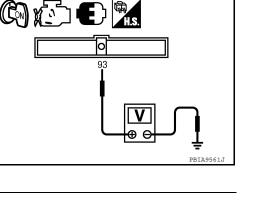
1. Disconnect ECM harness connectors.

2. Check the continuity between ECM harness connector and ground.

| E         | CM       | Ground | Continuity |
|-----------|----------|--------|------------|
| Connector | Terminal | Ground | Continuity |
| F14       | 12       |        |            |
| F14       | 16       |        |            |
|           | 107      | Ground | Existed    |
| E10       | 108      | Ground | LAISted    |
| EIU       | 111      |        |            |
|           | 112      |        |            |

3. Also check harness for short to power.

Is the inspection result normal?



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## POWER SUPPLY AND GROUND CIRCUIT

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6.DETECT MALFUNCTIONING PART

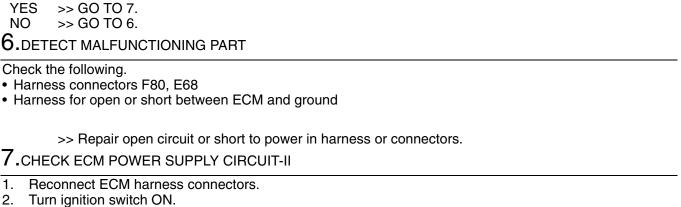
>> GO TO 7.

>> GO TO 6.

Harness connectors F80, E68

Check the following.

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- Turn ignition switch ON. 2. 3. Check the voltage between IPDM E/R harness connector and
  - ground.

1.

YES

NO

| IPDM E/R  |          | Ground | Voltage         |
|-----------|----------|--------|-----------------|
| Connector | Terminal | Grouna | voltage         |
| F10       | 53       | Ground | Battery voltage |

Is the inspection result normal?

YES >> Go to EC-390, "Diagnosis Procedure".

NO >> GO TO 8.

### 8. CHECK ECM POWER SUPPLY CIRCUIT-III

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

| EC        | CM       | Ground | Voltage  |
|-----------|----------|--------|--|
| Connector | Terminal | Ground | voliage  |
| E10       | 105      | Ground | After turning ignition switch OFF, battery volt-<br>age will exist for a few seconds, then drop ap-<br>proximately 0V. |

#### Is the inspection result normal?

YES >> GO TO 14.

NO-1 >> Battery voltage does not exist: GO TO 9.

NO-2 >> Battery voltage exists for more than a few seconds: GO TO 12.

### 9.CHECK ECM POWER SUPPLY CIRCUIT-IV

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

| ECM       |          | Ground | Voltage         |
|-----------|----------|--------|-----------------|
| Connector | Terminal | Ground | voltage         |
| F14       | 24       | Ground | Battery voltage |

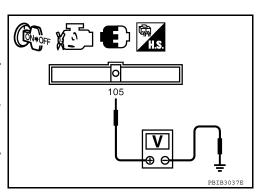
#### Is the inspection result normal?

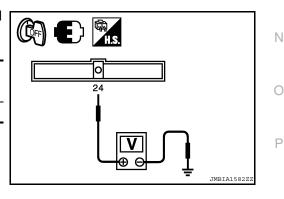
YES >> GO TO 10.

NO >> GO TO 12.

## 10. CHECK ECM POWER SUPPLY CIRCUIT-V

- Disconnect ECM harness connector. 1.
- Disconnect IPDM E/R harness connector E18. 2.
- 3. Check the continuity between ECM harness connector and IPDM E/R harness connector.





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## POWER SUPPLY AND GROUND CIRCUIT

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| ECM       |          | IPDM E/R           |    | Continuity |
|-----------|----------|--------------------|----|------------|
| Connector | Terminal | Connector Terminal |    | Continuity |
| E10       | 105      | E18                | 10 | Existed    |

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

Is the inspection result normal?

YES >> GO TO 17.

NO >> GO TO 11.

**11.** DETECT MALFUNCTIONING PART

Check the following.

Junction block connectors E44, E45

• 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 ECM POWER SUPPLY CIRCUIT-VI

1. Disconnect ECM harness connector.

2. Disconnect IPDM E/R harness connector F10.

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

| ECM       |          | IPDM E/R           |    | Continuity |
|-----------|----------|--------------------|----|------------|
| Connector | Terminal | Connector Terminal |    | Continuity |
| F14       | 24       | F10                | 69 | Existed    |

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

Is the inspection result normal?

YES >> GO TO 13.

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

## **13.**CHECK 15A FUSE

- 1. Disconnect 15A fuse (No. 42) from IPDM E/R.
- 2. Check 15A fuse.

Is the inspection result normal?

YES >> GO TO 17.

NO >> Replace 15A fuse (No. 42).

14. CHECK GROUND CONNECTION-II

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

```
YES >> GO TO 15.
```

NO >> Repair or replace ground connection.

15. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.

2. Check the continuity between ECM harness connector and ground.

## POWER SUPPLY AND GROUND CIRCUIT

#### < COMPONENT DIAGNOSIS >

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| E   | CM  | Ground                  | Continuity           |      |      |
|---|---|-------------------------|----------------------|------|------|
| Connector   | Terminal  | Ground                  | Continuity           |      |      |
| F14   | 12  |                         |                      |      |      |
| 1 14  | 16  |                         |                      |      |      |
|   | 107   | Ground                  | Existed              |      |      |
| E10   | 108   | Ground                  | Existed              |      |      |
| LIU   | 111   |                         |                      |      |      |
|   | 112   |                         |                      |      |      |
|   | narness for short   | to power.               |                      |      |      |
|   | result normal?  |                         |                      |      |      |
| YES >> GO<br>NO >> GO   |   |                         |                      |      |      |
|   | IALFUNCTIONIN   |                         |                      |      |      |
|   |   | GPARI                   |                      |      |      |
| heck the follow   | nnectors F80, E6  | 8                       |                      |      |      |
|   |   | een ECM and gro         | und                  |      |      |
|   |   | -                       |                      |      |      |
|   |   |                         |                      |      |      |
|   |   |                         | harness or connected | rs.  |      |
|   | air open circuit o<br>TERMITTENT IN                                     |                         | harness or connecto  | ors. |      |
| 7.CHECK IN  | TERMITTENT IN   | CIDENT                  | harness or connecte  | ors. | <br> |
| <b>7.</b> CHECK IN<br>refer to <u>GI-42, "</u>                                |   | CIDENT                  | harness or connecte  | ors. |      |
| 7.CHECK IN<br>refer to <u>GI-42, "</u><br>the inspection<br>YES >> Rep        | TERMITTENT IN<br>Intermittent Incid<br>result normal?<br>lace IPDM E/R. | CIDENT<br><u>ent"</u> . |                      |      | <br> |
| 7.CHECK IN<br>refer to <u>GI-42, "</u><br>the inspection<br>YES >> Rep        | TERMITTENT IN<br>Intermittent Incid<br>result normal?<br>lace IPDM E/R. | CIDENT<br><u>ent"</u> . | harness or connecte  |      | <br> |
| 7.CHECK IN<br>efer to <u>GI-42, "</u><br>the inspection<br>YES >> Rep         | TERMITTENT IN<br>Intermittent Incid<br>result normal?<br>lace IPDM E/R. | CIDENT<br><u>ent"</u> . |                      |      | <br> |
| 7.CHECK IN<br>refer to <u>GI-42, "</u><br>the inspection<br>YES >> Rep        | TERMITTENT IN<br>Intermittent Incid<br>result normal?<br>lace IPDM E/R. | CIDENT<br><u>ent"</u> . |                      |      |      |
| 7.CHECK IN<br>refer to <u>GI-42, "</u><br>the inspection<br>YES >> Rep        | TERMITTENT IN<br>Intermittent Incid<br>result normal?<br>lace IPDM E/R. | CIDENT<br><u>ent"</u> . |                      |      |      |
| 7.CHECK IN<br>refer to <u>GI-42, "</u><br>the inspection<br>YES >> Rep        | TERMITTENT IN<br>Intermittent Incid<br>result normal?<br>lace IPDM E/R. | CIDENT<br><u>ent"</u> . |                      |      |      |
| 7.CHECK IN<br>refer to <u>GI-42, "</u><br>the inspection<br>YES >> Rep        | TERMITTENT IN<br>Intermittent Incid<br>result normal?<br>lace IPDM E/R. | CIDENT<br><u>ent"</u> . |                      |      |      |
| 7.CHECK IN<br>efer to <u>GI-42, "</u><br>the inspection<br>YES >> Rep         | TERMITTENT IN<br>Intermittent Incid<br>result normal?<br>lace IPDM E/R. | CIDENT<br><u>ent"</u> . |                      |      |      |
| 7.CHECK IN<br>refer to <u>GI-42, "</u><br>the inspection<br>YES >> Rep        | TERMITTENT IN<br>Intermittent Incid<br>result normal?<br>lace IPDM E/R. | CIDENT<br><u>ent"</u> . |                      |      |      |
| 7.CHECK IN<br>refer to <u>GI-42, "</u><br>the inspection<br>YES >> Rep        | TERMITTENT IN<br>Intermittent Incid<br>result normal?<br>lace IPDM E/R. | CIDENT<br><u>ent"</u> . |                      |      |      |
| <b>7.</b> CHECK IN<br>efer to <u>GI-42, "</u><br>the inspection<br>YES >> Rep | TERMITTENT IN<br>Intermittent Incid<br>result normal?<br>lace IPDM E/R. | CIDENT<br><u>ent"</u> . |                      |      |      |
| 7.CHECK IN<br>refer to <u>GI-42, "</u><br>the inspection<br>YES >> Rep        | TERMITTENT IN<br>Intermittent Incid<br>result normal?<br>lace IPDM E/R. | CIDENT<br><u>ent"</u> . |                      |      |      |
| 7.CHECK IN<br>refer to <u>GI-42, "</u><br>the inspection<br>YES >> Rep        | TERMITTENT IN<br>Intermittent Incid<br>result normal?<br>lace IPDM E/R. | CIDENT<br><u>ent"</u> . |                      |      |      |
| 7.CHECK IN<br>efer to <u>GI-42, "</u><br>the inspection<br>YES >> Rep         | TERMITTENT IN<br>Intermittent Incid<br>result normal?<br>lace IPDM E/R. | CIDENT<br><u>ent"</u> . |                      |      |      |
| 7.CHECK IN<br>refer to <u>GI-42, "</u><br>the inspection<br>YES >> Rep        | TERMITTENT IN<br>Intermittent Incid<br>result normal?<br>lace IPDM E/R. | CIDENT<br><u>ent"</u> . |                      |      |      |
| 7.CHECK IN<br>efer to <u>GI-42, "</u><br>the inspection<br>YES >> Rep         | TERMITTENT IN<br>Intermittent Incid<br>result normal?<br>lace IPDM E/R. | CIDENT<br><u>ent"</u> . |                      |      |      |

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## U0129, U1022 CAN COMM CIRCUIT

## **DTC** Logic

INFOID:000000005441686

[QR25DE]

### DTC DETECTION LOGIC

| DTC No. | Trouble diagnosis name | DTC detecting condition  | Possible cause   |
|---------|------------------------|--|--|
| U0129   | Lost communication     | CAN communication signal of OBD (emission related diagnosis) is not received between brake ECU and ECM for 1 second or more.                 | HEV SYSTEM CAN communication<br>line between brake ECU and ECM |
| U1022   | with brake ECU         | CAN communication signal other than OBD (emis-<br>sion related diagnosis) is not received between<br>brake ECU and ECM for 1 second or more. | HEV SYSTEM CAN communication<br>line short                     |

### DTC CONFIRMATION PROCEDURE

## **1.**PERFORM DTC CONFIRMATION PROCEDURE

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

2. Check DTC.

#### Is DTC detected?

YES >> EC-118, "Diagnosis Procedure". NO >> INSPECTION END

### **Diagnosis** Procedure

Go to LAN-4, "Description".

INFOID:000000005441687

## **U0164 CAN COMM CIRCUIT**

## Description

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

## DTC Logic

INFOID:000000005441689

[QR25DE]

INFOID:000000005441688

### DTC DETECTION LOGIC

| DTC No.                                    | Trouble diagnosis name                               | DTC detecting condition  | Possible cause   |
|--|--|--|--|
| U0164                                      | Lost communication<br>with Controller (auto<br>amp.) | When ECM is not transmitting or receiving CAN com-<br>munication signal of OBD (emission related diagno-<br>sis) with Controller (auto amp.) for 2 seconds or<br>more. | CAN communication line between<br>Controller (auto amp.) and ECM<br>(CAN communication line is open or<br>shorted) |
|  | FIRMATION PRO  | CEDURE<br>ATION PROCEDURE  |  |
| 2. Check<br>Is DTC dete<br>YES >><br>NO >> | DTC.   |  | INFOID:0000000544165   |
| Go to <u>LAN-</u>                          | 17, "Trouble Diagno                                  | <u>sis Flow Chart"</u> .   |  |
|  |  |  |  |
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## U0293, U1020 CAN COMM CIRCUIT

## DTC Logic

INFOID:000000005441691

[QR25DE]

### DTC DETECTION LOGIC

| DTC No. | Trouble diagnosis name            | DTC detecting condition   | Possible cause  |
|---------|-----------------------------------|---|---|
| U0293   | Lost communication<br>with HV ECU | CAN communication signal of OBD (emission related diagnosis) is not received between HV ECU and ECM for 1 second or more.                 | HEV SYSTEM CAN communication<br>line between HV ECU and ECM |
| U1020   |                                   | CAN communication signal other than OBD (emis-<br>sion related diagnosis) is not received between HV<br>ECU and ECM for 1 second or more. | HEV SYSTEM CAN communication<br>line short                  |

### 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 >> <u>EC-120. "Diagnosis Procedure"</u>. NO >> INSPECTION END

NO >> INSPECTION ENL

### **Diagnosis Procedure**

Go to LAN-4, "Description".

INFOID:000000005441692

## U0400, U1021 CAN COMM DATA

## DTC Logic

DTC DETECTION LOGIC

| DTC No.   | Trouble diagnosis name  | DTC detecting condition  | Possible cause   |  |  |
|---|---|--|--|--|--|
| U0400   | Invalid data received from  | SUM data on CAN signal of OBD (emission re-<br>lated diagnosis) from HV ECU is different from<br>SUM data calculated by ECM.       | Harness or connectors<br>(HEV SYSTEM CAN communication |  |  |
| U1021   | hybrid vehicle control ECU  | SUM data on CAN signal other than OBD<br>(emission related diagnosis) from HV ECU is<br>different from SUM data calculated by ECM. | line is open or shorted)<br>• ECM<br>• HV ECU          |  |  |
| DTC CON   | FIRMATION PROCED  | URE  |  |  |  |
| <b>1</b> .PERFO                                   | RM DTC CONFIRMATIO  | N PROCEDURE  |  |  |  |
| 1. Turn ig<br>2. Check                            | nition switch ON and wai<br>DTC.  | t at least 3 seconds.  |  |  |  |
| <u>Is DTC det</u>                                 |   |  |  |  |  |
|   | <ul> <li>Go to <u>EC-121, "Diagnos</u></li> <li>INSPECTION END</li> </ul> | sis Procedure".  |  |  |  |
| Diagnosi  | s Procedure   |  | INFOID:000000005441694                                 |  |  |
| <b>1.</b> CHECK                                   | HEV SYSTEM CAN CO   | MMUNICATION CIRCUIT  |  |  |  |
|   | N-17, "Trouble Diagnosis  | s Procedure".  |  |  |  |
|   | ection result normal?<br>• GO TO 2.                                       |  |  |  |  |
| NO >>   | NO >> Repair or replace.  |  |  |  |  |
| 2.REPLACE ECM                                     |   |  |  |  |  |
| 2. Go to  | e ECM.<br>EC-14, "ADDITIONAL SE   | ERVICE WHEN REPLACING CONTRO   | L UNIT : Special Repair Require-                       |  |  |
| <u>ment"</u> .                                    |   |  |  |  |  |
| ~   | • GO TO 3.  |  |  |  |  |
| <u> </u>  | RM DTC CONFIRMATIO  | N PROCEDURE  |  |  |  |
| With CO I. Turn ig                                | NSULT-III<br>nition switch ON.  |  |  |  |  |
|   | "SELF-DIAG RESULTS"<br>"ERASE".   | mode with CONSULT-III.   |  |  |  |
| 4. Perform  | m DTC CONFIRMATION  | PROCEDURE.   |  |  |  |
| See <u>EC-121, "DTC Logic"</u> .<br>5. Check DTC. |   |  |  |  |  |
| With GST     Turn ignition switch ON.             |   |  |  |  |  |
| 2. Select   | "Service \$04" with GST.<br>n DTC CONFIRMATION                            | PROCEDURE  |  |  |  |
|   | <u>C-121, "DTC Logic"</u> .   |  |  |  |  |
|   | U0400 or U1021 display  | ed again?  |  |  |  |
| <u>13 IIIC D I C</u>                              |   |  |  |  |  |
| YES >>  | GO TO 4.<br>INSPECTION END  |  |  |  |  |

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- 1. Replace HV ECU.
- 2. Go to <u>HBC-12</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

## U0418, U1023 CAN COMM DATA

< COMPONENT DIAGNOSIS >

## U0418, U1023 CAN COMM DATA

## DTC Logic

DTC DETECTION LOGIC

| DTC No.  | Trouble diagnosis name                      | DTC detecting condition   | Possible cause   |  |  |
|--|---|---|--|--|--|
| U0418  | Invalid data received from                  | SUM data on CAN signal of OBD (emission re-<br>lated diagnosis) from brake ECU is different<br>from SUM data calculated by ECM.       | <ul> <li>Harness or connectors<br/>(HEV SYSTEM CAN communication<br/>line is open or shorted)</li> </ul> |  |  |
| U1023  | brake ECU                                   | SUM data on CAN signal other than OBD<br>(emission related diagnosis) from brake ECU is<br>different from SUM data calculated by ECM. | ECM     Brake ECU  |  |  |
| DTC CON  | FIRMATION PROCED                            | URE   |  |  |  |
| 1.PERFO  | RM DTC CONFIRMATIO                          | N PROCEDURE   |  |  |  |
| 2. Check<br>Is DTC dete<br>YES >>  |   |   |  |  |  |
| Diagnosi   | s Procedure                                 |   | INFOID:000000005441696   |  |  |
|  | HEV SYSTEM CAN CO                           | MMUNICATION CIRCUIT   |  |  |  |
|  | N-17, "Trouble Diagnosi                     |   |  |  |  |
| Is the inspe   | ection result normal?                       |   |  |  |  |
| -  | YES >> GO TO 2.<br>NO >> Repair or replace. |   |  |  |  |
| 2.REPLACE ECM  |   |   |  |  |  |
| <ol> <li>Replace ECM.</li> <li>Go to <u>EC-14. "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"</u>.</li> </ol> |   |   |  |  |  |
| ~  | • GO TO 3.                                  |   |  |  |  |
| •  | RM DTC CONFIRMATIO                          | N PROCEDURE   |  |  |  |
| With CO  |   |   |  |  |  |
| 2. Select  |   | mode with CONSULT-III.  |  |  |  |
|  | "ERASE".<br>n DTC CONFIRMATION              | PROCEDURE.  |  |  |  |
| See <u>EC-123, "DTC Logic"</u> .<br>5. Check DTC.  |   |   |  |  |  |
| With GST   |   |   |  |  |  |
| <ol> <li>Turn ignition switch ON.</li> <li>Select "Service \$04" with GST.</li> </ol>  |   |   |  |  |  |
| 3. Perform DTC CONFIRMATION PROCEDURE.<br>See <u>EC-123, "DTC Logic"</u> .   |   |   |  |  |  |
| 4. Check   | DTC.<br>U0418 or U1023 display              | ed anain?   |  |  |  |
| YES >>   | GO TO 4.                                    |   |  |  |  |
|  | NSPECTION END                               |   |  |  |  |
| +.KEPLA  | CE BRAKE ECU                                |   |  |  |  |

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- 1. Replace brake ECU.
- 2. Go to <u>BRC-193, "Exploded View"</u>.

>> INSPECTION END

## **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:000000005441698

### 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-<br>munication signal other than OBD (emission related<br>diagnosis) for 2 seconds or more. | Harness or connectors     (CAN communication line is open or     shorted) |
| DTC CON  | FIRMATION PRO          | CEDURE  |   |
| 1.PERFOR   | RM DTC CONFIRM         | ATION PROCEDURE   |   |
| 2. Check   | 1st trip DTC.          | d wait at least 3 seconds.  |   |
| Is 1st trip DTC detected?         YES       >> EC-125. "Diagnosis Procedure".         NO       >> INSPECTION END |                        |   |   |
| Diagnosis Procedure  |                        |   |   |
| Go to LAN-17, "Trouble Diagnosis Flow Chart".  |                        |   |   |
|  |                        |   |   |
|  |                        |   |   |

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### < COMPONENT DIAGNOSIS >

## DTC Logic

DTC DETECTION LOGIC

#### NOTE:

- If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for <u>EC-141, "DTC</u> <u>Logic"</u>.
- If DTC P0011 is displayed with DTC P0340, first perform the trouble diagnosis for <u>EC-255, "DTC</u> <u>Logic"</u>.

| DTC No. | Trouble diagnosis name                     | DTC detecting condition  | Possible cause  |
|---------|--|--|---|
| P0011   | Intake valve timing<br>control performance | There is a gap between angle of target and phase-control angle degree. | <ul> <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

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.

#### **TESTING CONDITION:**

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

#### With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON (READY) and select "DATA MONITOR" mode with CONSULT-III.
- 4. Maintain the following conditions for at least 10 consecutive seconds. Hold the accelerator pedal as steady as possible.

| VHCL SPEED SE | 70 km/h (43 mph) or more |
|---------------|--------------------------|
| ENG SPEED     | 800 - 2,000 rpm          |
| COOLAN TEMP/S | 70°C (221°F) or more     |
| Shift lever   | D position               |

#### **CAUTION:** Always drive at a safe speed.

- 5. Stop vehicle.
- 6. Check 1st trip DTC.

#### With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

YES >> Go to EC-127, "Diagnosis Procedure"

INFOID:000000005441700

| < COMPONENT DIA  | GNOSIS >   | [QR25DE]              |  |
|--|--|-----------------------|--|
| NO >> GO TO 3  | ·  |                       |  |
| 3.PERFORM DTC C  | CONFIRMATION PROCEDURE-II  |                       |  |
| With CONSULT-III<br>1. Maintain the follo                                  | wing conditions for at least 20 consecutive seconds.   | E                     |  |
| ENG SPEED  | 1,700 - 3,175 rpm (A constant rotation is maintained.)   | _                     |  |
| COOLAN TEMP/S  | More than 70°C (221°F)   |                       |  |
| Shift lever  | D position   |                       |  |
| Driving location uphill  | Driving vehicle uphill<br>(Increased engine load will help maintain the driving<br>conditions required for this test.) |                       |  |
| CAUTION:<br>Always drive at<br>2. Check 1st trip DT                        |  |                       |  |
| Is 1st trip DTC detected   | "With CONSULT-III" above.<br>ed?<br>-127, "Diagnosis Procedure"  |                       |  |
| NO >> INSPECT  | TION END   |                       |  |
|  |  | INFOID:00000005441701 |  |
| 1.CHECK OIL PRESSURE WARNING LAMP  |  |                       |  |
| <ol> <li>Check oil pressunated.</li> <li>Is oil pressure warnin</li> </ol> | -8. "Inspection".  |                       |  |
| 2.check intake v   | ALVE TIMING CONTROL SOLENOID VALVE   | PBIA8559J             |  |
| Refer to <u>EC-128, "Co</u>  |  |                       |  |
| Is the inspection resu   |  |                       |  |
| YES >> GO TO 3<br>NO >> Replace i  | Intake valve timing control solenoid valve.  |                       |  |
| 3. CHECK CRANKSHAFT POSITION SENSOR (POS)                                  |  |                       |  |
| Refer to <u>EC-253, "Co</u>  |  |                       |  |
| is the inspection resu   |  |                       |  |
| YES >> GO TO 4.  |  |                       |  |
| NO >> Replace crankshaft position sensor (POS).                            |  |                       |  |
| <b>4.</b> CHECK CAMSHAFT POSITION SENSOR (PHASE)                           |  |                       |  |
| Refer to <u>EC-257, "Co</u>  | mponent Inspection".   |                       |  |
| Is the inspection resu   |  |                       |  |
| YES >> GO TO 5<br>NO >> Replace of   | camshaft position sensor (PHASE).  |                       |  |
|  |  |                       |  |

5. CHECK CAMSHAFT (INTAKE)

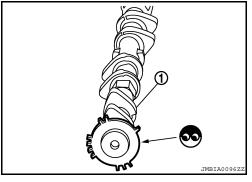
#### < COMPONENT DIAGNOSIS >

#### Check the following.

- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end

#### Is the inspection result normal?

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



## 6. CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned. <u>Are there any service records that may cause timing chain misaligned?</u>

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

NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to EM-47, "Inspection After Installation".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Clean lubrication line.

**8.**CHECK INTERMITTENT INCIDENT

Refer to <u>GI-42, "Intermittent Incident"</u>.

#### >> INSPECTION END

### Component Inspection

INFOID:000000005441702

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

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

| Terminals         | Resistance  |
|-------------------|---|
| 1 and 2           | 6.7 - 7.7 Ω   |
| 1 or 2 and ground | $\stackrel{\infty}{\longrightarrow} \Omega$ (Continuity should not exist) |

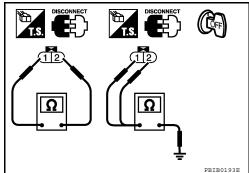
Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace intake valve timing control solenoid valve.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.



#### < COMPONENT DIAGNOSIS >

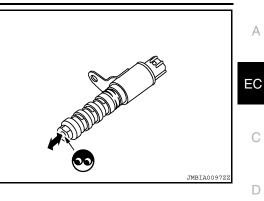
 Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.
 CAUTION:

Do not apply 12V 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 intake valve timing control solenoid valve.



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## P0031, P0032 A/F SENSOR 1 HEATER

## Description

INFOID:000000005441703

[QR25DE]

### SYSTEM DESCRIPTION

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

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:000000005441704

## DTC DETECTION LOGIC

| DTC No. | Trouble diagnosis name  | DTC detecting condition   | Possible cause   |
|---------|---|---|--|
| P0031   | Air fuel ratio (A/F) sensor<br>1 heater control circuit low     | The current amperage in the A/F sensor 1 heater<br>circuit is out of the normal range.<br>(An excessively low voltage signal is sent to ECM<br>through the A/F sensor 1 heater.)  | <ul> <li>Harness or connectors<br/>(The A/F sensor 1 heater circuit is<br/>open or shorted.)</li> <li>A/F sensor 1 heater</li> </ul> |
| P0032   | Air fuel ratio (A/F) sensor<br>1 heater control circuit<br>high | The current amperage in the A/F sensor 1 heater<br>circuit is out of the normal range.<br>(An excessively high voltage signal is sent to ECM<br>through the A/F sensor 1 heater.) | <ul> <li>Harness or connectors<br/>(The A/F sensor 1 heater circuit is<br/>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 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 between 11V at idle.

#### >> GO TO 2.

### 2. PERFORM DTC CONFIRMATION PROCEDURE

1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and let engine idle for at least 10 seconds.

2. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-130, "Diagnosis Procedure".

### NO >> INSPECTION END

### Diagnosis Procedure

INFOID:000000005441705

### **1**.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E9. Refer to Ground Inspection in GI-45. "Circuit Inspection".

#### Is the inspection result normal?

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

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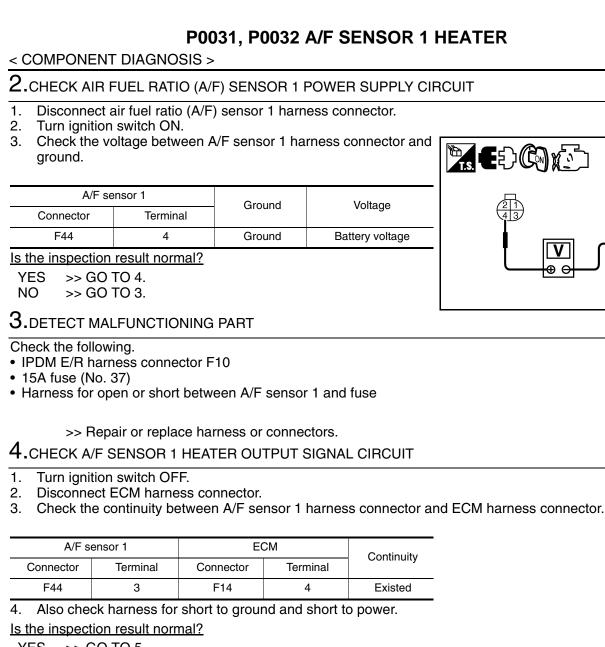
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YES >> GO TO 5.

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

**5.**CHECK A/F SENSOR 1 HEATER

Refer to EC-132, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

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

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

- Discard any 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 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-42, "Intermittent Incident".

## P0031, P0032 A/F SENSOR 1 HEATER

#### < COMPONENT DIAGNOSIS >

>> Repair or replace.

**Component Inspection** 

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

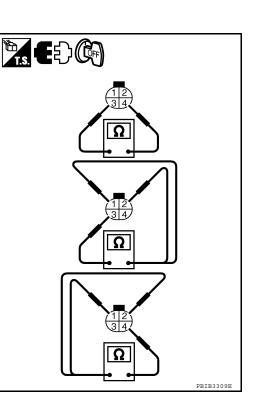
- 1. Turn ignition switch OFF.
- 2. Disconnect A/F sensor 1 harness connector.
- 3. Check resistance between A/F sensor 1 terminals as follows.

| Terminals  | Resistance                    |
|------------|-------------------------------|
| 3 and 4    | 1.8 - 2.44 Ω [at 25°C (77°F)] |
| 3 and 1, 2 | $\Omega^{\infty}$             |
| 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 air fuel ratio (A/F) sensor 1. **CAUTION:** 

- Discard any 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 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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[QR25DE]

## P0037, P0038 HO2S2 HEATER

#### < COMPONENT DIAGNOSIS >

## P0037, P0038 HO2S2 HEATER

## Description

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### SYSTEM DESCRIPTION

| Sensor   | Input signal to ECM        | ECM function           | Actuator                      | ı. |
|--|----------------------------|------------------------|-------------------------------|----|
| Camshaft position sensor (PHASE)<br>Crankshaft position sensor (POS) | Engine speed               | Heated oxygen sensor 2 |                               |    |
| Engine coolant temperature sensor                                    | Engine coolant temperature | heater control         | Heated oxygen sensor 2 heater |    |
| Mass air flow sensor   | Amount of intake air       |                        |                               | 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                           |   |
| More than 3 minutes after engine stopped.  |                               |   |
| Below 3,600 rpm after the following conditions are met.<br>• Engine: After warming up  |                               | G |
| <ul> <li>Driving for 3 minutes at a speed of 80 km/h (50 MPH) or more<br/>(Keep the vehicle speed as steady as possible during the cruis-<br/>ing.)</li> </ul> | ON                            | Н |

## **DTC Logic**

INFOID:000000005441708

## DTC DETECTION LOGIC

| DTC No.   | Trouble diagnosis name                                   | DTC detecting condition   | Possible cause   | J |
|-----------|--|---|--|---|
| <br>P0037 | Heated oxygen<br>sensor 2 heater<br>control circuit low  | The current amperage in the heated oxygen sen-<br>sor 2 heater circuit is out of the normal range.<br>(An excessively low voltage signal is sent to ECM<br>through the heated oxygen sensor 2 heater.)  | <ul> <li>Harness or connectors<br/>(The heated oxygen sensor 2 heater circuit is<br/>open or shorted.)</li> <li>Heated oxygen sensor 2 heater</li> </ul> | K |
| <br>P0038 | Heated oxygen<br>sensor 2 heater<br>control circuit high | The current amperage in the heated oxygen sen-<br>sor 2 heater circuit is out of the normal range.<br>(An excessively high voltage signal is sent to ECM<br>through the heated oxygen sensor 2 heater.) | <ul> <li>Harness or connectors<br/>(The heated oxygen sensor 2 heater circuit is<br/>shorted.)</li> <li>Heated oxygen sensor 2 heater</li> </ul>         | L |

### DTC CONFIRMATION PROCEDURE

### **1.**PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conduct- N ing 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 11V at idle.

#### >> GO TO 2.

### 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.

## P0037, P0038 HO2S2 HEATER

< COMPONENT DIAGNOSIS >

- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON (READY).
- Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. CAUTION:

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

Keep the vehicle speed as steady as possible during the cruising.

7. Check 1st trip DTC.

#### Is 1st trip DTC detected?

- YES >> Go to EC-134, "Diagnosis Procedure".
- NO >> INSPECTION END

#### Diagnosis Procedure

### **1.**CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E9. Refer to Ground Inspection in GI-45, "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.
- Check the voltage between HO2S2 harness connector and ground.

| HO2S2     |          | Ground  | Voltage         |
|-----------|----------|---------|-----------------|
| Connector | Terminal | Giodina | Vollage         |
| F42       | 2        | Ground  | Battery voltage |

Is the inspection result normal?

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

### **3.**DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R connector F10
- 15A fuse (No. 37)
- Harness for open or short between heated oxygen sensor 2 and fuse

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

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

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

| HO2S2     |          | E         | Continuity |            |
|-----------|----------|-----------|------------|------------|
| Connector | Terminal | Connector | Terminal   | Continuity |
| F42       | 3        | F14       | 13         | Existed    |

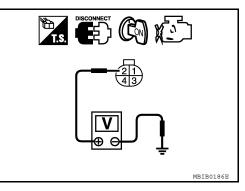
4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

### EC-134



INFOID:000000005441709

#### 5. CHECK HEATED OXYGEN SENSOR 2 HEATER Refer to EC-135, "Component Inspection". Is the inspection result normal? YES >> GO TO 7. NO >> GO TO 6. **6.**REPLACE HEATED OXYGEN SENSOR 2 Replace heated oxygen sensor 2. **CAUTION:** • Discard any 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 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-42, "Intermittent Incident". >> INSPECTION END Component Inspection INFOID:000000005441710 1. CHECK HEATED OXYGEN SENSOR 2 HEATER 1. Turn ignition switch OFF. 2. Disconnect heated oxygen sensor 2 harness connector. Check resistance between HO2S2 terminals as follows. 3 Terminals Resistance 2 and 3 3.4 - 4.4 Ω [at 25°C (77°F)] 1 and 2, 3, 4 ∞Ω (Continuity should not exist) 4 and 1, 2, 3 Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 2. Ω 3 4 Ω PBIB3310

P0037, P0038 HO2S2 HEATER

## 2.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

< COMPONENT DIAGNOSIS >

#### CAUTION:

• Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

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• Before installing new 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

#### < COMPONENT DIAGNOSIS >

## P0043, P0044 HO2S3 HEATER

## Description

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INFOID:000000005441711

### SYSTEM DESCRIPTION

| Sensor                            | Input signal to ECM        | ECM function           | Actuator                       |   |
|-----------------------------------|----------------------------|------------------------|--------------------------------|---|
| Camshaft position sensor (PHASE)  | Engine speed               |                        |                                |   |
| Crankshaft position sensor (POS)  |                            | Heated oxygen sensor 3 | Heated oxygen sensor 3 heater  |   |
| Engine coolant temperature sensor | Engine coolant temperature | heater control         | Theated oxygen sensor 3 heater | D |
| Mass air flow sensor              | Amount of intake air       |                        |                                | D |

The ECM performs ON/OFF control of the heated oxygen sensor 3 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

### OPERATION

| Engine speed  | Heated oxygen sensor 3 heater | F   |
|---|-------------------------------|-----|
| Above 3,600 rpm   | OFF                           |     |
| More than 3 minutes after engine stopped.   | OFF                           | 0   |
| <ul> <li>Below 3,600 rpm after the following conditions are met.</li> <li>Engine: After warming up</li> <li>Driving for 3 minutes at a speed of 80 km/h (50 MPH) or more (Keep the vehicle speed as steady as possible during the cruising.)</li> </ul> | ON                            | — G |

## DTC Logic

INFOID:000000005441712

### DTC DETECTION LOGIC

| DTC No. | Trouble diagnosis<br>name                                | DTC detecting condition Possible cause  |  |
|---------|--|---|--|
| P0043   | Heated oxygen<br>sensor 3 heater<br>control circuit low  | The current amperage in the heated oxygen sen-<br>sor 3 heater circuit is out of the normal range.<br>(An excessively low voltage signal is sent to ECM<br>through the heated oxygen sensor 3 heater.)  | <ul> <li>Harness or connectors<br/>(The heated oxygen sensor 3 heater circuit is<br/>open or shorted.)</li> <li>Heated oxygen sensor 3 heater</li> </ul> |
| P0044   | Heated oxygen<br>sensor 3 heater<br>control circuit high | The current amperage in the heated oxygen sen-<br>sor 3 heater circuit is out of the normal range.<br>(An excessively high voltage signal is sent to ECM<br>through the heated oxygen sensor 3 heater.) | <ul> <li>Harness or connectors<br/>(The heated oxygen sensor 3 heater circuit is<br/>shorted.)</li> <li>Heated oxygen sensor 3 heater</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.
- **TESTING CONDITION:**

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

#### >> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.

#### < COMPONENT 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. Turn ignition switch ON (READY).
- 6. Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. CAUTION:

# Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

#### Keep the vehicle speed as steady as possible during the cruising.

7. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-138, "Diagnosis Procedure".

NO >> INSPECTION END

### **Diagnosis** Procedure

### **1.**CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK HO2S3 POWER SUPPLY CIRCUIT

- 1. Disconnect heated oxygen sensor 3 harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between HO2S3 harness connector and ground.

| HO2S3     |          | Ground | Voltage         |  |
|-----------|----------|--------|-----------------|--|
| Connector | Terminal | Ground | vonage          |  |
| F202      | 2        | Ground | Battery voltage |  |

Is the inspection result normal?

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

## **3.**DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F58, F201
- IPDM E/R harness connector F10
- 15A fuse (No. 37)
- Harness for open or short between heated oxygen sensor 3 and fuse

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

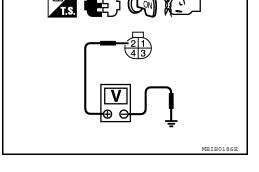
#### **4.**CHECK HO2S3 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check harness continuity between HO2S3 harness connector and ECM harness connector.

| HO2S3     |          | ECM       |          | Continuity |
|-----------|----------|-----------|----------|------------|
| Connector | Terminal | Connector | Terminal | Continuity |
| F202      | 3        | F14       | 17       | Existed    |

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

Is the inspection result normal?



[QR25DE]

INFOID:000000005441713



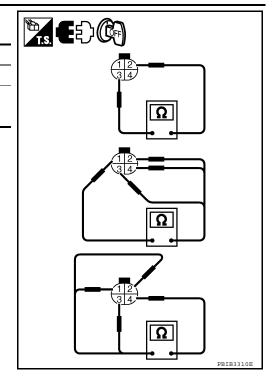
| P0043, P0044 H02S3 HEATER   |                       |
|---|-----------------------|
| < COMPONENT DIAGNOSIS >   | [QR25DE]              |
| YES >> GO TO 6.<br>NO >> GO TO 5.   | A                     |
| 5. DETECT MALFUNCTIONING PART   |                       |
| Check the following.  | EC                    |
| <ul> <li>Harness connectors F58, F201</li> <li>Harness for open or short between heated oxygen sensor 3 and ECM</li> </ul>              | EC                    |
| • hamess for open of short between heated oxygen sensor 3 and LOM   |                       |
| >> Repair open circuit or short to ground or short to power in harness or connectors.   | С                     |
| 6.CHECK HEATED OXYGEN SENSOR 3  |                       |
| Refer to EC-139, "Component Inspection".  | D                     |
| Is the inspection result normal?  |                       |
| YES >> GO TO 8.<br>NO >> GO TO 7.   | E                     |
| 7. REPLACE HEATED OXYGEN SENSOR 3   |                       |
| Replace heated oxygen sensor 3.   |                       |
| CAUTION:  | F                     |
| • Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) surface such as a concrete floor; use a new one. | onto a hard           |
| • Before installing new sensor, clean exhaust system threads using oxygen sensor threads  |                       |
| [commercial service tool: (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (<br>service tool).                             | commercial            |
|   | Н                     |
| >> INSPECTION END   |                       |
| 8. CHECK INTERMITTENT INCIDENT  |                       |
| Refer to GI-42, "Intermittent Incident".  |                       |
|   |                       |
| >> INSPECTION END   | J                     |
| Component Inspection  | IFOID:000000005441714 |
| <b>1.</b> CHECK HEATED OXYGEN SENSOR 3 HEATER   | К                     |
|   |                       |
| <ol> <li>Turn ignition switch OFF.</li> <li>Disconnect heated oxygen sensor 3 harness connector.</li> </ol>                             |                       |
|   | L                     |
|   |                       |
|   | M                     |
|   |                       |
|   | Ν                     |
|   | 14                    |
|   |                       |
|   | 0                     |
|   |                       |
|   | Р                     |
|   |                       |

#### < COMPONENT DIAGNOSIS >

3. Check resistance between HO2S3 terminals as follows.

| Terminals                        | Resistance                    |  |
|----------------------------------|-------------------------------|--|
| 2 and 3                          | 3.3 - 4.4 Ω [at 25°C (77°F)]  |  |
| 1 and 2, 3, 4                    | Ω∞                            |  |
| 4 and 1, 2, 3                    | (Continuity should not exist) |  |
| Is the inspection result normal? |                               |  |

Is the inspection result normal?YES>> INSPECTION ENDNO>> GO TO 2.



## 2. REPLACE HEATED OXYGEN SENSOR 3

Replace heated oxygen sensor 3.

- CAUTION:
- Discard any 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 sensor, clean exhaust system threads using oxygen sensor thread cleaner [commercial service tool: (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).

>> INSPECTION END

## **P0075 IVT CONTROL SOLENOID VALVE**

#### < COMPONENT DIAGNOSIS >

## P0075 IVT CONTROL SOLENOID VALVE

### Description

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

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

The longer pulse width advances valve angle.

The shorter pulse width retards valve angle.

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



#### DTC DETECTION LOGIC

Plunger

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|------|----------|--|
|      | <b>\</b> |  |

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INFOID:000000005441716

| DTC No.                          | Trouble diagnosis name  | DTC detecting condition   | Possible cause   |
|----------------------------------|---|---|--|
| P0075                            | Intake valve timing control solenoid valve circuit                      | An improper voltage is sent to the ECM through intake valve timing control solenoid valve.          | <ul> <li>Harness or connectors<br/>(Intake valve timing control solenoid valve<br/>circuit is open or shorted.)</li> <li>Intake valve timing control solenoid valve</li> </ul> |
| DTC CO                           | NFIRMATION PROC   | EDURE   | <u>.</u>   |
| <b>1</b> .PREC                   | ONDITIONING   |   |  |
| ing the ne<br>1. Turn<br>2. Turn | ext test.<br>ignition switch OFF and<br>ignition switch ON.             | nas been previously conducted, always<br>d wait at least 10 seconds.<br>d wait at least 10 seconds. | s perform the following before conduct-  |
|                                  | >> GO TO2.  |   |  |
| 2.PERF                           | ORM DTC CONFIRMA  | TION PROCEDURE  |  |
|                                  |   | DE 1" ( <u>HBC-104</u> ) to start engine, and le  | et engine idle for 5 seconds.  |
|                                  | k 1st trip DTC.<br>DTC detected?  |   |  |
| YES :                            | >> Go to <u>EC-141, "Diag</u> >> INSPECTION END                         | nosis Procedure".   |  |
| Diagnos                          | sis Procedure   |   | INFOID:00000005441717  |
| <b>1.</b> CHEC                   | K INTAKE VALVE TIMI   | NG CONTROL SOLENOID VALVE PC  | WER SUPPLY CIRCUIT   |
| 2. Disco                         | ignition switch OFF.<br>Innect intake valve timi<br>ignition switch ON. | ng control solenoid valve harness conr  | nector.  |
|                                  |   |   |  |
|                                  |   |   |  |

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## **P0075 IVT CONTROL SOLENOID VALVE**

#### < COMPONENT DIAGNOSIS >

4. Check the voltage between intake valve timing control solenoid valve harness connector and ground.

| IVT control solenoid valve |          | Ground Voltage |                 |
|----------------------------|----------|----------------|-----------------|
| Connector                  | Terminal | Ground         | voltage         |
| F59                        | 1        | Ground         | Battery voltage |

Is the inspection result normal?

YES >> GO TO 2.

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

2.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.

| IVT control s | control solenoid valve ECM |           | CM       | Continuity |
|---------------|----------------------------|-----------|----------|------------|
| Connector     | Terminal                   | Connector | Terminal | Continuity |
| F59           | 2                          | F13       | 78       | Existed    |

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

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.

 ${
m 3.}$  CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-142, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace intake valve timing control solenoid valve.

**4.**CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

#### >> INSPECTION END

#### **Component Inspection**

INFOID:000000005441718

## 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.

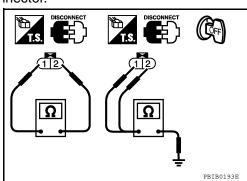
| Terminals         | Resistance  |
|-------------------|---|
| 1 and 2           | 6.7 - 7.7 Ω   |
| 1 or 2 and ground | $\stackrel{\infty}{\longrightarrow} \Omega$ (Continuity should not exist) |

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace intake valve timing control solenoid valve.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II



SEF206W

## **P0075 IVT CONTROL SOLENOID VALVE**

#### < COMPONENT DIAGNOSIS >

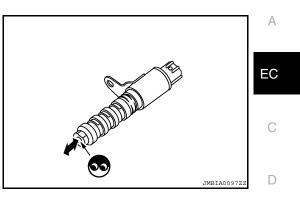
- 1. Remove intake valve timing control solenoid valve.
- Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.
   CAUTION:

Do not apply 12V 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 intake valve timing control solenoid valve.



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## P0101 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.

## DTC Logic

### DTC DETECTION LOGIC

DTC No. DTC detecting condition Possible cause Trouble diagnosis name · Harness or connectors (The sensor circuit is open or A high voltage from the sensor is sent to ECM shorted.) A) under light load driving condition. Mass air flow sensor • EVAP control system pressure sensor Mass air flow sensor cir-· Harness or connectors P0101 cuit range/performance (The sensor circuit is open or shorted.) A low voltage from the sensor is sent to ECM un-· Intake air leaks B) der heavy load driving condition. · Mass air flow sensor EVAP control system pressure sensor

### DTC CONFIRMATION PROCEDURE

### **1**.PRECONDITIONING

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

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

#### >> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Wait at least 10 seconds at idle speed.
- 3. Check 1st trip DTC.

#### Is 1st trip DTC detected?

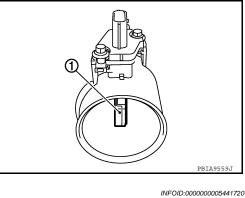
- YES >> Go to EC-146, "Diagnosis Procedure".
- NO-1 >> With CONSULT-III: GO TO 3.
- NO-2 >> With GST: GO TO 5.

### $\mathbf{3}$ .CHECK MASS AIR FLOW SENSOR FUNCTION

 Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.

### EC-144

INFOID:000000005441719



· Intake air temperature sensor

#### < COMPONENT DIAGNOSIS >

- 2. Select "DATA MONITOR" mode with CONSULT-III.
- 3. Check the voltage of "MAS A/F SE-B1" with "DATA MONITOR".
- 4. Increases engine speed to about 2,500 rpm.
- Monitor the linear voltage rise in response to engine speed 5. increases.

#### Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Go to EC-146, "Diagnosis Procedure".

## А ок V 5.00 EC 2.50 1.25 0.00 D NG V 5.00 Ε 2.50 1.25 0.00

## 4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

- 1. Turn ignition switch OFF.
- Turn ignition switch ON (READY) and drive vehicle. 2.
- 3. Maintain the following conditions for at least 10 consecutive seconds.

| ENG SPEED  | More than 1,250 rpm  |   |   |  |
|--|--|---|---|--|
| THRTL SEN 1-B1   | More than 1.5V   |   |   |  |
| THRTL SEN 2-B1   | THRTL SEN 2-B1 More than 1.5V  |   |   |  |
| Shift lever  | Suitable position  |   |   |  |
| Driving location   | Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test. |   | Κ |  |
| CAUTION:<br>Always drive veh<br>4. Check 1st trip DTC<br>Is 1st trip DTC detecte |  |   | L |  |
| YES >> Go to <u>EC-146, "Diagnosis Procedure"</u> .<br>NO >> INSPECTION END      |  |   |   |  |
| <b>5.</b> PERFORM COMPO  | ONENT FUNCTION CHECK FOR MALFUNCT  | ON B                                      |   |  |
|  | nction check. Refer to EC-145, "Component Fu   | inction Check".                           | Ν |  |
| NOTE:  | on about to about the overall function of the  | mann air flow concer aircuit. During this |   |  |
| check, a DTC might no  | on check to check the overall function of the<br>ot be confirmed.  | hass all now sensor circuit. During this  | 0 |  |
| Is the inspection result   | normal?  |   | 0 |  |
| YES >> INSPECT<br>NO >> Go to <u>EC-</u>   | ION END<br>146, "Diagnosis Procedure".   |   | Р |  |
| Component Func   | tion Check   | INFOID:000000005441721                    |   |  |
| 1  |  |   |   |  |

## I.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

#### With GST

Activate "INSPECTION MODE 1" (HBC-104) to start engine, and warm up engine to normal operating 1. temperature.

## EC-145

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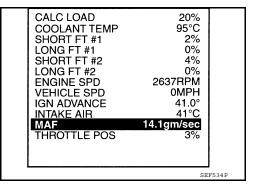
#### < COMPONENT DIAGNOSIS >

## [QR25DE]

- 2. Select Service \$01 with GST.
- 3. Check the mass air flow sensor signal with Service \$01.
- 4. Check for linear mass air flow sensor signal value rise in response to increases to about 2,500 rpm in engine speed.

#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-146, "Diagnosis Procedure".



## **Diagnosis Procedure**

INFOID:000000005441722

## **1.**INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-144, "DTC Logic".

Which malfunction is detected?

- A >> GO TO 3.
- B >> GO TO 2.

2.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 3.

NO >> Reconnect the parts.

 $\mathbf{3.}$  CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace ground connection.

4.CHECK MAF SENSOR POWER SUPPLY CIRCUIT

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

| MAF       | sensor   | Ground | Voltage         |  |
|-----------|----------|--------|-----------------|--|
| Connector | Terminal | Ground | voltage         |  |
| F31       | 2        | Ground | Battery voltage |  |

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

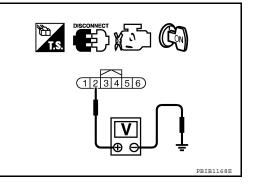
| 5. | DETEC | T MAL | FUNC <sup>-</sup> | TIONING | PART |
|----|-------|-------|-------------------|---------|------|
|----|-------|-------|-------------------|---------|------|

#### Check the following.

Junction block connector E44

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



## < COMPONENT DIAGNOSIS >

[QR25DE]

| < COMPONE   | ENT DIAGNO      | )515 >                         |                |                |                             |                       |
|---|-----------------|--------------------------------|----------------|----------------|-----------------------------|-----------------------|
| >> R  | Repair open c   | ircuit or short to             | o ground or s  | short to power | r in harness or connectors. |                       |
| 6.снеск м   | AF SENSOR       | GROUND CIF                     |                | OPEN AND S     | HORT                        |                       |
|   | tion switch Of  |                                |                |                |                             |                       |
| 2. Disconne   | ect ECM harn    | ess connector.                 |                |                |                             |                       |
| 3. Check the  | e continuity b  | etween MAF s                   | ensor harnes   | ss connector a | and ECM harness connector.  |                       |
|   |                 |                                |                |                | -                           |                       |
|   | sensor          | EC                             |                | Continuity     |                             |                       |
| Connector<br>F31  | Terminal        | Connector<br>F13               | Terminal       | Eviated        | -                           |                       |
| -   | 3               | -                              | 56             | Existed        | -                           |                       |
| <ol> <li>Also check</li> <li>Is the inspection</li> </ol> |                 | r short to groui               | iu anu short   | to power.      |                             |                       |
| •   | GO TO 7.        | <u>ina:</u>                    |                |                |                             |                       |
|   |                 | ircuit or short to             | o ground or s  | short to power | r in harness or connectors. |                       |
| 7.снеск м   | AF SENSOR       | INPUT SIGNA                    | AL CIRCUIT I   | FOR OPEN A     | ND SHORT                    |                       |
| 1. Check the  | e continuity b  | etween MAF s                   | ensor harnes   | s connector    | and ECM harness connector.  |                       |
|   | <b>,</b> -      |                                |                |                |                             |                       |
| MAF s   | sensor          | EC                             | Μ              | Continuity     | •                           |                       |
| Connector   | Terminal        | Connector                      | Terminal       | Continuity     |                             | (                     |
| F31   | 4               | F13                            | 58             | Existed        | -                           |                       |
| 2. Also chec  | ck harness fo   | r short to grou                | nd and short   | to power.      | •                           |                       |
| Is the inspecti   | ion result nor  | mal?                           |                |                |                             |                       |
|   | O TO 8.         |                                |                |                |                             |                       |
| ~   | • •             |                                | •              | short to power | r in harness or connectors. |                       |
| O.CHECK IN  | ITAKE AIR TI    | EMPERATURE                     | ESENSOR        |                |                             |                       |
| Check intake  |                 | ure sensor.<br>Tent Inspection | п              |                |                             |                       |
| Is the inspecti   | -               | -                              | <br>_          |                |                             |                       |
|   | GO TO 9.        | <u>inar:</u>                   |                |                |                             |                       |
|   |                 | air flow senso                 | r (with intake | air temperati  | ure sensor).                |                       |
| <b>9.</b> CHECK E   | VAP CONTRO      | OL SYSTEM P                    | RESSURE S      | SENSOR         |                             |                       |
| Refer to EC-2   | 286, "Compor    | nent Inspection                |                |                |                             |                       |
| Is the inspect  | ion result nor  | mal?                           |                |                |                             |                       |
|   | GO TO 10.       |                                |                |                |                             |                       |
|   | •               | ontrol syster                  | •              | ensor.         |                             | I                     |
| IU.CHECK  | MASS AIR F      | LOW SENSOR                     | 7              |                |                             |                       |
| Refer to <u>EC-1</u>                                      | 47, "Compor     | nent Inspection                |                |                |                             |                       |
|   | ion result nor  | mal?                           |                |                |                             |                       |
|   | GOTO 11.        | oir flow conce                 | ~              |                |                             |                       |
|   | •               | air flow senso                 |                |                |                             | (                     |
|   |                 |                                |                |                |                             |                       |
| Heter to GI-42  | 2, "Intermitter | <u>nt Incident"</u> .          |                |                |                             |                       |
| IN  |                 |                                |                |                |                             |                       |
|   | NSPECTION       |                                |                |                |                             |                       |
| Componen  | it Inspectio    | on                             |                |                | IN                          | IFOID:000000005441723 |
| 1.снеск м   | ASS AIR FLO     | OW SENSOR-I                    |                |                |                             |                       |
|   |                 |                                |                |                |                             |                       |
|   |                 |                                |                |                |                             |                       |

#### < COMPONENT DIAGNOSIS >

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Lift up the vehicle.
- 4. Turn ignition switch ON.
- 5. Connect CONSULT-III and select "DATA MONITOR" mode.
- 6. Select "MAS A/F SE-B1" and check indication.

| Monitor item  | Condition          | MAS A/F SE-B1 |
|---------------|--------------------|---------------|
| MAS A/F SE-B1 | Ignition switch ON | Approx. 0.4 V |

- 7. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- 8. Depress the accelerator pedal and keep it.
- 9. Shift the selector lever to N position with engine running. CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

10. Select "MAS A/F SE-B1" in "DATA MONITOR" and check indication.

| Monitor item  | Condition  | MAS A/F SE-B1 |
|---------------|--|---------------|
| MAS A/F SE-B1 | Idle (Engine is warmed-up to normal operat-<br>ing temperature.) | 0.9 - 1.1 V   |

11. Shift the selector lever to P position.

12. Fully depress the accelerator pedal and keep it.

13. Check indication.

| Monitor item  | Condition  | MAS A/F SE-B1 |
|---------------|--|---------------|
| MAS A/F SE-B1 | 2,500 rpm (Engine is warmed-up to normal operating temperature.) | 1.4 - 1.7 V   |

14. Fully release accelerator pedal then fully depress it.

15. Check for linear voltage rise in response to engine being increased to about 2,500 rpm.

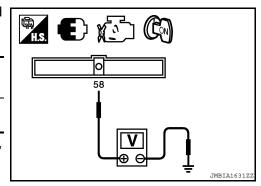
#### Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Lift up the vehicle.
- 4. Turn ignition switch ON.
- 5. Check the voltage between ECM harness connector and ground.

| ECM       |                           | Ground | Condition          | Voltage       |  |
|-----------|---------------------------|--------|--------------------|---------------|--|
| Connector | Terminal                  | Giouna | Condition          | voltage       |  |
| F13       | 58<br>(MAF sensor signal) | Ground | Ignition switch ON | Approx. 0.4 V |  |

- 6. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- 7. Depress the accelerator pedal and keep it.
- 8. Shift the selector lever to N position with engine running. CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.



#### < COMPONENT DIAGNOSIS >

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

| ECM       |                                | Ground | Condition   | Voltage     |
|-----------|--------------------------------|--------|---|-------------|
| Connector | Terminal                       | Ciouna | Condition   | vonage      |
| F13       | 58<br>(MAF sen-<br>sor signal) | Ground | Idle (Engine is warmed-up to<br>normal operating tempera-<br>ture.) | 0.9 - 1.1 V |



- 11. Fully depress the accelerator pedal and keep it.
- 12. Check the voltage between ECM harness connector and ground.

| ECM       |                                | Ground | Condition   | Voltage     |
|-----------|--------------------------------|--------|---|-------------|
| Connector | Terminal                       | Ground | Condition   | voltage     |
| F13       | 58<br>(MAF sen-<br>sor signal) | Ground | 2,500 rpm (Engine is warmed-<br>up to normal operating tem-<br>perature.) | 1.4 - 1.7 V |

- 13. Fully release accelerator pedal then fully depress it.
- 14. Check for linear voltage rise in response to engine being increased to about 2,500 rpm.

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

#### 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 following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

Is the inspection result normal?

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

3. CHECK MASS AIR FLOW SENSOR-II

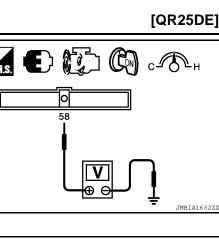
#### With CONSULT-III

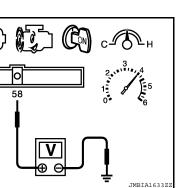
- 1. Repair or replace malfunctioning part.
- 2. Lift up the vehicle.
- 3. Turn ignition switch ON.
- 4. Connect CONSULT-III and select "DATA MONITOR" mode.
- 5. Select "MAS A/F SE-B1" and check indication.

- Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating p temperature.
- 7. Depress the accelerator pedal and keep it.
- 8. Shift the selector lever to N position with engine running. CAUTION:

# Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

9. Select "MAS A/F SE-B1" in "DATA MONITOR" and check indication.





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#### < COMPONENT DIAGNOSIS >

| Monitor item  | Condition  | MAS A/F SE-B1 |
|---------------|--|---------------|
| MAS A/F SE-B1 | Idle (Engine is warmed-up to normal operat-<br>ing temperature.) | 0.9 - 1.1 V   |

- 10. Shift the selector lever to P position.
- 11. Fully depress the accelerator pedal and keep it.
- 12. Check indication.

| Monitor item  | Condition  | MAS A/F SE-B1 |
|---------------|--|---------------|
| MAS A/F SE-B1 | 2,500 rpm (Engine is warmed-up to normal operating temperature.) | 1.4 - 1.7 V   |

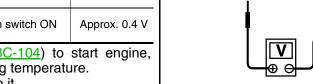
13. Fully release accelerator pedal then fully depress it.

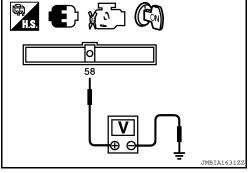
14. Check for linear voltage rise in response to engine being increased to about 2,500 rpm.

#### **Without CONSULT-III**

- 1. Repair or replace malfunctioning part.
- 2. Lift up the vehicle.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ECM harness connector and ground.

| ECM       |                           | Ground | Condition          | Voltage       |  |
|-----------|---------------------------|--------|--------------------|---------------|--|
| Connector | Terminal                  | around | Condition          | voltage       |  |
| F13       | 58<br>(MAF sensor signal) | Ground | Ignition switch ON | Approx. 0.4 V |  |





- 5. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- 6. Depress the accelerator pedal and keep it.
- 7. Shift the selector lever to N position with engine running. CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

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

|           | ECM                       | Ground | Condition  | Voltage     |
|-----------|---------------------------|--------|--|-------------|
| Connector | Terminal                  | Ground | Condition  | vollage     |
| F13       | 58<br>(MAF sensor signal) | Ground | Idle (Engine is warmed-<br>up to normal operating<br>temperature.) | 0.9 - 1.1 V |

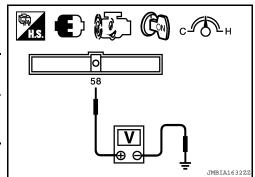
- 9. Shift the selector lever to P position.
- 10. Fully depress the accelerator pedal and keep it.
- 11. Check the voltage between ECM harness connector and ground.

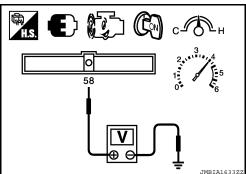
|           | ECM                       | Ground | Condition  | Voltage     |
|-----------|---------------------------|--------|--|-------------|
| Connector | Terminal                  | Ground | dround Condition   |             |
| F13       | 58<br>(MAF sensor signal) | Ground | 2,500 rpm (Engine is<br>warmed-up to normal op-<br>erating temperature.) | 1.4 - 1.7 V |

12. Fully release accelerator pedal then fully depress it.

13. Check for linear voltage rise in response to engine being increased to about 2,500 rpm.

Is the inspection result normal?







| YES >>   |   |  |   |   |               |                |             |
|--|---|--|---|---|---------------|----------------|-------------|
|  | <ul> <li>INSPECTION EN</li> <li>GO TO 4.</li> </ul>   | ID   |   |   |               |                |             |
| CHECK  | MASS AIR FLOW   | SENSO  | R-III   |   |               |                |             |
| Turn ig  | <b>NSULT-III</b><br>nition switch OFF.<br>nect mass air flow  | sensor h   | arness connec   | tor and reconne   | ect it again  |                |             |
| Lift up f<br>Turn ig<br>Connee   | the vehicle.<br>nition switch ON.<br>ct CONSULT-III ar<br>"MAS A/F SE-B1"   | d select   | "DATA MONITO  |   |               |                |             |
| Monito   | or item   | Conditior  | M   | AS A/F SE-B1  |               |                |             |
| IAS A/F SE   |   | switch ON  |   | Approx. 0.4 V   |               |                |             |
| temper<br>Depres<br>Shift th   | s the accelerator  <br>e selector lever to  | pedal and  | d keep it.  | -   | nd warm up d  | engine to norm | al operatin |
| engine   | ON:<br>leave the selecto<br>operates but ele<br>"MAS A/F SE-B1"   | ctricity of  | cannot be gen   | erated.   | -             | ne. In the N p | osition, th |
| Monitor ite  | m   | Condition  |   | MAS A/F SE-B1   |               |                |             |
|  |   | armed-un   | to normal operat-   |   |               |                |             |
| MAS A/F SE   | E-B1 Idle (Engine is w  |  |   | 0.9 - 1.1 V   |               |                |             |
| . Shift th<br>2. Fully de  |   | .)<br>P positic  | n.  | 0.9 - 1.1 V   |               |                |             |
| . Shift th<br>. Fully de   | e selector lever to epress the acceler indication.  | .)<br>P positic  | n.<br>al and keep it.   | 0.9 - 1.1 V   |               |                |             |
| <ol> <li>Shift th</li> <li>Fully de</li> <li>Check</li> <li>Monitor ite</li> </ol>   | e selector lever to<br>epress the acceler<br>indication.  | .)<br>P positic<br>ator peda<br>Condition  | n.<br>al and keep it.   |   |               |                |             |
| <ol> <li>Shift th</li> <li>Fully de</li> <li>Check</li> <li>Monitor ite</li> <li>MAS A/F SE</li> <li>Fully ref</li> <li>Check</li> <li>Without</li> <li>Turn ig</li> <li>Discon</li> <li>Lift up f</li> <li>Turn ig</li> </ol>                               | e selector lever to<br>epress the acceler<br>indication.<br>m<br>2,500 rpm (Eng<br>operating temper<br>elease accelerator<br>for linear voltage r<br><b>CONSULT-III</b><br>nition switch OFF.<br>nect mass air flow<br>the vehicle.<br>nition switch ON.<br>the voltage bet                     | P positic<br>ator peda<br>Condition<br>ne is warm<br>erature.)<br>pedal the<br>ise in res                        | on.<br>al and keep it.<br>ned-up to normal<br>en fully depress<br>sponse to engin<br>narness connec                 | MAS A/F SE-B1<br>1.4 - 1.7 V<br>s it.<br>e being increas                                      |               |                |             |
| . Shift th<br>2. Fully de<br>3. Check<br>Monitor ite<br>MAS A/F SE<br>4. Fully re<br>5. Check<br>Without<br>Turn ig<br>Discon<br>Lift up t<br>Turn ig<br>Check   | e selector lever to<br>epress the acceler<br>indication.<br>m<br>2,500 rpm (Eng<br>operating temper<br>elease accelerator<br>for linear voltage r<br><b>CONSULT-III</b><br>nition switch OFF.<br>nect mass air flow<br>the vehicle.<br>nition switch ON.<br>the voltage bet                     | P positic<br>ator peda<br>Conditior<br>ine is warm<br>erature.)<br>pedal the<br>ise in res<br>sensor h<br>ween E | on.<br>al and keep it.<br>ned-up to normal<br>en fully depress<br>sponse to engin<br>narness connec<br>CM harness o | MAS A/F SE-B1<br>1.4 - 1.7 V<br>it.<br>e being increas<br>tor and reconne<br>connector and    | ect it again. |                |             |
| <ol> <li>Shift th</li> <li>Fully de</li> <li>Check</li> <li>Monitor ite</li> <li>MAS A/F SE</li> <li>Fully re</li> <li>Check</li> <li>Without</li> <li>Turn ig</li> <li>Discon</li> <li>Lift up f</li> <li>Turn ig</li> <li>Check</li> <li>ground</li> </ol> | e selector lever to<br>epress the acceler<br>indication.<br>2,500 rpm (Eng<br>operating tempe<br>elease accelerator<br>for linear voltage r<br><b>CONSULT-III</b><br>nition switch OFF.<br>nect mass air flow<br>the vehicle.<br>nition switch ON.<br>the voltage bet<br><u>ECM</u><br>Terminal | P positic<br>ator peda<br>Condition<br>ne is warm<br>erature.)<br>pedal the<br>ise in res                        | on.<br>al and keep it.<br>ned-up to normal<br>en fully depress<br>sponse to engin<br>narness connec                 | MAS A/F SE-B1<br>1.4 - 1.7 V<br>s it.<br>e being increas                                      | ect it again. |                |             |
| 2. Fully de<br>3. Check<br>Monitor ite<br>MAS A/F SE<br>4. Fully re<br>5. Check<br>Without<br>. Turn ig<br>. Discon<br>. Lift up f<br>. Turn ig<br>. Check   | e selector lever to<br>epress the acceler<br>indication.<br>2,500 rpm (Eng<br>operating tempe<br>elease accelerator<br>for linear voltage r<br><b>CONSULT-III</b><br>nition switch OFF.<br>nect mass air flow<br>the vehicle.<br>nition switch ON.<br>the voltage bet                           | P positic<br>ator peda<br>Conditior<br>ine is warm<br>erature.)<br>pedal the<br>ise in res<br>sensor h<br>ween E | on.<br>al and keep it.<br>ned-up to normal<br>en fully depress<br>sponse to engin<br>narness connec<br>CM harness o | MAS A/F SE-B1<br>1.4 - 1.7 V<br>it.<br>te being increas<br>tor and reconnector and<br>Voltage | ect it again. | x ()<br>1      |             |

engine operates but electricity cannot be generated.

< COMPONENT DIAGNOSIS >

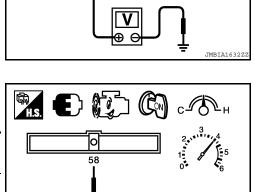
#### < COMPONENT DIAGNOSIS >

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

|           | ECM                       | Ground | Condition  | Voltage     |
|-----------|---------------------------|--------|--|-------------|
| Connector | Terminal                  | Ground | Condition  | voltage     |
| F13       | 58<br>(MAF sensor signal) | Ground | Idle (Engine is warmed-<br>up to normal operating<br>temperature.) | 0.9 - 1.1 V |

10. Shift the selector lever to P position.

- 11. Fully depress the accelerator pedal and keep it.
- 12. Check the voltage between ECM harness connector and ground.



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| ECM       |                           | Ground | Condition  | Voltage     |  |
|-----------|---------------------------|--------|--|-------------|--|
| Connector | Terminal                  | Ground | Condition  | vollage     |  |
| F13       | 58<br>(MAF sensor signal) | Ground | 2,500 rpm (Engine is<br>warmed-up to normal op-<br>erating temperature.) | 1.4 - 1.7 V |  |

13. Fully release accelerator pedal then fully depress it.

14. Check for linear voltage rise in response to engine being increased to about 2,500 rpm.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Clean or replace mass air flow sensor.

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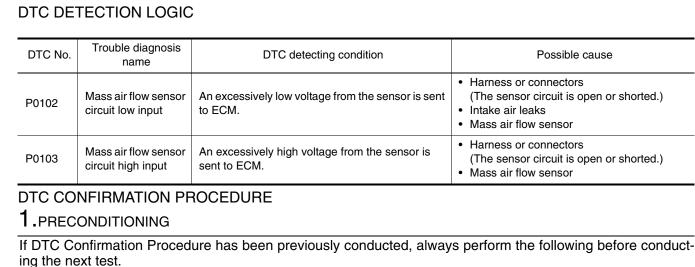
## P0102, P0103 MAF SENSOR

## Description

DTC Logic

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.



- 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 >> GO TO 2.

P0103 >> GO TO 3.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

1. Activate "INSPECTION MODE 1" (HBC-104) to start engine, and wait at least 5 seconds.

2. Check DTC.

#### Is DTC detected?

- YES >> Go to EC-154, "Diagnosis Procedure".
- NO >> INSPECTION END

 ${f 3.}$  PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-I

- 1. Turn ignition switch ON and wait at least 5 seconds.
- 2. Check DTC.
- Is DTC detected?
- YES >> Go to EC-154, "Diagnosis Procedure".
- NO >> GO TO 4.

## **4.**PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-II

1. Activate "INSPECTION MODE 1" (HBC-104) to start engine, and wait at least 5 seconds.

2. Check DTC.

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Is DTC detected?

YES >> Go to <u>EC-154, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

**1**.INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

P0102 >> GO TO 2. P0103 >> GO TO 3.

2. CHECK INTAKE SYSTEM

Check the following for connection.

Air duct

Vacuum hoses

• Intake air passage between air duct to intake manifold

Is the inspection result normal?

YES >> GO TO 3.

NO >> Reconnect the parts.

**3.**CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace ground connection.

**4.**CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.

- 2. Turn ignition switch ON.
- 3. Check the voltage between MAF sensor harness connector and ground.

| MAF       | MAF sensor |        | Voltage         |
|-----------|------------|--------|-----------------|
| Connector | Terminal   | Ground | voltage         |
| F31       | 2          | Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

## 5. DETECT MALFUNCTIONING PART

Check the following.

- Junction block connector E44
- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and IPDM E/R

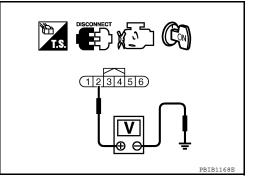
>> Repair open circuit or short to ground or short to power in harness or connectors.

## 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.



INFOID:000000005441726

#### < COMPONENT DIAGNOSIS >

[QR25DE]

|  | sensor   | EC                               | NA  | 1   | А           |
|--|--|----------------------------------|---|---|-------------|
|  |  |                                  |   | Continuity  | / 1         |
| Connector  | Terminal   | Connector                        | Terminal  |   |             |
| F31  | 3  | F13                              | 56  |   | EC          |
| Is the inspecti<br>YES >> G<br>NO >> R<br>7.CHECK M<br>1. Check the<br>MAF s<br>Connector<br>F31 | ion result nor<br>aO TO 7.<br>lepair open ci<br>AF SENSOR<br>e continuity b<br>sensor<br>Terminal<br>4 | ircuit or short t<br>INPUT SIGNA | o ground or s<br>AL CIRCUIT<br>sensor harnes<br>M<br>Terminal<br>58 | short to power in harness or connectors.<br>FOR OPEN AND SHORT<br>ss connector and ECM harness connector. | C<br>D<br>F |
| Is the inspecti  |  | -                                |   |   |             |
| YES >> G   | GO TO 8.<br>Iepair open ci   | ircuit or short t                | o ground or s   | short to power in harness or connectors.  | G           |
| Refer to EC-1  | 55, "Compor  | ent Inspection                   | ".  |   | Н           |
|  | ITERMITTEN   |                                  | or.   |   | <br>J       |
| Componen   | •  |                                  |   | INFOID:00000005441727   | K           |
|  |  | JW SENSOR-                       |   |   | I           |
| <ol> <li>Reconnect</li> <li>Lift up the</li> <li>Turn ignit</li> <li>Connect (</li> </ol>        | ion switch OF<br>ct all harness<br>e vehicle.<br>ion switch Of<br>CONSULT-III                          | connectors di                    | ATA MONITO  | DR" mode.   | M           |
| Monitor item   |  | Condition                        |   | MAS A/F SE-B1   |             |
| MAS A/F SE-B   | 1 Ignition swit  | ch ON                            |   | Approx. 0.4 V   | 0           |
| 7. Activate '<br>temperate   | 'INSPECTIOI<br>ure.  | N MODE 1" ( <u>F</u>             |   | start engine, and warm up engine to normal operating  |             |
| 9. Shift the s   | selector lever<br>N:   | or pedal and k<br>to N position  | with engine r   | unning.   | Ρ           |

# Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

10. Select "MAS A/F SE-B1" in "DATA MONITOR" and check indication.

#### < COMPONENT DIAGNOSIS >

[QR25DE]

JMBIA1631Z

| Monitor item  | Condition  | MAS A/F SE-B1 |
|---------------|--|---------------|
| MAS A/F SE-B1 | Idle (Engine is warmed-up to normal operat-<br>ing temperature.) | 0.9 - 1.1 V   |

- 11. Shift the selector lever to P position.
- 12. Fully depress the accelerator pedal and keep it.
- 13. Check indication.

| Monitor item  | Condition  | MAS A/F SE-B1 |
|---------------|--|---------------|
| MAS A/F SE-B1 | 2,500 rpm (Engine is warmed-up to normal operating temperature.) | 1.4 - 1.7 V   |

14. Fully release accelerator pedal then fully depress it.

15. Check for linear voltage rise in response to engine being increased to about 2,500 rpm.

#### **Without CONSULT-III**

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Lift up the vehicle.
- 4. Turn ignition switch ON.
- 5. Check the voltage between ECM harness connector and ground.

|           | ECM                       |        | Condition          | Voltage       |
|-----------|---------------------------|--------|--------------------|---------------|
| Connector | Terminal                  | Ground | Condition          | vollage       |
| F13       | 58<br>(MAF sensor signal) | Ground | Ignition switch ON | Approx. 0.4 V |
| 0 A I' I  |                           |        |                    |               |

- 6. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- 7. Depress the accelerator pedal and keep it.
- 8. Shift the selector lever to N position with engine running. CAUTION:

Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

Check the voltage between ECM harness connector and ground.

| E         | CM                             | Ground | Condition   | Voltage     |
|-----------|--------------------------------|--------|---|-------------|
| Connector | Terminal                       | Gibunu | Condition   | voitage     |
| F13       | 58<br>(MAF sen-<br>sor signal) | Ground | Idle (Engine is warmed-up to<br>normal operating tempera-<br>ture.) | 0.9 - 1.1 V |

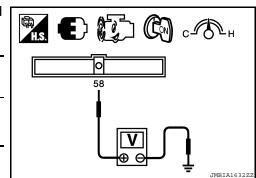
10. Shift the selector lever to P position.

- 11. Fully depress the accelerator pedal and keep it.
- 12. Check the voltage between ECM harness connector and ground.

| E         | CM                             | Ground | Condition   | Voltage     |
|-----------|--------------------------------|--------|---|-------------|
| Connector | Terminal                       | Giouna |   |             |
| F13       | 58<br>(MAF sen-<br>sor signal) | Ground | 2,500 rpm (Engine is warmed-<br>up to normal operating tem-<br>perature.) | 1.4 - 1.7 V |

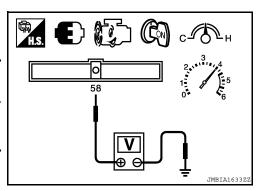
13. Fully release accelerator pedal then fully depress it.

14. Check for linear voltage rise in response to engine being increased to about 2,500 rpm.



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|  | P0102, P010  | 03 MAF SENS    | SOR                                    |    |
|--|--|----------------|--|----|
| < COMPONENT DIA  | AGNOSIS >  |                | [QR25DE]                               |    |
| Is the inspection resu   | It normal?   |                |  |    |
| YES >> GO TO 4<br>NO >> GO TO 2  |  |                |  | А  |
| 2.CHECK FOR THE  | CAUSE OF UNEVEN AIR FL   |                | IASS AIR FLOW SENSOR                   | EC |
| <ul> <li>Crushed air ducts</li> <li>Malfunctioning se</li> <li>Uneven dirt of air</li> </ul> | use of uneven air flow through<br>s<br>eal of air cleaner element  |                | sor. Refer to following.               | C  |
| <u>Is the inspection resu</u><br>YES >> GO TO 4  | It normal?   |                |  | D  |
| NO >> GO TO 3<br>3.CHECK MASS AII  |  |                |  | Е  |
| <ol> <li>Lift up the vehicle</li> <li>Turn ignition swit</li> <li>Connect CONSU</li> </ol>   | e malfunctioning part.<br>e.   | TOR" mode.     |  | F  |
| Monitor item   |  | MAS A/F SE-B1  |  | G  |
| MAS A/F SE-B1  | Ignition switch ON   | Approx. 0.4 V  |  | Н  |
| temperature.<br>7. Depress the acce  | CTION MODE 1" ( <u>HBC-104</u> )<br>elerator pedal and keep it.<br>lever to N position with engine           | -              | nd warm up engine to normal operating  | I  |
| Never leave the<br>engine operates   | selector lever in the N pos<br>but electricity cannot be ge<br>SE-B1" in "DATA MONITOR"                      | enerated.      | period of time. In the N position, the | J  |
| Monitor item   | Condition  | MAS A/F SE-B1  |  | K  |
|  | Engine is warmed-up to normal opera mperature.)  |                |  | L  |
| <ol> <li>Shift the selector</li> <li>Fully depress the</li> <li>Check indication</li> </ol>  | accelerator pedal and keep it  | i.             |  | M  |
| Monitor item   | Condition  | MAS A/F SE-B1  |  |    |
|  | rpm (Engine is warmed-up to norma<br>ting temperature.)  | ll 1.4 - 1.7 V |  | Ν  |
| 14. Check for linear Without CONSUL  | elerator pedal then fully depre<br>voltage rise in response to eng<br><b>T-III</b><br>• malfunctioning part. |                | ed to about 2,500 rpm.                 | 0  |
| <ol> <li>2. Lift up the vehicle</li> <li>3. Turn ignition swit</li> </ol>                    |  |                |  | Ρ  |

#### < COMPONENT DIAGNOSIS >

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

| ECM       |                           | Ground           | Condition          | Voltage       |
|-----------|---------------------------|------------------|--------------------|---------------|
| Connector | Terminal                  | Ground Condition |                    |               |
| F13       | 58<br>(MAF sensor signal) | Ground           | Ignition switch ON | Approx. 0.4 V |

- 5. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- 6. Depress the accelerator pedal and keep it.
- 7. Shift the selector lever to N position with engine running.
   CAUTION:
   Never leave the selector lever in the N position for a long period of time. In the N position, the

## engine operates but electricity cannot be generated.

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

|           | ECM                       | Ground | Condition  | Voltage     |
|-----------|---------------------------|--------|--|-------------|
| Connector | Terminal                  | Giouna | Condition  | vollage     |
| F13       | 58<br>(MAF sensor signal) | Ground | Idle (Engine is warmed-<br>up to normal operating<br>temperature.) | 0.9 - 1.1 V |

9. Shift the selector lever to P position.

10. Fully depress the accelerator pedal and keep it.

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

| ECM       |                           | Ground | Condition  | Voltage     |
|-----------|---------------------------|--------|--|-------------|
| Connector | Terminal                  | Ground | Condition  | vollage     |
| F13       | 58<br>(MAF sensor signal) | Ground | 2,500 rpm (Engine is<br>warmed-up to normal op-<br>erating temperature.) | 1.4 - 1.7 V |

12. Fully release accelerator pedal then fully depress it.

13. Check for linear voltage rise in response to engine being increased to about 2,500 rpm.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

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

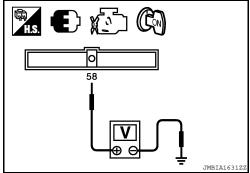
#### With CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Lift up the vehicle.
- 4. Turn ignition switch ON.
- 5. Connect CONSULT-III and select "DATA MONITOR" mode.
- 6. Select "MAS A/F SE-B1" and check indication.

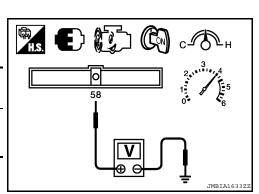
| Monitor item  | Condition          | MAS A/F SE-B1 |
|---------------|--------------------|---------------|
| MAS A/F SE-B1 | Ignition switch ON | Approx. 0.4 V |

- 7. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- 8. Depress the accelerator pedal and keep it.
- 9. Shift the selector lever to N position with engine running.

## EC-158



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#### < COMPONENT DIAGNOSIS >

#### **CAUTION:** Never leave the selector lever in the N position for a long period of time. In the N position, the А engine operates but electricity cannot be generated. 10. Select "MAS A/F SE-B1" in "DATA MONITOR" and check indication. EC MAS A/F SE-B1 Monitor item Condition Idle (Engine is warmed-up to normal operat-0.9 - 1.1 V MAS A/F SE-B1 ing temperature.) 11. Shift the selector lever to P position. 12. Fully depress the accelerator pedal and keep it. 13. Check indication. D Monitor item Condition MAS A/F SE-B1 2,500 rpm (Engine is warmed-up to normal MAS A/F SE-B1 1.4 - 1.7 V operating temperature.) 14. Fully release accelerator pedal then fully depress it. 15. Check for linear voltage rise in response to engine being increased to about 2,500 rpm. F Without CONSULT-III 1. Turn ignition switch OFF. 2. Disconnect mass air flow sensor harness connector and reconnect it again. 3. Lift up the vehicle. 4. Turn ignition switch ON. 5. Check the voltage between ECM harness connector and 🛸 🖸 🔬 Н ground.

| ECM       |                           | Ground  | Condition          | Voltage       |
|-----------|---------------------------|---------|--------------------|---------------|
| Connector | Terminal                  | Citouna | Condition          | voltage       |
| F13       | 58<br>(MAF sensor signal) | Ground  | Ignition switch ON | Approx. 0.4 V |

- 6. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- 7. Depress the accelerator pedal and keep it.
- 8. Shift the selector lever to N position with engine running. CAUTION:

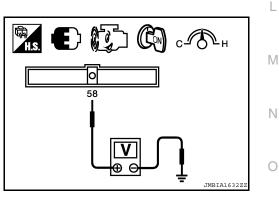
Never leave the selector lever in the N position for a long period of time. In the N position, the engine operates but electricity cannot be generated.

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

|           | ECM                       | Ground | Condition  | Voltage     |
|-----------|---------------------------|--------|--|-------------|
| Connector | Terminal                  | Giouna | Condition  | vollage     |
| F13       | 58<br>(MAF sensor signal) | Ground | Idle (Engine is warmed-<br>up to normal operating<br>temperature.) | 0.9 - 1.1 V |



11. Fully depress the accelerator pedal and keep it.



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#### < COMPONENT DIAGNOSIS >

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

|           | ECM                       | Ground  | Condition  | Voltage     |
|-----------|---------------------------|---------|--|-------------|
| Connector | Terminal                  | Circuna | Condition  | vollage     |
| F13       | 58<br>(MAF sensor signal) | Ground  | 2,500 rpm (Engine is<br>warmed-up to normal op-<br>erating temperature.) | 1.4 - 1.7 V |

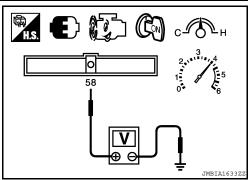
13. Fully release accelerator pedal then fully depress it.

14. Check for linear voltage rise in response to engine being increased to about 2,500 rpm.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Clean or replace mass air flow sensor.



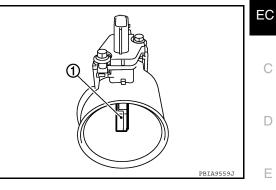
[QR25DE]

## P0112, P0113 IAT SENSOR

## Description

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

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



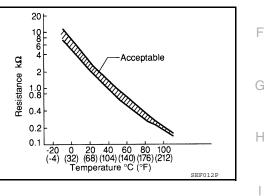
#### <Reference data>

| Intake air temperature<br>°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 terminal 50 (Intake air temperature sensor) and ground.

#### **CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



## DTC Logic

INFOID:000000005441729

#### DTC DETECTION LOGIC

| DTC No. | Trouble diagnosis name                                   | DTC detecting condition                                     | Possible cause  | K |
|---------|--|---|---|---|
| P0112   | Intake air tempera-<br>ture sensor circuit<br>low input  | An excessively low voltage from the sensor is sent to ECM.  | <ul> <li>Harness or connectors</li> <li>(The sensor circuit is open or shorted.)</li> </ul> | L |
| P0113   | Intake air tempera-<br>ture sensor circuit<br>high input | An excessively high voltage from the sensor is sent to ECM. | Intake air temperature sensor   | Μ |

## DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

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

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

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

2. Check 1st trip DTC.

#### Is 1st trip DTC detected?

INFOID:000000005441728

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## P0112, P0113 IAT SENSOR

< COMPONENT DIAGNOSIS >

#### YES >> Go to <u>EC-162</u>, "Diagnosis Procedure".

NO >> INSPECTION END

## Diagnosis Procedure

## **1**.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

## 2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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

| MAF       | sensor             | Ground | Voltage    |
|-----------|--------------------|--------|------------|
| Connector | Connector Terminal |        | voltage    |
| F31       | 5                  | Ground | Approx. 5V |

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.

 $\mathbf{3}$ . CHECK INTAKE AIR TEMPERATURE 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.

| MAF       | sensor   | E         | Continuity |         |
|-----------|----------|-----------|------------|---------|
| Connector | Terminal | Connector | Continuity |         |
| F31       | 6        | F13       | 56         | 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-162, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

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

**5.**CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

#### >> INSPECTION END

## Component Inspection

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

1. Turn ignition switch OFF.

2. Disconnect mass air flow sensor harness connector.

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## P0112, P0113 IAT SENSOR

#### < COMPONENT DIAGNOSIS >

Is the inspection result normal?

Terminals

5 and 6

YES

NO

3. Check resistance between mass air flow sensor terminals as follows.

| eck<br>'s. | resistance between mass   | air flow s | sensor terminals as fol- | <b>1.</b> EÐ |
|------------|---|------------|--------------------------|--------------|
| als        | Condition   |            | Resistance $k\Omega$     | 654321       |
| 6          | Intake air temperature °C (°F)  | 25 (77)    | 1.800 - 2.200            |              |
| >          | ection result normal?<br>> INSPECTION END<br>> Replace mass air flow s<br>ture sensor). | ensor (w   | vith intake air tempera- |              |

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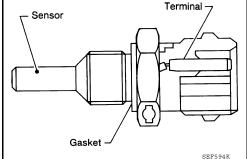
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## P0116 ECT SENSOR

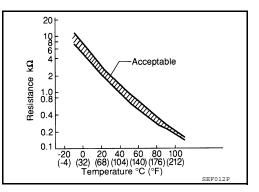
## Description

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.



#### <Reference data>

| Engine coolant temperature<br>°C (°F) | Voltage* V | Resistance $k\Omega$ |
|---------------------------------------|------------|----------------------|
| -10 (14)                              | 4.4        | 7.0 - 11.4           |
| 20 (68)                               | 3.5        | 2.37 - 2.63          |
| 50 (122)                              | 2.2        | 0.68 - 1.00          |
| 90 (194)                              | 0.9        | 0.236 - 0.260        |



\*: These data are reference values and are measured between ECM terminal 46 (Engine coolant temperature sensor) and ground.

#### CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

## DTC Logic

INFOID:000000005441733

#### DTC DETECTION LOGIC

#### NOTE:

If DTC P0116 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to <u>EC-166, "DTC Logic"</u>.

| DTC No. | Trouble diagnosis name  | DTC detecting condition   | Possible cause  |
|---------|---|---|---|
| P0116   | Engine coolant temper-<br>ature sensor circuit<br>range/performance | Engine coolant temperature signal from engine<br>coolant temperature sensor does not fluctuate,<br>even when some time has passed after starting<br>the engine with pre-warming up condition. | Harness or connectors     (High or low resistance in the circuit) |

## 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.

TEST CONDITON:

#### Before performing the following procedure, do not fill with the fuel.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

INFOID:000000005441732

## P0116 ECT SENSOR

| < COMPONENT DIAGNOSIS >   | [QR25DE]               |
|---|------------------------|
| <ol> <li>Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm it up to normal oper<br/>ture.</li> <li>Rev engine up to 2,000 rpm for more than 10 minutes.</li> </ol>  | ating tempera-         |
| 3. Move the vehicle to a cool place, then stop engine and turn ignition switch OFF.   | _                      |
| <ol> <li>Check resistance between "fuel level sensor unit and fuel pump" terminals 4 and 5.</li> <li>Soak the vehicle until the resistance between "fuel level sensor unit and fuel pump" term becomes 0.5 kΩ higher than the value measured before soaking.</li> <li>CAUTION:</li> </ol> | ninals 4 and 5         |
| Never turn ignition switch ON during the soaking time.<br>NOTE:   |                        |
| <ul> <li>Soak time changes depending on ambient air temperature. It may take several hours.</li> <li>Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and let it idle for 20 minutes.</li> <li>Check 1st trip DTC.</li> </ul>   |                        |
| <u>Is 1st trip DTC detected?</u><br>YES >> <u>EC-165, "Diagnosis Procedure"</u><br>NO >> INSPECTION END   |                        |
| Diagnosis Procedure   | INFOID:000000005441734 |
| 1.CHECK GROUND CONNECTION   |                        |
| <ol> <li>Turn ignition switch OFF.</li> <li>Check ground connection E9. Refer to Ground Inspection in <u>GI-45, "Circuit Inspection"</u>.</li> </ol>  |                        |
| Is the inspection result normal?  |                        |
| YES >> GO TO 2.<br>NO >> Repair or replace ground connection.   |                        |
| 2.CHECK ENGINE COOLANT TEMPERATURE SENSOR   |                        |
| Refer to EC-165, "Component Inspection".  |                        |
| Is the inspection result normal?  |                        |
| YES >> GO TO 3.   |                        |
| NO >> Replace engine coolant temperature sensor.  |                        |
| <b>3.</b> CHECK INTERMITTENT INCIDENT   |                        |
| Refer to GI-42, "Intermittent Incident".  |                        |
| >> INSPECTION END   |                        |
| Component Inspection  | INFOID:000000005441735 |
| 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR  |                        |
|   |                        |

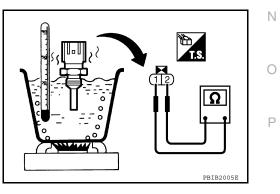
- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor.
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

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

Is the inspection result normal?

YES >> INSPECTION END

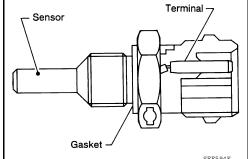
NO >> Replace engine coolant temperature sensor.



## P0117, P0118 ECT SENSOR

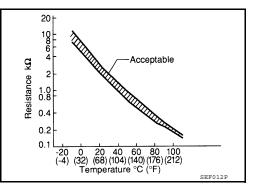
## Description

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<br>°C (°F)] | Voltage* (V) | Resistance (k $\Omega$ |
|--|--------------|------------------------|
| -10 (14)                               | 4.4          | 7.0 - 11.4             |
| 20 (68)                                | 3.5          | 2.37 - 2.63            |
| 50 (122)                               | 2.2          | 0.68 - 1.00            |
| 90 (194)                               | 0.9          | 0.236 - 0.260          |



\*: These data are reference values and are measured between ECM terminal 46 (Engine coolant temperature sensor) and ground.

#### CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

## DTC Logic

INFOID:000000005441737

## DTC DETECTION LOGIC

| DTC No. | Trouble Diagnosis<br>Name                                      | DTC detecting condition                                     | Possible Cause  |
|---------|--|---|---|
| P0117   | Engine coolant tem-<br>perature sensor cir-<br>cuit low input  | An excessively low voltage from the sensor is sent to ECM.  | <ul> <li>Harness or connectors</li> <li>(The sensor circuit is open or shorted.)</li> </ul> |
| P0118   | Engine coolant tem-<br>perature sensor cir-<br>cuit high input | An excessively high voltage from the sensor is sent to ECM. | Engine coolant temperature sensor   |

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

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

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

- 2. Turn ignition switch ON.
- 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.

INFOID:000000005441736

## P0117, P0118 ECT SENSOR

|  |   | •                                  | 0118        | ECT SEN        | GOR<br>[QR25DE]           |    |  |
|--|---|------------------------------------|-------------|----------------|---------------------------|----|--|
| < COMPONENT  |   | 10 >                               |             |                | [4:12022]                 |    |  |
| YES >> Go t  | o <u>EC-167, "[</u>   | Diagnosis Procedur                 | <u>e"</u> . |                |                           | А  |  |
| NO >> INSI   | PECTION EN  | ND                                 |             |                | _                         |    |  |
| Diagnosis Pr   | ocedure   |                                    |             |                | INFOID:00000005441738     | EC |  |
| 1.CHECK GRO  |   |                                    |             |                |                           |    |  |
| <ol> <li>Turn ignition</li> <li>Check arour</li> </ol> |   |                                    | ind Ins     | nection in GL  | 45, "Circuit Inspection". | С  |  |
| Is the inspection                                      |   |                                    |             |                | to, onodit mopositorr.    |    |  |
| YES >> GO  |   |                                    |             |                |                           | D  |  |
| -  | -   | e ground connection OWER SUPPLY CI |             |                |                           |    |  |
|  |   | Int temperature (EC                |             |                | oppector                  | Е  |  |
| 2. Turn ignition                                       | switch ON.  |                                    |             |                |                           |    |  |
| <ol> <li>Check the v<br/>ground.</li> </ol>            | oltage betwe  | en ECT sensor ha                   | rness o     | connector and  |                           | F  |  |
| 9.00.00  |   |                                    |             |                |                           |    |  |
| ECT :  | sensor  | Ground                             |             | Voltage        |                           |    |  |
| Connector  | Terminal  |                                    |             | _              |                           | G  |  |
| F11<br>Is the inspection                               | 1   | Ground                             |             | Approx. 5V     |                           |    |  |
| YES >> GO  |   |                                    |             |                |                           | Н  |  |
|  |   | uit or short to grou               | nd or s     | hort to power  | SEF206W                   |    |  |
| -  | Arness or cor   | nnectors.<br>ROUND CIRCUIT I       |             |                | OBT                       |    |  |
| 1. Turn ignition                                       |   |                                    | 0110        |                |                           |    |  |
| 2. Disconnect I  | ECM harnes  | s connector.                       |             |                |                           | J  |  |
| 3. Check the co  | ontinuity bet   | ween ECT sensor h                  | arness      | connector ar   | nd ECM harness connector. |    |  |
| ECT sens   | sor   | ECM                                |             |                |                           | Κ  |  |
| Connector  | Terminal  | Connector Terr                     | ninal       | Continuity     |                           |    |  |
| F11  | 2   | F13 5                              | 52          | Existed        | -                         | L  |  |
|  |   | hort to ground and                 | short t     | o power.       |                           |    |  |
| Is the inspection<br>YES >> GO                         |   | <u>al?</u>                         |             |                |                           |    |  |
|  |   | uit or short to grour              | nd or sł    | ort to power i | n harness or connectors.  | Μ  |  |
| 4.CHECK ENG  | INE COOLA   | NT TEMPERATUR                      | E SEN       | SOR            |                           |    |  |
| Refer to EC-167  |   |                                    |             |                |                           | Ν  |  |
| Is the inspection                                      |   | <u>al?</u>                         |             |                |                           |    |  |
|  | YES >> GO TO 5.<br>NO >> Replace engine coolant temperature sensor. |                                    |             |                |                           |    |  |
| 5. CHECK INTE  |   |                                    |             |                |                           |    |  |
| Refer to <u>GI-42, "</u>                               | Intermittent I  | Incident".                         |             |                |                           | Ρ  |  |
| >> INSI  | PECTION EN  | ND                                 |             |                |                           |    |  |
| Component I  | nspection   |                                    |             |                | INFOID:00000005441739     |    |  |
| 1.CHECK ENG  | INE COOLA   | NT TEMPERATUR                      | E SEN       | SOR            |                           |    |  |
| 1. Turn ignition                                       | switch OFF.   |                                    |             |                |                           |    |  |
|  |   |                                    |             |                |                           |    |  |

## P0117, P0118 ECT SENSOR

#### < COMPONENT DIAGNOSIS >

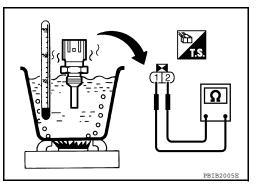
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor.
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor.



P0122, P0123 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 potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

## DTC Logic

## DTC DETECTION LOGIC

#### NOTE:

If DTC P0122 or P0123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-321, "DTC Logic".

| DTC No.         | Trouble diagnosis name   | DTC detecting condition  | Possible cause   |
|-----------------|--|--|--|
| P0122           | Throttle position sensor<br>2 circuit low input                        | An excessively low voltage from the TP sensor 2 is sent to ECM.  | Harness or connectors     (TP sensor 2 circuit is open or shorted.)      |
| P0123           | Throttle position sensor<br>2 circuit high input                       | An excessively high voltage from the TP sensor 2 is sent to ECM. | <ul> <li>Electric throttle control actuator<br/>(TP sensor 2)</li> </ul> |
| DTC CON         | FIRMATION PROCI  | EDURE  |  |
| 1.PRECO         | NDITIONING   |  |  |
| ing the nex     | t test.  | as been previously conducted, always p                           | perform the following before conduct-                                    |
|                 | nition switch OFF and<br>nition switch ON.                             | wait at least 10 seconds.  |  |
| 3. Turn ig      | nition switch OFF and  | wait at least 10 seconds.  |  |
|                 | CONDITION:<br>forming the followin                                     | g procedure, confirm that battery vol                            | age is more than 8V at idle  |
|                 |  | <b>3</b> F. • • • • • • • • • • • • • • • • • •                  |  |
| >>              | > GO TO 2.   |  |  |
| 2.perfo         | RM DTC CONFIRMAT   | TION PROCEDURE   |  |
|                 |  | ADY).<br>al to start engine, then keep engine runr               | ing for at least 1 second.   |
| Is DTC det      | ected?   |  |  |
|                 | <ul> <li>Go to <u>EC-169, "Diag</u></li> <li>INSPECTION END</li> </ul> | nosis Procedure".  |  |
| Diagnosi        | s Procedure  |  | INFOID:000000005441742   |
| <b>1</b> .CHECK | GROUND CONNECT   | ION  |  |
|                 | nition switch OFF.   |  |  |
| 2. Check        | ground connection E9   | ). Refer to Ground Inspection in <u>GI-45, "(</u>                | Circuit Inspection"  |

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2010 Altima HEV

[QR25DE]

Throttle position sensor

Sensor 1

Seńsor 2

90

45

Throttle valve opening angle (deg)

6.0

4.0

0<sup>L</sup>

sensor

Throttle position s output voltage 0.6

135

PBTB0145E

INFOID:000000005441741

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## P0122, P0123 TP SENSOR

#### < COMPONENT DIAGNOSIS >

## **2.**CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

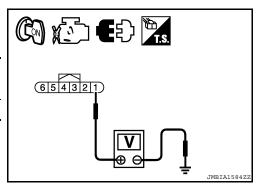
- 1. Disconnect electric throttle control actuator harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between electric throttle control actuator harness connector and ground.

| _ | Electric throttle | control actuator | Ground | Voltage    |  |
|---|-------------------|------------------|--------|------------|--|
|   | Connector         | Terminal         | Ground | vonage     |  |
|   | F57               | 1                | Ground | Approx. 5V |  |

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.



[QR25DE

## **3.**CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

| Electric throttle control actuator |          | ECM       |          | Continuity |  |
|------------------------------------|----------|-----------|----------|------------|--|
| Connector                          | Terminal | Connector | Terminal | Continuity |  |
| F57                                | 4        | F13       | 36       | Existed    |  |

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

Is the inspection result normal?

YES >> GO TO 4.

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

## **4.**CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

| Electric throttle control actuator |          | ECM                |    | Continuity |  |
|------------------------------------|----------|--------------------|----|------------|--|
| Connector                          | Terminal | Connector Terminal |    | Continuity |  |
| F57                                | 3        | F13                | 38 | Existed    |  |

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

Is the inspection result normal?

YES >> GO TO 5.

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

**5.**CHECK THROTTLE POSITION SENSOR

Refer to EC-171. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.

2. Go to EC-171, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

**Component Inspection** 

**1.**CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- Reconnect all harness connectors disconnected. 2.
- Perform EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement". 3.
- Turn ignition switch ON. 4.
- 5. Set shift lever to D position.
- 6. Check the voltage between ECM harness connector and ground.

| ECM       |                         | Ground Condition |                       | Voltage            |                  |  |
|-----------|-------------------------|------------------|-----------------------|--------------------|------------------|--|
| Connector | Terminal                | around           | Condition voltage     |                    | voltage          |  |
|           | 37<br>(TP sensor        |                  |                       | Fully<br>released  | More than 0.36 V |  |
| F13       | 1 signal)               | - Ground         | und Accelerator pedal | Fully<br>depressed | Less than 4.75 V |  |
|           | 38<br>(TP sonsor        |                  |                       | Fully<br>released  | Less than 4.75 V |  |
|           | (TP sensor<br>2 signal) |                  | Fully<br>depressed    | More than 0.36 V   |                  |  |

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace electric throttle control actuator.
- Go to EC-171, "Special Repair Requirement". 2.

>> INSPECTION END

Special Repair Requirement

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

Refer to EC-15. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

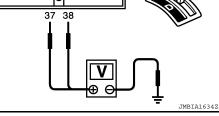
>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-16, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

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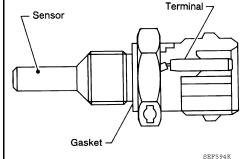
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## P0125 ECT SENSOR

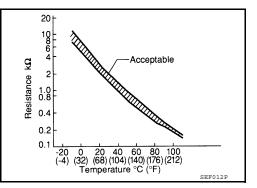
## Description

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



#### <Reference data>

| Engine coolant temperature<br>°C (°F)] | Voltage* (V) | Resistance (k $\Omega$ |
|--|--------------|------------------------|
| -10 (14)                               | 4.4          | 7.0 - 11.4             |
| 20 (68)                                | 3.5          | 2.37 - 2.63            |
| 50 (122)                               | 2.2          | 0.68 - 1.00            |
| 90 (194)                               | 0.9          | 0.236 - 0.260          |



\*: These data are reference values and are measured between ECM terminal 46 (Engine coolant temperature sensor) and ground.

#### CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

## DTC Logic

INFOID:000000005441746

## 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-166, "DTC Logic"</u>.
- If DTC P0125 is displayed with P0116, first perform the trouble diagnosis for DTC P0116. Refer to <u>EC-164, "DTC Logic"</u>.

| DTC No. | Trouble diagnosis name   | DTC detecting condition   | Possible cause  |
|---------|--|---|---|
| P0125   | Insufficient engine cool-<br>ant temperature for<br>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<br/>(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 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:000000005441745

## **P0125 ECT SENSOR**

| < COMPONENT DIAGNOSIS >  | [QR25DE]               |
|--|------------------------|
| 2. CHECK ENGINE COOLANT TEMPERATURE SENSOR FUNCTION  |                        |
| <ul> <li>With CONSULT-III</li> <li>1. Turn ignition switch ON.</li> <li>2. Select "DATA MONITOR" mode with CONSULT-III.</li> <li>3. Check that "COOLAN TEMP/S" is above 5°C (41°F).</li> </ul>   | E                      |
| With GST<br>Follow the procedure "With CONSULT-III" above.<br><u>Is it above 5°C (41°F)?</u>   | (                      |
| YES >> INSPECTION END<br>NO >> GO TO 3.  | ſ                      |
| 3. PERFORM DTC CONFIRMATION PROCEDURE  | L                      |
| <ul> <li>With CONSULT-III</li> <li>Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and run engine for 65 minutes</li> <li>Check 1st trip DTC.</li> <li>If "COOLAN TEMP/S" increases to more than 5°C (41°F) within 65 minutes, turn ignition</li> </ul> | •                      |
| because the test result will be OK.<br>CAUTION:  | F                      |
| Be careful not to overheat engine.<br>With GST<br>Follow the procedure "With CONSULT-III" above.   | (                      |
| <u>Is 1st trip DTC detected?</u><br>YES >> <u>EC-173, "Diagnosis Procedure"</u><br>NO >> INSPECTION END  | ŀ                      |
| Diagnosis Procedure  | INFOID:000000005441747 |
| 1. CHECK GROUND CONNECTION   |                        |
| <ol> <li>Turn ignition switch OFF.</li> <li>Check ground connection E9. Refer to Ground Inspection in <u>GI-45. "Circuit Inspection"</u>.</li> </ol>   |                        |
| <u>Is the inspection result normal?</u><br>YES >> GO TO 2.<br>NO >> Repair or replace ground connection.   | ŀ                      |
| 2. CHECK ENGINE COOLANT TEMPERATURE SENSOR   |                        |
| Refer to <u>EC-173, "Component Inspection"</u> .<br><u>Is the inspection result normal?</u>  | l                      |
| YES >> GO TO 3.<br>NO >> Replace engine coolant temperature sensor.  | Ν                      |
| 3. CHECK THERMOSTAT OPERATION  | <u> </u>               |
| When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and con coolant does not flow.<br>Is the inspection result normal?  | firm the engine        |
| YES >> GO TO 4.<br>NO >> Repair or replace thermostat. Refer to <u>CO-19. "Removal and Installation"</u> .   | C                      |
| 4.CHECK INTERMITTENT INCIDENT  |                        |
| Refer to <u>GI-42, "Intermittent Incident"</u> .   | F                      |
| >> INSPECTION END  |                        |
| Component Inspection   | INFOID:000000005441748 |
| 1.CHECK ENGINE COOLANT TEMPERATURE SENSOR  |                        |
| 1. Turn ignition switch OFF.   |                        |

## **P0125 ECT SENSOR**

## < COMPONENT DIAGNOSIS >

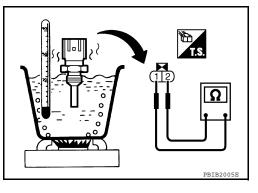
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor.
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor.

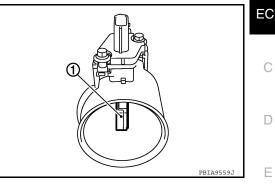


## P0127 IAT SENSOR

## 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.



Acceptable

0 20 40 60 80 100 (32) (68) (104) (140) (176) (212) Temperature °C (°F)

20

10 6 4

0.2

0.

-20

Resistance k0 8.0 8.0 7

#### <Reference data>

| Intake air temperature<br>°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 terminal 50 (Intake air temperature sensor) and ground.

#### CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



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## DTC Logic

DTC DETECTION LOGIC

| DTC No. | Trouble diagnosis name             | DTC detecting condition   | Possible cause   | N |
|---------|------------------------------------|---|--|---|
| P0127   | Intake air temperature<br>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<br/>(The sensor circuit is open or shorted)</li> <li>Intake air temperature sensor</li> </ul> | L |

## 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.

#### **TESTING CONDITION:**

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If this test is conducted with the drive wheels lifted, activate "INPSECTION MODE 1" (<u>HBC-104</u>). If a road test is expected to be easier, it is unnecessary to lift up the vehicle.

#### >> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

#### With CONSULT-III

- 1. Wait until engine coolant temperature is less than 96°C (205°F)
- Turn ignition switch ON.

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## P0127 IAT SENSOR

#### < COMPONENT DIAGNOSIS >

- Select "DATA MONITOR" mode with CONSULT-III.
- Check the engine coolant temperature.
- If the engine coolant temperature is not less than 96°C (205°F), turn ignition switch OFF and cool down engine.

#### NOTĔ:

Perform the following steps before engine coolant temperature is above 96°C (205°F).

- 2. Turn ignition switch ON.
- 3. Select "DATA MONITOR" mode with CONSULT-III.
- 4. Turn ignition switch ON (READY).
- Hold vehicle speed at more than 70 km/h (43 MPH) for 95 consecutive seconds. CAUTION:

## Always drive vehicle at a safe speed.

NOTE:

#### Never fully release accelerator pedal during the cruising.

6. Check 1st trip DTC.

#### With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

YES >> Go to <u>EC-176, "Diagnosis Procedure"</u>. NO >> INSPECTION END

## Diagnosis Procedure

**1.**CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45. "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-176, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

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

 ${f 3.}$ CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

## Component Inspection

## 1. CHECK INTAKE AIR TEMPERATURE SENSOR

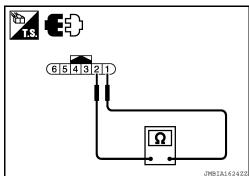
- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector.
- Check resistance between mass air flow sensor terminals as follows.

| Terminals | Condition                      |         | Resistance $k\Omega$ |
|-----------|--------------------------------|---------|----------------------|
| 1 and 2   | Intake air 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).



INFOID:000000005441752

INFOID:000000005441751

## **P0128 THERMOSTAT FUNCTION**

#### < COMPONENT DIAGNOSIS >

## P0128 THERMOSTAT FUNCTION

## **DTC Logic**

#### DTC DETECTION LOGIC

#### NOTE:

If DTC P0128 is displayed with DTC P0300, P0301, P0302, P0303 or P0304, first perform the trouble diagnosis for DTC P0300, P0301, P0302, P0303, P0304. Refer to <u>EC-243, "DTC Logic"</u>.

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough.

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

| DTC No.  | Trouble diagnosis name   | DTC detecting condition   | Possible cause  |  |  |  |
|--|--|---|---|--|--|--|
| P0128  | Thermostat function  | The engine coolant temperature does not reach<br>to specified temperature even though the en-<br>gine has run long enough.  | <ul> <li>Thermostat</li> <li>Leakage from sealing portion of thermostat</li> <li>Engine coolant temperature sensor</li> </ul> |  |  |  |
| DTC CON  | FIRMATION PROC   | EDURE   |   |  |  |  |
| 1.PRECO  | NDITIONING   |   |   |  |  |  |
| ing the next<br>1. Turn ig<br>2. Turn ig<br>3. Turn ig<br><b>TESTING C</b><br>• For best<br>• For best   | t test.<br>nition switch OFF and<br>nition switch ON.<br>nition switch OFF and<br>CONDITION:<br>results, perform at a<br>results, perform at e | as been previously conducted, always p<br>wait at least 10 seconds.<br>wait at least 10 seconds.<br>mbient temperature of –10°C (14°F) o<br>engine coolant temperature of –10°C ( | r higher.<br>14°F) to 52°C (126°F).   |  |  |  |
| >>   | GO TO 2.   | ing procedure, do not fill with the fue   | I.  |  |  |  |
| <b>2.</b> PERFOR   | RM DTC CONFIRMA  | TION PROCEDURE  |   |  |  |  |
| 2. Turn bl<br>3. Turn ig   | C switch OFF.<br>ower fan switch OFF.<br>nition switch ON.   |   |   |  |  |  |
|  | . Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III.  |   |   |  |  |  |
| <ol> <li>Check the indication of "COOLAN TEMP/S"<br/>If it is below 52°C (126°F), go to following step.<br/>If it is above 52°C (126°F), cool down the engine to less than 52°C (126°F). Then go to next steps.</li> <li>Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine.</li> </ol> |  |   |   |  |  |  |
| 7. Drive v   | ehicle for 10 consecu  | tive minutes under the following condition  | ns.   |  |  |  |
| VHCL SPEE  | D SE More than   | 80 km/h (50 MPH)  |   |  |  |  |
| If "CO   | s drive vehicle at a s<br>OLAN TEMP/S" incr  | eases to more than 71°C (160°F) with  | in 10 minutes, turn ignition switch   |  |  |  |
| 8. Check<br>(a) With GS<br>Follow the p  | ecause the test resu<br>1st trip DTC.<br>T<br>procedure "With CON  |   |   |  |  |  |

Is 1st trip DTC detected?

YES >> Go to <u>EC-178, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

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## **P0128 THERMOSTAT FUNCTION**

< COMPONENT DIAGNOSIS >

## Diagnosis Procedure

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

Refer to EC-178, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace engine coolant temperature sensor.

2.CHECK THERMOSTAT

#### Check thermostat. Refer to CO-19, "Removal and Installation".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace thermostat.

## Component Inspection

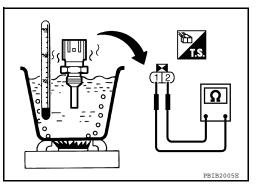
## 1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor.
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

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

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace engine coolant temperature sensor.



[QR25DE]

INFOID:000000005441755

Revision: September 2009

## P0130 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).

## ange. sion layer at this current re hydrocarratio by this ted in the about 800°C

Protector

INFOID:000000005441757

PBIB3354E



Holder

18 20 22 Air fuel ratio

24 26 28

[QR25DE]

#### 

## DTC Logic

## DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal fluctuates according to fuel feedback control.

| DTC No. | Trouble diagnosis name                   | DTC detecting condition |   | Possible Cause   | K |
|---------|--|-------------------------|---|--|---|
| P0130   | Air fuel ratio (A/F) sensor 1<br>circuit | A)                      | The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in the range other than approx. 2.2V. | <ul> <li>Harness or connectors<br/>(The A/F sensor 1 circuit is open<br/>or shorted.)</li> <li>A/F sensor 1</li> </ul> | 1 |
|         |  | B)                      | The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2V.                         |  |   |

## 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.

## TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

#### >> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

#### With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Let it idle for 2 minutes.

## EC-179

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3. Check 1st trip DTC.

## Is 1st trip DTC detected?

YES >> Go to EC-181, "Diagnosis Procedure".

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

NO-2 >> Without CONSULT-III: GO TO 7.

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

- 1. Select "A/F SEN1 (B1)" in "DATA MONITOR" mode with CONSULT-III.
- 2. Check "A/F SEN1 (B1)"indication.

Does the indication fluctuates around 2.2V?

YES >> GO TO 4.

NO >> Go to <u>EC-181, "Diagnosis Procedure"</u>.

**4.**PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-I

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

- 2. Turn ignition switch ON (READY).
- 3. Select "A/F SEN1 (B1) P1276" of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III.

4. Touch "START".

5. When the following conditions are met, "TESTING" will be displayed on the CONSULT-III screen.

| ENG SPEED     | 950 - 2,600 rpm            |
|---------------|----------------------------|
| VHCL SPEED SE | More than 64 km/h (40 mph) |
| B/FUEL SCHDL  | 1.0 - 16.0 msec            |
| Shift lever   | D position                 |

# If "TESTING" is not displayed after 20 seconds, retry from step 2. CAUTION:

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

Is "TESTING" displayed on CONSULT-III screen?

YES >> GO TO 5.

NO >> Check A/F sensor 1 function again. GO TO 3.

**5.**PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-II

Release accelerator pedal fully.

NOTE:

Never apply brake during releasing the accelerator pedal.

Which does "TESTING" change to?

COMPLETED>>GO TO 6.

OUT OF CONDITION>>Retry DTC CONFIRMATION PROCEDURE. GO TO 4.

6. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-III

Touch "SELF-DIAG RESULT"

Which is displayed on CONSULT-III screen?

YES >> INSPECTION END

NO >> Go to EC-181, "Diagnosis Procedure".

## **1.**PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform Component Function Check. Refer to EC-181, "Component Function Check".

#### NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-181, "Diagnosis Procedure".

#### [QR25DE] < COMPONENT DIAGNOSIS > **Component Function Check** INFOID:000000005441758 **1.**PERFORM COMPONENT FUNCTION CHECK With GST EC **CAUTION:** Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. 1. Activate "INSPECTION MODE 1" (HBC-104) to start engine, and warm up engine to normal operating temperature. 2. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch ON (READY). Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes. 4. D 5. Set D position, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH). NOTÉ: Ε Never apply brake during releasing the accelerator pedal. Repeat steps 4 to 5 for five times. 6. Stop the vehicle and turn ignition switch OFF. 7. Turn ignition switch ON. 8. Turn ignition switch OFF and wait at least 10 seconds. 9. 10. Turn ignition switch ON (READY). 11. Repeat steps 4 to 5 for five times. 12. Stop the vehicle and connect GST to the vehicle. 13. Check 1st trip DTC. Is 1st trip DTC detected? Н YES >> Go to EC-181, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure INFOID:000000005441759 1. CHECK GROUND CONNECTION 1. Turn ignition switch OFF. 2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection". Is the inspection result normal? YES >> GO TO 2. Κ 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. Turn ignition switch ON. 2. Check the voltage between A/F sensor 1 harness connector and 3. ground. M A/F sensor 1 Voltage Ground Ν Connector Terminal F44 4 Ground Battery voltage Is the inspection result normal? C YES >> GO TO 4. NO >> GO TO 3. PBIB3308E Ρ

# **3.**DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R harness connector F10
- 15A fuse (No. 37)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

А

# P0130 A/F SENSOR 1

#### < COMPONENT 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.

| A/F ser   | A/F sensor 1 |                    | ECM |            |  |
|-----------|--------------|--------------------|-----|------------|--|
| Connector | Terminal     | Connector Terminal |     | Continuity |  |
| F44       | 1            | F13                | 45  | Existed    |  |
| 1 44      | 2            | 115                | 49  | LAISIEU    |  |

4. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

| A/F sensor 1 |          | ECM       |          | Ground | Continuity  |
|--------------|----------|-----------|----------|--------|-------------|
| Connector    | Terminal | Connector | Terminal | Giouna | Continuity  |
| F44          | 1        | F13       | 45       | Ground | Not existed |
| 1 44         | 2        | 113       | 49       | Giounu | NOT EXISTED |

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

**5.**CHECK INTERMITTENT INCIDENT

#### Perform GI-42, "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 air fuel ratio (A/F) sensor 1.

#### **CAUTION:**

- Discard any 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 sensor, clean exhaust system threads using oxygen sensor thread cleaner [commercial service tool: (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).

>> INSPECTION END

# P0131 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).

#### the nsor er at rent carthis = 0°C 4500

Holder

Protector

18 20 22 Air fuel ratio

24 26 28

INFOID:000000005441761

PBIB3354E

# **DTC Logic**

#### DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately low.

| DTC No. | Trouble diagnosis name                            | DTC detecting condition  | Possible Cause   | Κ |
|---------|---|--|--|---|
| P0131   | Air fuel ratio (A/F) sensor 1 circuit low voltage | <ul> <li>The A/F signal computed by ECM from the A/<br/>F sensor 1 signal is constantly approx. 0V.</li> </ul> | <ul> <li>Harness or connectors<br/>(The A/F sensor 1 circuit is open or<br/>shorted.)</li> <li>A/F sensor 1</li> </ul> | L |

#### DTC CONFIRMATION PROCEDURE

#### .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.

#### TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

#### >> GO TO 2.

# 2. CHECK A/F SENSOR FUNCTION

#### With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Select "A/F SEN1 (B1)" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "A/F SEN1 (B1)" indication.

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#### With GST

Follow the procedure "With CONSULT-III" above.

Is the indication constantly approx. 0V?

YES >> Go to EC-184, "Diagnosis Procedure".

NO >> GO TO 3.

**3.**PERFORM DTC CONFIRMATION PROCEDURE

#### With CONSULT-III

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF, wait at least 10 seconds and then turn ignition switch ON (READY).
- 4. Drive and accelerate vehicle to more than 70 km/h (43 MPH) within 1 minute after turning ignition switch ON (READY).

CAUTION:

#### Always drive vehicle at a safe speed.

5. Maintain the following conditions for about 20 consecutive seconds.

| ENG SPEED      | 1,000 - 3,200 rpm          |
|----------------|----------------------------|
| VHCL SPEED SE  | More than 70 km/h (43 mph) |
| B/FUEL SCHDL   | 1.5 - 15.0 msec            |
| COOLAN TEMP/S  | More than 70°C (158°F)     |
| Selector lever | Suitable position          |

#### NOTE:

- Keep the accelerator pedal as steady as possible during the cruising.
- If this procedure is not completed within 150 seconds after turning ignition switch ON (READY) at step 3, return to step 1.
- 6. Check 1st trip DTC.

#### With GST

Follow the procedure "With CONSULT-III" above.

#### Is 1st trip DTC detected?

- YES >> Go to EC-184, "Diagnosis Procedure".
- NO >> INSPECTION END

#### **Diagnosis** Procedure

#### **1**.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E9. Refer to Ground Inspection in <u>GI-45, "Circuit Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

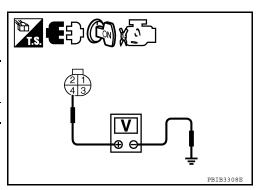
# **2.**CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect A/F sensor 1 harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between A/F sensor 1 harness connector and ground.

| A/F se    | ensor 1  | Ground   | Voltage         |
|-----------|----------|----------|-----------------|
| Connector | Terminal | Circuita | Voltage         |
| F44       | 4        | Ground   | Battery voltage |

Is the inspection result normal?

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



# P0131 A/F SENSOR 1

# < COMPONENT DIAGNOSIS >

| < COMPONE              | NT DIAGNC                 | SIS >       |             |            |                | [QR25DE]   |
|------------------------|---------------------------|-------------|-------------|------------|----------------|--|
| <b>3.</b> DETECT M     | IALFUNCTIC                | NING P      | ART         |            |                |  |
| Check the foll         |                           | . =         |             |            |                |  |
| 15A fuse (No           | arness conne<br>o. 37)    | ector F10   |             |            |                |  |
|                        | open or shor              | t betwee    | n A/F sen   | sor 1 and  | fuse           |  |
| >> P                   | epair or repla            | oo harne    | se or oor   | noctors    |                |  |
|                        | F SENSOR 1                |             |             |            | OR OPEN A      | ND SHORT   |
|                        | ion switch OF             |             |             |            |                |  |
| . Disconne             | ct ECM harne              | ess conn    |             | r 1 harnoa | o connector o  | and ECM harness connector.   |
| . Check the            |                           | elween P    | VF Seliso   | i i names  | S CONNECTOR A  | ind ECM namess connector.  |
| A/F se                 | nsor 1                    |             | ECM         |            | Continuity     | -  |
| Connector              | Terminal                  | Conne       | ector       | Terminal   | Continuity     | _  |
| F44                    | 1                         | F1          | 3           | 45<br>49   | Existed        |  |
| Check the              |                           | etween A    | /F senso    | -          | s connector c  | F ECM harness connector and ground.  |
|                        |                           |             |             |            |                |  |
| A/F sense              | or 1                      | EC          | Μ           | Ground     | Continuity     | -  |
| Connector              |                           | onnector    | Terminal    |            |                | -  |
| F44                    | 1                         | F13         | 45          | Ground     | Not existed    |  |
| Also chec              | k harness for             | short to    | -           |            |                | -  |
|                        | on result norr            | <u>mal?</u> |             |            |                |  |
|                        | O TO 5.<br>epair open ci  | rcuit or s  | hort to ar  | ound or sh | ort to power i | in harness or connectors.  |
|                        | TERMITTEN                 |             |             |            |                |  |
| erform <u>GI-42</u>    | 2, "Intermitten           | t Inciden   | <u>t"</u> . |            |                |  |
| •                      | on result norr            | <u>mal?</u> |             |            |                |  |
| /ES >>G<br>NO >>R      | O IO 6.<br>epair or repla | ice.        |             |            |                |  |
|                        | AIR FUEL R                |             | F) SENS     | OR 1       |                |  |
|                        | el ratio (A/F)            | sensor 1    |             |            |                |  |
| AUTION:<br>Discard any | v sensor wh               | ich has     | been dro    | opped from | n a height of  | f more than 0.5 m (19.7 in) onto a hard  |
| surface suc            | h as a conc               | rete floo   | r; use a i  | new one.   | -              |  |
|                        |                           |             |             |            |                | s using oxygen sensor thread cleaner<br>roved anti-seize lubricant (commercial |
| service too            |                           |             |             |            | <i>.</i>       | `  |
| ~~ IN                  | ISPECTION                 |             |             |            |                |  |
| 22 IN                  |                           |             |             |            |                |  |
|                        |                           |             |             |            |                |  |

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# P0132 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.

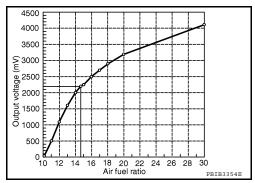
The sensor is capable of precise measurement  $\lambda = 1$ , but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide  $\lambda$  range.

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).

# Protector Holder



Zirconia element

INFOID:000000005441764

# DTC Logic

#### DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately high.

| DTC No. | Trouble diagnosis name                             | DTC detecting condition   | Possible Cause   |
|---------|--|---|--|
| P0132   | Air fuel ratio (A/F) sensor 1 circuit high voltage | • The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5V. | <ul> <li>Harness or connectors<br/>(The A/F sensor 1 circuit is open or<br/>shorted.)</li> <li>A/F sensor 1</li> </ul> |

#### DTC CONFIRMATION PROCEDURE

# **1.**CHECK LOW FUEL WARNING LIGHT

1. Turn ignition switch ON.

2. Check the state of low fuel warning light.

Is low fuel warning light illuminated?

YES >> Refill the fuel until low fuel warning light turned OFF. Then GO TO 2.

NO >> GO TO 2.

#### 2.PRECONDITIONING

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

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 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 10.5V at idle.

INFOID:000000005441763

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# P0132 A/F SENSOR 1

## < COMPONENT DIAGNOSIS >

| 3.CHECK A/F SENSOR F   | UNCTION   | А      |
|--|---|--------|
| <ul> <li>With CONSULT-III</li> <li>Activate "INSPECTION temperature.</li> </ul>  | N MODE 1" (HBC-104) to start engine, and warm up engine to normal operating   |        |
| <ol> <li>Select "A/F SEN1 (B1)"</li> <li>Check "A/F SEN1 (B1)"</li> </ol>  | " in "DATA MONITOR" mode with CONSULT-III. " indication.  | EC     |
| With GST     Follow the procedure "With  |   | С      |
| Is the indication constantly   |   |        |
| -  | "Diagnosis Procedure".  |        |
| NO >> GO TO 4.   |   | D      |
| 4.PERFORM DTC CONFI  | RMATION PROCEDURE   |        |
| With CONSULT-III   |   | Ε      |
| <ol> <li>Turn ignition switch OF</li> <li>Turn ignition switch ON</li> </ol>   | F and wait at least 10 seconds.   |        |
| 3. Turn ignition switch OF   | F, wait at least 10 seconds and then turn ignition switch ON (READY).<br>ehicle to more than 70 km/h (43 MPH) within 1 minute after turning ignition switch | F      |
| Always drive vehicle   | <b>at a safe speed.</b><br>conditions for about 20 consecutive seconds.   | G      |
| ENG SPEED  | 1,000 - 3,200 rpm   | Н      |
| VHCL SPEED SE  | More than 70 km/h (43 mph)  |        |
| B/FUEL SCHDL   | 1.5 - 15.0 msec   |        |
| COOLAN TEMP/S  | More than 70°C (158°F)  |        |
| Selector lever   | Suitable position   |        |
| <ul> <li>If this procedure is<br/>at step 3, return to s</li> </ul>  | or pedal as steady as possible during the cruising.<br>not completed within 150 seconds after turning ignition switch ON (READY)<br>step 1.                 | J<br>K |
| <ul> <li>6. Check 1st trip DTC.</li> <li>With GST</li> <li>Follow the procedure "With<br/>Is 1st trip DTC detected?</li> <li>YES &gt;&gt; Go to EC-187.<br/>NO &gt;&gt; INSPECTION IS</li> </ul> | "Diagnosis Procedure".  | L      |
| Diagnosis Procedure  |   | Μ      |
| 1.CHECK GROUND CON   |   | N      |
| 1. Turn ignition switch OF   | F.  | IN     |
| -  | ion E9. Refer to Ground Inspection in <u>GI-45, "Circuit Inspection"</u> .  | ~      |
| Is the inspection result norr  | <u>nar?</u>   | 0      |
| YES >> GO TO 2.<br>NO >> Repair or repla   | ce ground connection.   |        |
| • ' '  | IO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT  | Ρ      |
| 1 Disconnect A/E sensor  |   |        |

Disconnect A/F sensor 1 harness connector.
 Turn ignition switch ON.

# P0132 A/F SENSOR 1

#### < COMPONENT DIAGNOSIS >

A/F sensor 1

Terminal

4

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

| en A/     | F sensor T name | ss connector and | Ĩs €₽©) XĒ |
|-----------|-----------------|------------------|------------|
|           | Ground          | Voltage          | 21         |
|           | Ground          | Battery voltage  |            |
| <u> ?</u> |                 |                  |            |

Is the inspection result normal?

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

Connector

F44

# **3.** DETECT MALFUNCTIONING PART

Check the following.

IPDM E/R harness connector F10

- 15A fuse (No. 37)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

# 4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

| A/F s     | ensor 1  | E         | CM       | Continuity |
|-----------|----------|-----------|----------|------------|
| Connector | Terminal | Connector | Terminal | Continuity |
| F44       | 1        | F13       | 45       | Existed    |
| 1 44      | 2        |           | 49       | LAISIEU    |

4. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

| A/F sensor 1 |          | ECM       |          | Ground | Continuity  |
|--------------|----------|-----------|----------|--------|-------------|
| Connector    | Terminal | Connector | Terminal | Ciouna | Continuity  |
| F44          | 1        | F13       | 45       | Ground | Not existed |
| 1 44         | 2        | 115       | 49       | Gibana | NOT EXISTED |

5. Also check harness for short to power.

#### Is the inspection result normal?

YES >> GO TO 5.

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

#### **5.**CHECK INTERMITTENT INCIDENT

Perform GI-42, "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 air fuel ratio (A/F) sensor 1.

#### CAUTION:

- Discard any 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 sensor, clean exhaust system threads using oxygen sensor thread cleaner [commercial service tool: (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).

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# P0132 A/F SENSOR 1

#### < COMPONENT DIAGNOSIS >

>> INSPECTION END

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# P0133 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.

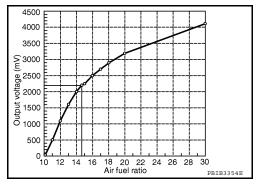
The sensor is capable of precise measurement  $\lambda = 1$ , but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide  $\lambda$  range.

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).

# 



#### INFOID:000000005441767

# DTC Logic

#### DTC DETECTION LOGIC

To judge the malfunction of A/F sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the A/F sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the A/F sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

| DTC No. | Trouble diagnosis name                                 | DTC detecting condition   | Possible Cause  |
|---------|--|---|---|
| P0133   | Air fuel ratio (A/F) sensor 1<br>circuit slow response | <ul> <li>The response of the A/F signal computed by<br/>ECM from A/F sensor 1 signal takes more than<br/>the specified time.</li> </ul> | <ul> <li>Harness or connectors<br/>(The A/F sensor 1 circuit is open or<br/>shorted.)</li> <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 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 11V at idle. Do you have CONSULT-III?

# EC-190

| FUISS AN SENSOR I  |        |
|--|--------|
| < COMPONENT DIAGNOSIS > [QR25  | DE]    |
| YES >> GO TO 2.<br>NO >> GO TO 6.  |        |
| 2.PERFORM DTC CONFIRMATION PROCEDURE   | A      |
|  |        |
| With CONSULT-III  Turn ignition switch ON (READY).   | EC     |
| 2. Depress accelerator pedal and wait at least 6 minutes.  |        |
| <ul> <li>NOTE:<br/>If keeping depressing the accelerator pedal for more than 6 minutes, fuel will be cut off after some tir</li> <li>Select "A/F SEN1(B1) P0133" of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III.</li> <li>Touch "START".</li> </ul> | ne. C  |
| 5. Drive vehicle at a speed of 90 km/h (56 MPH) or more for at least 15 seconds.   | D      |
| CAUTION:<br>Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.   |        |
| <ol> <li>Touch "SELF-DIAG RESULT".</li> </ol>  | _      |
| Which is displayed on CONSULT-III?   | E      |
| COMPLETED>>GO TO 3.<br>OUT OF CONDITION>>GO TO 4.  |        |
| <b>3.</b> PERFORM DTC CONFIRMATION PROCEDURE   | F      |
| Touch "SELF-DIAG RESULT".  |        |
| Which is displayed on CONSULT-III?   | G      |
| OK >> INSPECTION END   |        |
| NG >> Go to <u>EC-192, "Diagnosis Procedure"</u> .   |        |
| 4.PERFORM DTC CONFIRMATION PROCEDURE   | H      |
| Stop vehicle with engine running and let it idle for about 10 seconds.   |        |
| Which is displayed on CONSULT-III?<br>TESTING>>GO TO 5.  | 1      |
| OUT OF CONDITION>>GO TO 2.   |        |
| 5. PERFORM DTC CONFIRMATION PROCEDURE  | J      |
| 1. Wait at least 20 seconds at idle under the condition that "TESTING" is displayed on the CONSU screen.   | LT-III |
| 2. Make sure that "TESTING" changes to "COMPLETED".  | K      |
| If "TESTING" changed to "OUT OF CONDITION", refer to <u>EC-105. "Component Function Check"</u> .<br>3. Touch "SELF-DIAG RESULT".   |        |
| Which is displayed on CONSULT-III?   | L      |
| OK >> INSPECTION END   |        |
| NG >> Go to <u>EC-192, "Diagnosis Procedure"</u> .   | N.4    |
| 6.PERFORM DTC CONFIRMATION PROCEDURE   | M      |
| <ul> <li>With GST</li> <li>Turn ignition switch ON (READY).</li> </ul>   |        |
| 2. Depress accelerator pedal and wait at least 6 minutes.  | Ν      |
| <b>NOTE:</b><br>If keeping depressing the accelerator pedal for more than 6 minutes, fuel will be cut off after some tir   | no     |
| <ol> <li>Drive vehicle at a speed of 100 km/h (62 MPH) or more for at least 15 consecutive seconds.</li> <li>CAUTION:</li> </ol>   | 0      |
| Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.   |        |
| <ol> <li>Stop vehicle with engine running and then let engine idle for about 1 minute.</li> <li>Check 1st trip DTC.</li> </ol>   | Р      |
| Is 1st trip DTC detected?  |        |
| VES >> Go to EC-192 "Diagnosis Procedure"  |        |

- YES >> Go to <u>EC-192, "Diagnosis Procedure"</u>. NO >> INSPECTION END

# Diagnosis Procedure

INFOID:000000005441768

## **1**.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

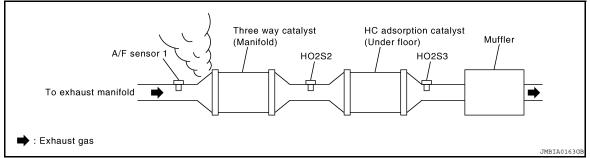
2.RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1. Refer to EM-29, "Removal and Installation".

>> GO TO 3.

# **3.**CHECK EXHAUST GAS LEAK

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and run engine at idle speed.
- 2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.

NO >> GO TO 4.

**4.**CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

#### Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 5.

**5.**CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- 1. Clear the mixture ratio self-learning value. Refer to <u>EC-18, "MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement"</u>.
- 2. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine.
- 3. Wait for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to <u>EC-224, "DTC Logic"</u> or <u>EC-228,</u> <u>"DTC Logic"</u>.

NO >> GO TO 6.

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

1. Turn ignition switch OFF.

- 2. Disconnect A/F sensor 1 harness connector.
- 3. Turn ignition switch ON.

# P0133 A/F SENSOR 1

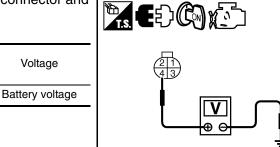
#### < COMPONENT DIAGNOSIS >

A/F sensor 1

Terminal

4

Check the voltage between A/F sensor 1 harness connector and 4. ground.



YES >> GO TO 8. NO >> GO TO 7.

Connector

F44

# 7. DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R harness connector F10
- 15A fuse (No. 37)
- Harness for open or short between A/F sensor 1 and fuse
  - >> Repair or replace harness or connectors.

## ${f 8.}$ CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Ground

Ground

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

| A/F ser   | nsor 1   | EC        | ECM      |            |  |  |
|-----------|----------|-----------|----------|------------|--|--|
| Connector | Terminal | Connector | Terminal | Continuity |  |  |
| F44       | 1        | F13       | 45       | Existed    |  |  |
| 1 44      | 2        | 115       | 49       | LAISIEU    |  |  |

Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground. 4

| A/F ser   | nsor 1   | ECM       |          | Ground | Continuity  |
|-----------|----------|-----------|----------|--------|-------------|
| Connector | Terminal | Connector | Terminal | Ground | Continuity  |
| F44       | 1        | F13       | 45       | Ground | Not existed |
| 1 44      | 2        | 113       | 49       | Ground | NOT EXISTED |

5. Also check harness for short to power.

#### Is the inspection result normal?

YES >> GO TO 9.

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

#### ${f 9.}$ CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Ν Refer to EC-132, "Component Inspection". Is the inspection result normal? YES >> GO TO 10. NO >> GO TO 13. **10.**CHECK MASS AIR FLOW SENSOR Check mass air flow sensor. Ρ Refer to EC-147, "Component Inspection". Is the inspection result normal?

YES

>> GO TO 11.

NO >> Replace mass air flow sensor.

**11.**CHECK PCV VALVE

Refer to EC-401, "Component Inspection".

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Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace PCV valve.

12. CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace.

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

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

#### CAUTION:

- Discard any 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 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 HO2S2

# Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.

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



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 (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuelcut.

| DTC No. | Trouble diagnosis name                        | DTC detecting condition  | Possible cause  |
|---------|---|--|---|
| P0137   | Heated oxygen sensor 2<br>circuit low voltage | The maximum voltage from the sensor is not reached to the specified voltage. | <ul> <li>Harness or connectors<br/>(The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> <li>Fuel pressure</li> <li>Fuel injector</li> <li>Intake air leaks</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 before conducting the next test.

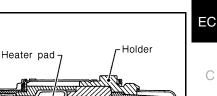
1. Turn ignition switch OFF and wait at least 10 seconds.

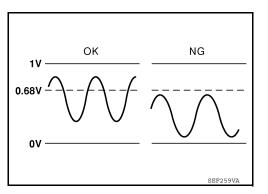
2. Turn ignition switch ON.

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).





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INFOID:000000005441769

Zirconia tube

SEF327R

# **3.** PERFORM DTC CONFIRMATION PROCEDURE

#### With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine 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 (READY) and select "DATA MONITOR" mode with CONSULT-III.
- 6. Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. CAUTION:

# Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

#### Keep the vehicle speed as steady as possible during the cruising.

- 7. Stop the vehicle and shift the selector lever to P position.
- 8. Fully depress the accelerator pedal and keep it until step 11.
- Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F). If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F).
- 10. Select "HO2S2 (B1) P1147" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 11. Touch "START".
  - NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

12. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT-III screen?

- OK >> INSPECTION END
- NG >> Go to EC-197, "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-196, "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-197, "Diagnosis Procedure".

#### **Component Function Check**

INFOID:000000005441771

#### **1.**PERFORM COMPONENT FUNCTION CHECK

#### Without CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition ON (READY) and drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes.

#### CAUTION:

# Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

#### Keep the vehicle speed as steady as possible during the cruising.

6. Stop vehicle and shift the selector lever to P position.

# EC-196

# P0137 HO2S2

Voltage

The voltage should

#### < COMPONENT DIAGNOSIS >

Terminal

ECM

Connector

7. Check the voltage between ECM harness connector and ground under the following condition.

Condition

Fully depress the accel-

Ground

| ₩<br>H.S. | e 🕼 | P<br>R      |
|-----------|-----|-------------|
|           | 33  |             |
|           |     | _           |
|           |     | JMBIA1635ZZ |

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А

EC

| F13                         | 33<br>(HO2S2<br>signal)      | Ground                         | erator peo | ess the accel-<br>lal and keep<br>ly release ac-<br>pedal. | The voltage should<br>be above 0.68V at<br>least once during<br>this procedure. |  | С   |
|-----------------------------|------------------------------|--------------------------------|------------|--|---|--|-----|
| Is the insp                 |                              |                                |            |  |   |  |     |
|                             |                              |                                |            | Procedure".  |   |  | D   |
| Diagnos                     |                              |                                | lagriosis  | <u>Flocedule</u>   |   | INFOID:000000005441772                   | E   |
| <b>1.</b> CHECK             | GROUN                        | D CONNE                        | ECTION     |  |   |  |     |
|                             |                              | itch OFF.                      |            |  |   |  | F   |
| 2. Check                    | •                            |                                |            | er to Ground   | I Inspection in <u>GI-4</u>   | 5, "Circuit Inspection".                 |     |
|                             | > GO TO                      |                                | <u></u>    |  |   |  | G   |
| -                           | •                            | •                              | •          | connection.  |   |  | G   |
| 2.CLEAR                     | THE MIX                      | TURE RA                        | ATIO SEL   | F-LEARNIN  | IG VALUE  |  |     |
|                             |                              |                                |            |  | fer to <u>EC-18, "MIX</u>   | TURE RATIO SELF-LEARNING VALUE           | H   |
|                             |                              | <u>al Repair F</u><br>ECTION M |            |  | o start engine, and   | let engine idle for at least 10 minutes. |     |
| <u>ls the 1st t</u>         | rip DTC F                    | 0171 det                       | ected? Is  | it difficult to  | start engine?   | -  |     |
|                             | > Perform<br>> GO TO         |                                | iagnosis   | for DTC P0   | 171. Refer to <u>EC-22</u>  | 24, "DTC Logic".                         |     |
| _                           |                              | -                              |            |  | N AND SHORT   |  | J   |
|                             |                              | itch OFF.                      |            |  |   |  |     |
| 2. Discor                   | nect hea                     | ted oxyge                      |            | 2 harness o  | connector.  |  | IZ. |
|                             |                              | M harness                      |            |  | connector and EC  | M harness connector.                     | K   |
| 4. Oneck                    |                              |                                | /een 1102  |  |   | in namess connector.                     |     |
| HO2                         | S2                           | EC                             | М          | Continuitur  |   |  | L   |
| Connector                   | Terminal                     | Connector                      | Terminal   | Continuity   |   |  |     |
| F42                         | 1                            | F13                            | 35         | Existed  |   |  | M   |
|                             |                              |                                | •          | ound and sh  | ort to power.   |  |     |
| <u>Is the insp</u><br>YES > | <u>ection res</u><br>> GO TO |                                | <u>l?</u>  |  |   |  | Ν   |
| -                           |                              |                                | it or shor | t to ground  | or short to power in  | harness or connectors.                   | I N |
|                             | •                            | •                              |            | •  | OPEN AND SHOP   |  | -   |
| 1. Check                    | the conti                    | nuity betw                     | veen HO2   | 2S2 harness  | connector and EC  | M harness connector.                     | 0   |

| HO2S2     |          | EC                 | Continuity |            |
|-----------|----------|--------------------|------------|------------|
| Connector | Terminal | Connector Terminal |            | Continuity |
| F42       | 4        | F13                | 33         | Existed    |

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground. Ρ

# P0137 HO2S2

| HO2S2     |          | ECM       |          | Ground | Continuity  |
|-----------|----------|-----------|----------|--------|-------------|
| Connector | Terminal | Connector | Terminal | Ground | Continuity  |
| F42       | 4        | F13       | 33       | Ground | Not existed |

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

**5.**CHECK HEATED OXYGEN SENSOR 2

Refer to EC-198. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

**6.**REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- Discard any 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 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-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

**1**.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2-1

#### With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition ON (READY) and select "DATA MONITOR" mode with CONSULT-III.
- 6. Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. CAUTION:

# Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

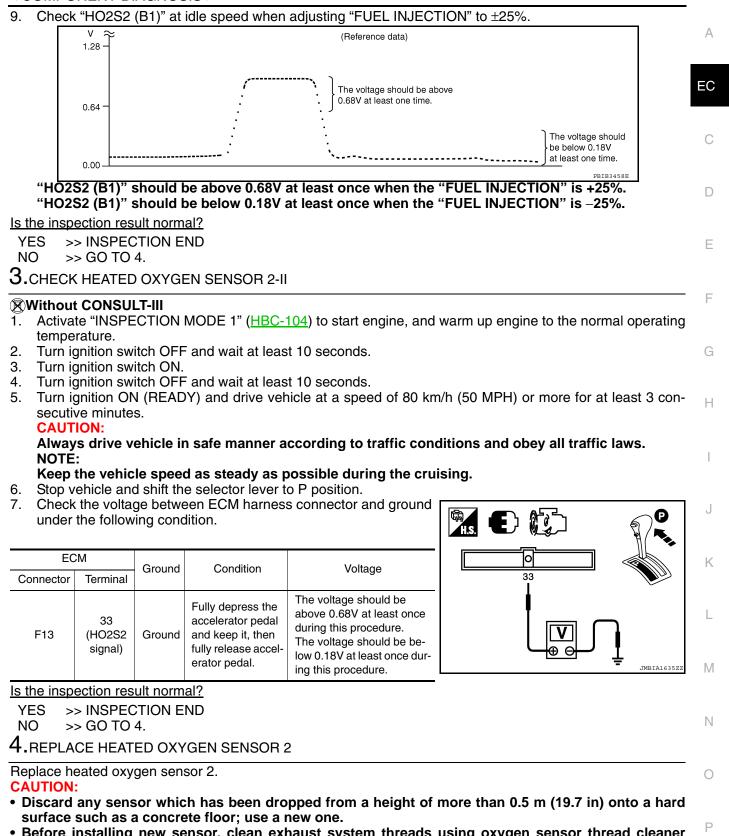
#### Keep the vehicle speed as steady as possible during the cruising.

- 7. Stop vehicle and shift the selector lever to P position.
- 8. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-III.

INEOID-000000005441773

# P0137 HO2S2

#### < COMPONENT DIAGNOSIS >



• Before installing new 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 HO2S2

# Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.

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



NG

PBTB1848F

PBIB2376

000327

Zirconia tube

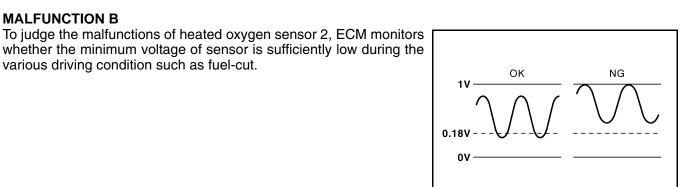
#### DTC DETECTION LOGIC

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 (manifold) causes the longer switching time.

#### **MALFUNCTION A**

MALFUNCTION B

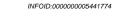
To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



| DTC No. | Trouble diagnosis name                         | DTC detecting condition |  | Possible cause  |
|---------|--|-------------------------|--|---|
|         | A)   |                         | An excessively high voltage from the sen-<br>sor is sent to ECM.             | <ul> <li>Harness or connectors<br/>(The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> </ul>   |
| P0138   | Heated oxygen sensor 2<br>circuit high voltage | B)                      | The minimum voltage from the sensor is not reached to the specified voltage. | <ul> <li>Harness or connectors<br/>(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

various driving condition such as fuel-cut.



Holder

Heater pad

OK

1.2V

1۷

٥v

## [QR25DE]

| 1.PRECONDITIONING  | Λ  |
|--|----|
| If DTC Confirmation Procedure has been previously conducted, always perform the following before conduct-<br>ing the next test.  | А  |
| 1 Turn ignition switch OFF and wait at least 10 seconds  | EC |
| <ol> <li>Turn ignition switch OFF and wait at least 10 seconds.</li> </ol>   |    |
| >> GO TO 2.  | С  |
| 2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A   |    |
| 1. Activate "INSPECTION MODE 1" (HBC-104) to start engine, and warm up engine to normal operating  | D  |
| temperature.<br>2. Turn ignition switch OFF and wait at least 10 seconds.  |    |
| <ol> <li>Turn ignition switch ON.</li> <li>Turn ignition switch OFF and wait at least 10 seconds.</li> <li>Turn ignition switch ON (READY).</li> </ol>   | Е  |
| 6. Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes.  | F  |
| CAUTION:<br>Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.<br>NOTE:  | 1  |
| <ul> <li>Keep the vehicle speed as steady as possible during the cruising.</li> <li>7. Check 1st trip DTC.</li> </ul>  | G  |
| Is 1st trip DTC detected?  |    |
| YES >> Go to <u>EC-202, "Diagnosis Procedure"</u> .<br>NO-1 >> With CONSULT-III: GO TO 3.<br>NO-2 >> Without CONSULT-III: GO TO 5.   | Η  |
| <b>3.</b> PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B   | Ι  |
| NOTE:  |    |
| <ul> <li>For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30 °C (32 to 86 °F).</li> <li>1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating</li> </ul> | J  |
| <ul><li>temperature.</li><li>Turn ignition switch OFF and wait at least 10 seconds.</li><li>Turn ignition switch ON.</li></ul>   |    |
| 4. Turn ignition switch OFF and wait at least 10 seconds.  | Κ  |
| <ol> <li>Turn ignition switch ON (READY) and select "DATA MONITOR" mode with CONSULT-III.</li> <li>Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes.</li> </ol>                             |    |
| CAUTION:<br>Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.   | L  |
| NOTE:<br>Keep the vehicle speed as steady as possible during the cruising.   | M  |
| <ol> <li>Stop the vehicle and shift the selector lever to P position.</li> <li>Fully depress the accelerator pedal and keep it until step 11.</li> </ol>   |    |
| <ol> <li>Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).<br/>If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F).</li> </ol>                                       | Ν  |
| <ol> <li>Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.</li> <li>Touch "START".</li> <li>NOTE:</li> </ol>   |    |
| It will take at most 10 minutes until "COMPLETED" is displayed.<br>12. Touch "SELF-DIAG RESULT".   | 0  |
| Which is displayed on CONSULT-III  |    |
| OK >> INSPECTION END   | Ρ  |
| NG >> Go to <u>EC-202. "Diagnosis Procedure"</u> .<br>CAN NOT BE DIAGNOSED>>GO TO 4.   |    |
| 4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALUNCTION B AGAIN   |    |
| 4 Turn invitien suiteb OFF and beaus the unbids in a seal place (as do the unbids)   |    |

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).

2. Perform DTC CONFIRMATION PROCEDURE again.

< COMPONENT DIAGNOSIS >

#### >> GO TO 3.

## **5.**PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to <u>EC-202, "Diagnosis Procedure"</u>. **NOTE:** 

Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-202, "Diagnosis Procedure".

# Component Function Check

INFOID:000000005441776

# **1.**PERFORM COMPONENT FUNCTION CHECK

#### Without CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition ON (READY) and drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes.

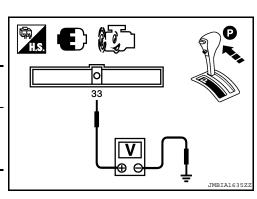
# CAUTION:

# Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

#### Keep the vehicle speed as steady as possible during the cruising.

- 6. Stop vehicle and shift the selector lever to P position.
- 7. Check the voltage between ECM harness connector and ground under the following condition.

| ECM       |                         | Ground | Condition  | Voltage   |  |
|-----------|-------------------------|--------|--|---|--|
| Connector | Terminal                |        |  | vollage   |  |
| F13       | 33<br>(HO2S2<br>signal) | Ground | Fully depress the acceler-<br>ator pedal and keep it,<br>then fully release acceler-<br>ator pedal | The voltage should<br>be below 0.18V at<br>least once during<br>this procedure. |  |



#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-202, "Diagnosis Procedure".

#### Diagnosis Procedure

#### **1**.INSPECTION START

Confirm the detected malfunction (A or B). Refer to <u>EC-200, "DTC Logic"</u>. <u>Which malfunction is detected?</u>

A >> GO TO 2.

B >> GO TO 2.

2. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "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

#### < COMPONENT DIAGNOSIS >

A

EC

Ε

F

Н

Κ

M

Ν

P

1. Disconnect heated oxygen sensor 2 harness connector.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between HO2S2 harness connector and ECM harness connector.

| HO2       | 282      | EC                 | Continuity |            |
|-----------|----------|--------------------|------------|------------|
| Connector | Terminal | Connector Terminal |            | Continuity |
| F42       | 1        | F13                | 35         | 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 HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

| HO2       | HO2S2    |                    | ECM |            |  |
|-----------|----------|--------------------|-----|------------|--|
| Connector | Terminal | Connector Terminal |     | Continuity |  |
| F42       | 4        | F13                | 33  | Existed    |  |

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

| HO2S2     |          | ECM       |          | Ground | Continuity  |
|-----------|----------|-----------|----------|--------|-------------|
| Connector | Terminal | Connector | Terminal | Ground | Continuity  |
| F42       | 4        | F13       | 33       | Ground | Not existed |

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

#### 5.CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

#### Water should not exist.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace harness or connectors.

**6.**CHECK HEATED OXYGEN SENSOR 2

Refer to EC-205, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

**1.**REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. CAUTION:

 Discard any 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 sensor, clean exhaust system threads using oxygen sensor thread cleaner [commercial service tool: (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).

>> INSPECTION END

**8.**CHECK INTERMITTENT INCIDENT

< COMPONENT DIAGNOSIS >

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

9. CHECK GROUND CONNECTION

- Turn ignition switch OFF. 1
- Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection". 2.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace ground connection.

10. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to EC-18, "MIXTURE RATIO SELF-LEARNING VALUE 1 <u>CLEAR : Special Repair Requirement</u>". Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start for at least 10 minutes.
- 2.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0172. Refer to EC-228, "DTC Logic". NO >> GO TO 11.

11. CHECK H02S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect heated oxygen sensor 2 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between HO2S2 harness connector and ECM harness connector.

| HO2       | HO2S2    |                    | ECM |            |  |
|-----------|----------|--------------------|-----|------------|--|
| Connector | Terminal | Connector Terminal |     | Continuity |  |
| F42       | 1        | F13                | 35  | Existed    |  |

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

Is the inspection result normal?

YES >> GO TO 12.

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

12. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between HO2S2 harness connector and ECM harness connector. 1.

| HO2S2     |          | EC                 | М  | Continuity |
|-----------|----------|--------------------|----|------------|
| Connector | Terminal | Connector Terminal |    | Continuity |
| F42       | 4        | F13                | 33 | Existed    |

Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

| HO2S2     |          | EC        | М        | Ground   | Continuity  |
|-----------|----------|-----------|----------|----------|-------------|
| Connector | Terminal | Connector | Terminal | Circuita | Continuity  |
| F42       | 4        | F13       | 33       | Ground   | Not existed |

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 13.

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

13. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-205, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

| < COMPONENT DIAGNOSIS >   | [QR25DE]                             |
|---|--------------------------------------|
| NO >> GO TO 14.   |                                      |
| 14.REPLACE HEATED OXYGEN SENSOR 2   |                                      |
| Replace heated oxygen sensor 2.   |                                      |
| • Discard any 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.  |                                      |
| <ul> <li>Before installing new sensor, clean exhaust system threads using oxygen<br/>[commercial service tool: (J-43897-18 or J-43897-12)] and approved anti-seize</li> </ul> |                                      |
| service tool).  | iupricant (commerciai                |
|   |                                      |
| >> INSPECTION END   |                                      |
| 15. CHECK INTERMITTENT INCIDENT   |                                      |
| Refer to GI-42, "Intermittent Incident".  |                                      |
| >> INSPECTION END   |                                      |
| Component Inspection  | WEOD.000000005444770                 |
|   | INFOID:000000005441778               |
| 1.INSPECTION START  |                                      |
| Do you have CONSULT-III?  |                                      |
| Do you have CONSULT-III?<br>YES >> GO TO 2.   |                                      |
| NO $>>$ GO TO 3.  |                                      |
| 2.CHECK HEATED OXYGEN SENSOR 2-1  |                                      |
| With CONSULT-III  |                                      |
| <ol> <li>Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine<br/>temperature.</li> </ol>  | e to the normal operating            |
| 2. Turn ignition switch OFF and wait at least 10 seconds.   |                                      |
| <ol> <li>Turn ignition switch ON.</li> <li>Turn ignition switch OFF and wait at least 10 seconds.</li> </ol>  |                                      |
| <ol> <li>Turn ignition ON (READY) and select "DATA MONITOR" mode with CONSULT-II</li> </ol>   | Ι.                                   |
| 6. Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive CAUTION:   | minutes.                             |
| Always drive vehicle in safe manner according to traffic conditions and obe<br>NOTE:  | ey all traffic laws.                 |
| Keep the vehicle speed as steady as possible during the cruising.   |                                      |
| <ol> <li>Stop vehicle and shift the selector lever to P position.</li> <li>Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)"</li> </ol>                  | as the monitor item with             |
| CONSULT-III.  |                                      |
| <ul> <li>9. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to ±25%.</li> <li>∨ ≈ (Reference data)</li> </ul>  |                                      |
| 1.28 -  |                                      |
|   |                                      |
| The voltage should be above<br>0.68V at least one time.   |                                      |
| 0.64 -  |                                      |
|   | The voltage should<br>be below 0.18V |
| 0.00  | at least one time.                   |
| "HO2S2 (B1)" should be above 0.68V at least once when the "FUEL INJECT  |                                      |
| "HO2S2 (B1)" should be below 0.18V at least once when the "FUEL INJECT  | 1ON" is –25%.                        |
| <u>Is the inspection result normal?</u><br>YES >> INSPECTION END  |                                      |
| NO $>>$ GO TO 4.  |                                      |

Revision: September 2009

# 3.CHECK HEATED OXYGEN SENSOR 2-11

#### Without CONSULT-III

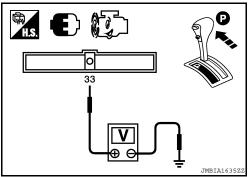
- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition ON (READY) and drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes.
  - CAUTION:

# Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

#### Keep the vehicle speed as steady as possible during the cruising.

- 6. Stop vehicle and shift the selector lever to P position.
- 7. Check the voltage between ECM harness connector and ground under the following condition.

| EC        | ECM                     |        | Condition  | Voltage  |
|-----------|-------------------------|--------|--|--|
| Connector | Terminal                | Ground | Condition  | vonage   |
| F13       | 33<br>(HO2S2<br>signal) | Ground | Fully depress the accelerator pedal and keep it, then fully release accelerator pedal. | The voltage should be<br>above 0.68V at least once<br>during this procedure.<br>The voltage should be be-<br>low 0.18V at least once dur-<br>ing this procedure. |



Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

**4.**REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

#### CAUTION:

- Discard any 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 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 HO2S2

# Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.

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



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 (manifold) 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 the various driving condition such as fuel-cut.

| DTC No. | Trouble diagnosis name | DTC detecting condition                          | Possible cause  |
|---------|------------------------|--|---|
| P0139   | Heated oxygen sensor 2 | It takes more time for the sensor to respond be- | <ul> <li>Harness or connectors</li></ul>  |
|         | circuit slow response  | tween rich and lean than the specified time.     | (The sensor circuit is open or shorted) <li>Heated oxygen sensor 2</li> <li>Fuel pressure</li> <li>Fuel injector</li> <li>Intake air leaks</li> |

#### 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 before conducting the next test.

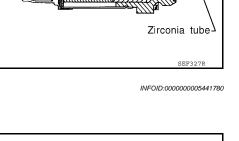
1. Turn ignition switch OFF and wait at least 10 seconds.

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).



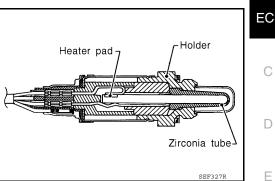
NG

SEF302U

OK

11

0V



INFOID:000000005441779

A

F

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Μ

Ν

# **3.** PERFORM DTC CONFIRMATION PROCEDURE

#### With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine 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 (READY) and select "DATA MONITOR" mode with CONSULT-III.
- 6. Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. CAUTION:

# Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

#### Keep the vehicle speed as steady as possible during the cruising.

- 7. Stop the vehicle and shift the selector lever to P position.
- 8. Fully depress the accelerator pedal and keep it until step 11.
- Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F). If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F).
- 10. Select "HO2S2 (B1) P0139" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 11. Touch "START".
  - NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

12. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT-III?

- OK >> INSPECTION END
- NG >> GO TO 4.

CAN NOT BE DIAGNOSED>>GO TO 4.

#### **4.**PERFORM THE RESULT OF DTC CONFIRMATION PROCEDURE

- 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-208, "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-209, "Diagnosis Procedure".

#### **Component Function Check**

INFOID:000000005441781

#### **1.**PERFORM COMPONENT FUNCTION CHECK

#### **Without CONSULT-III**

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition ON (READY) and drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes.

#### CAUTION:

# Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

#### Keep the vehicle speed as steady as possible during the cruising.

6. Stop vehicle and shift the selector lever to P position.

# EC-208

# P0139 HO2S2

#### < COMPONENT DIAGNOSIS >

7. Check the voltage between ECM harness connector and ground under the following condition.

|   | Ground   | Condition  | Voltage   |  |
|---|----------|--|---|--|
|   | Ground   | Fully depress the accel-<br>erator pedal and keep it,<br>then fully release accel-<br>erator pedal | A change of voltage<br>should be more than<br>0.30V for during this<br>procedure. |  |
| s | ult norm | al?  |   |  |

Is the inspection res YES >> INSPECTION END

Terminal

33

(HO2S2 signal)

NO >> Go to EC-209, "Diagnosis Procedure".

# Diagnosis Procedure

ECM

Connector

F13

## 1.CHECK GROUND CONNECTION

- Turn ignition switch OFF. 1
- Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection". 2.
- Is the inspection result normal?

YFS >> GO TO 2.

NO >> Repair or replace ground connection.

2.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Н 1. Clear the mixture ratio self-learning value. Refer to EC-18, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement". Activate "INSPECTION MODE 1" (HBC-104) to start engine, and let engine idle for at least 10 minutes. 2. Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine? >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-224, "DTC Logic" or EC-228, YES "DTC Logic". NO >> GO TO 3.  ${f 3.}$  CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch OFF. Κ Disconnect heated oxygen sensor 2 harness connector. 3. Disconnect ECM harness connector. 4. Check the continuity between HO2S2 harness connector and ECM harness connector.

| H        | HO2S2      |           | ECM      |            |
|----------|------------|-----------|----------|------------|
| Connecto | r Terminal | Connector | Terminal | Continuity |
| F42      | 1          | F13       | 35       | Existed    |

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

Is the inspection result normal?

YFS >> GO TO 4.

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

#### 4.CHECK H02S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between HO2S2 harness connector and ECM harness connector. 1.

| HO2       | HO2S2    |                    | ECM |            |
|-----------|----------|--------------------|-----|------------|
| Connector | Terminal | Connector Terminal |     | Continuity |
| F42       | 4        | F13                | 33  | Existed    |

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.



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А

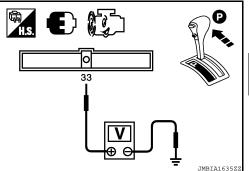
EC

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# P0139 HO2S2

| HO2S2     |          | ECM       |          | Ground | Continuity  |
|-----------|----------|-----------|----------|--------|-------------|
| Connector | Terminal | Connector | Terminal | Ground | Continuity  |
| F42       | 4        | F13       | 33       | Ground | Not existed |

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

**5.**CHECK HEATED OXYGEN SENSOR 2

Refer to EC-210. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

**6.**REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

- CAUTION:
- Discard any 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 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-42, "Intermittent Incident".

#### >> INSPECTION END

**Component Inspection** 

**1**.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2-1

#### With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition ON (READY) and select "DATA MONITOR" mode with CONSULT-III.
- 6. Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. CAUTION:

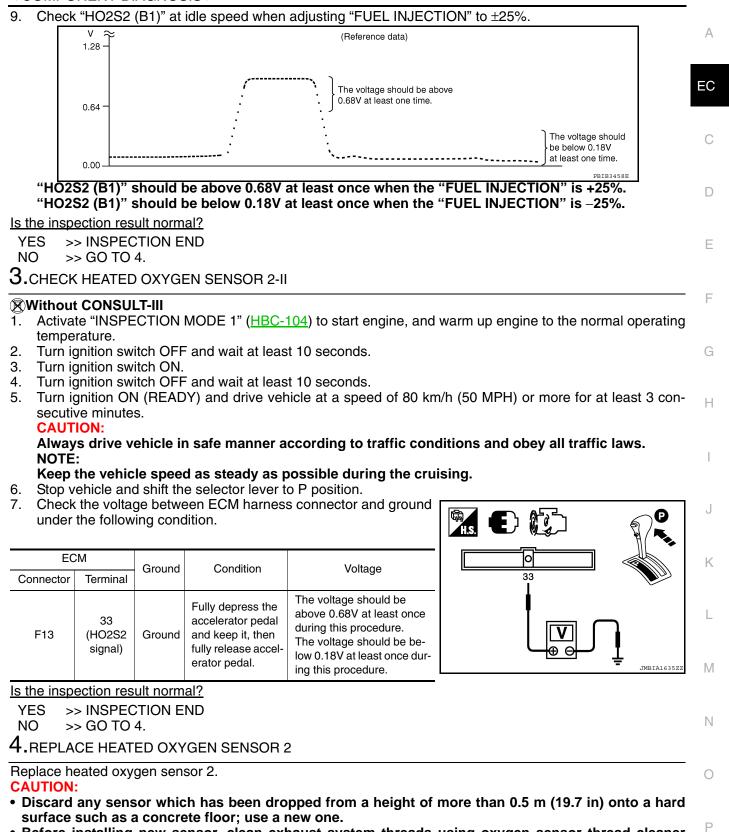
# Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

#### Keep the vehicle speed as steady as possible during the cruising.

- 7. Stop vehicle and shift the selector lever to P position.
- 8. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-III.

# P0139 HO2S2

#### < COMPONENT DIAGNOSIS >



• Before installing new 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

# P0143 HO2S3

# Description

The heated oxygen sensor 3, after HC adsorption catalyst (Under floor), monitors the oxygen level in the exhaust gas.

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 3 is not used for engine control operation.

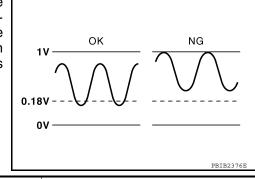
# r Heater pad Heater pad F Holder Zirconia tube

# DTC Logic

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#### DTC DETECTION LOGIC

The heated oxygen sensor 3 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 (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 3, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel cut.



| DTC No. | Trouble diagnosis name                         | DTC detecting condition  | Possible cause  |
|---------|--|--|---|
| P0143   | Heated oxygen sensor 3<br>circuit high voltage | The minimum voltage from the sensor is not reached to the specified voltage. | <ul> <li>Harness or connectors<br/>(The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 3</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 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. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine 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 (READY).
- 6. Repeat following procedure 3 times.
- Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes.

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

# EC-212

# P0143 HO2S3

| < COMPONENT DIAGNOSIS >   | [QR25DE]               |
|---|------------------------|
| <ul> <li>NOTE:</li> <li>Keep the vehicle speed as steady as possible during the cruising.</li> <li>Never raise engine speed above 3,600 rpm in this step.</li> <li>Release accelerator pedal fully and stop vehicle.</li> </ul>   | A                      |
| NOTE:<br>Never turn ignition switch OFF.<br>7. Check 1st trip DTC.  | EC                     |
| Is 1st trip DTC detected?   |                        |
| YES >> Go to <u>EC-213. "Diagnosis Procedure"</u> .<br>NO >> INSPECTION END   | C                      |
| Diagnosis Procedure   | INFOID:000000005441786 |
| 1. CHECK GROUND CONNECTION  |                        |
| <ol> <li>Turn ignition switch OFF.</li> <li>Check ground connection E9. Refer to Ground Inspection in <u>GI-45, "Circuit Inspection"</u>.</li> </ol>  | E                      |
| <u>Is the inspection result normal?</u><br>YES >> GO TO 2.  | F                      |
| NO >> Repair or replace ground connection.  |                        |
| 2. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE  | G                      |
| <ol> <li>Clear the mixture ratio self-learning value. Refer to <u>EC-18, "MIXTURE RATIO SELF-LE</u><br/><u>CLEAR : Special Repair Requirement"</u>.</li> <li>Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and let engine idle for at learning is the start engine.</li> </ol> | ARNING VALUE           |
| Is the 1st trip DTC P0172 detected? Is it difficult to start engine?  | H                      |
| YES >> Perform trouble diagnosis for DTC P0172. Refer to <u>EC-229, "Diagnosis Procedu</u>  | <u>re"</u> .           |
| NO >> GO TO 3.<br>3.CHECK HO2S3 GROUND CIRCUIT FOR OPEN AND SHORT   | I                      |
| 1. Turn ignition switch OFF.  |                        |
| <ol> <li>Disconnect heated oxygen sensor 3 harness connector.</li> <li>Disconnect ECM harness connector.</li> </ol>   | J                      |
| 4. Check the continuity between HO2S3 harness connector and ECM harness connector.  |                        |
| HO2S3 ECM   | K                      |
| Connector Terminal Connector Terminal   |                        |
| F202 1 F13 35 Existed   | L                      |
| 5. Also check harness for short to ground and short to power.   |                        |
| Is the inspection result normal?  | N                      |
| YES >> GO TO 5.<br>NO >> GO TO 4.   |                        |
| 4.DETECT MALFUNCTIONING PART  | Ν                      |
| Check the following.  |                        |
| <ul> <li>Harness connectors F58, F201</li> <li>Harness for open or short between heated oxygen sensor 3 and ECM</li> </ul>  | 0                      |
| >> Repair open circuit or short to ground or short to power in harness or connectors  |                        |
| 5. CHECK HO2S3 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT  | P                      |
| 1. Check the continuity between HO2S3 harness connector and ECM harness connector.  |                        |

| HO2S3     |          | ECM       |          | Continuity |
|-----------|----------|-----------|----------|------------|
| Connector | Terminal | Connector | Terminal | Continuity |
| F202      | 4        | F13       | 34       | Existed    |

# P0143 HO2S3

#### < COMPONENT DIAGNOSIS >

2. Check the continuity between HO2S3 harness connector or ECM harness connector and ground.

| HO2S3     |          | ECM       |          | Ground | Continuity  |
|-----------|----------|-----------|----------|--------|-------------|
| Connector | Terminal | Connector | Terminal | Ground | Continuity  |
| F202      | 4        | F13       | 34       | Ground | Not existed |

3. Also check harness for 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 F58, F201

Harness for open or short between heated oxygen sensor 3 and ECM

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

7.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace.

**8.**REPLACE HEATED OXYGEN SENSOR 3

Replace heated oxygen sensor 3.

CAUTION:

- Discard any 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 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

# P0144 HO2S3

# Description

The heated oxygen sensor 3, after HC adsorption catalyst (Under floor), monitors the oxygen level in the exhaust gas.

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 3 is not used for engine control operation.

# Heater pad Heater pad Heater pad Holder C D Zirconia tube

**DTC Logic** 

#### DTC DETECTION LOGIC

The heated oxygen sensor 3 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 (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 3, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuelcut.

| oltage of the sensor<br>dition such as fuel- | 0.68V | SEF259VA |
|--|-------|----------|
|  |       |          |

1V

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| DTC No. | Trouble diagnosis name                        | DTC detecting condition  | Possible cause  |   |
|---------|---|--|---|---|
| P0144   | Heated oxygen sensor 3<br>circuit low voltage | The maximum voltage from the sensor is not reached to the specified voltage. | <ul> <li>Harness or connectors<br/>(The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 3</li> <li>Fuel pressure</li> <li>Fuel injector</li> <li>Intake air leaks</li> </ul> | K |

#### 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. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine 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 (READY).
- 6. Repeat following procedure 3 times.

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# P0144 HO2S3

< COMPONENT DIAGNOSIS >

Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes.

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

- Keep the vehicle speed as steady as possible during the cruising.
- Never raise engine speed above 3,600 rpm in this step. Release accelerator pedal fully and stop vehicle.
- NOTE:
- Never turn ignition switch OFF.
- Check 1st trip DTC.
- Is 1st trip DTC detected?
- YES >> Go to EC-216, "Diagnosis Procedure".
- NO >> INSPECTION END

#### Diagnosis Procedure

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "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-18, "MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement"</u>.
- 2. Activate "INSPECTION MODE 1"(HBC-104) to start engine, and let engine idle for at least 10 minutes.
- Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?
- YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to <u>EC-224, "DTC Logic"</u> or <u>EC-228,</u> <u>"DTC Logic"</u>.

NO >> GO TO 3.

 $\mathbf{3.}$  CHECK HO2S3 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 3 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between HO2S3 harness connector and ECM harness connector.

| HO2S3     |          | E         | Continuity |            |
|-----------|----------|-----------|------------|------------|
| Connector | Terminal | Connector | Terminal   | Continuity |
| F202      | 1        | F13       | 35         | Existed    |

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

Is the inspection result normal?

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

#### **4.**DETECT MALFUNCTIONING PART

Check the following.

Harness connectors F58, F201

Harness for open or short between heated oxygen sensor 3 and ECM

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

5.CHECK HO2S3 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S3 harness connector and ECM harness connector.

### P0144 HO2S3

| НО                                    | 2S3        | F                       | СМ            |                        |                 |   | А  |
|---------------------------------------|------------|-------------------------|---------------|------------------------|-----------------|---|----|
| Connector                             | Terminal   | Connector               | Terminal      | Continuity             |                 |   |    |
| F202                                  | 4          | F13                     | 34            | Existed                |                 |   |    |
| 2. Check                              | the contin | uity betwee             | n HO2S3 h     | arness conr            | nector or ECM   | harness connector and ground.   | EC |
|                                       |            |                         |               |                        |                 |   |    |
| HO                                    | 2S3        | E                       | СМ            | Ground                 | Continuity      |   | С  |
| Connector                             | Terminal   | Connector               | Terminal      |                        | _               | -   |    |
| F202                                  | 4          | F13                     | 34            | Ground                 | Not existed     |   | D  |
|                                       |            | ess for shor            | t to power.   |                        |                 |   |    |
| <u>Is the inspector</u><br>YES >:     | > GO TO 7  |                         |               |                        |                 |   | _  |
|                                       | > GO TO 6  |                         |               |                        |                 |   | Е  |
| 6.DETEC                               | T MALFUI   |                         | B PART        |                        |                 |   |    |
| Check the                             | following. |                         |               |                        |                 |   | F  |
|                                       |            | s F58, F20 <sup>-</sup> |               |                        |                 | NN 4  |    |
| <ul> <li>Harness</li> </ul>           | for open o | or short detv           | veen neated   | a oxygen sei           | nsor 3 and EC   |   | G  |
| >:                                    | > Repair o | pen circuit d           | or short to a | round or sh            | ort to power in | harness or connectors.  | G  |
|                                       |            |                         |               |                        |                 |   |    |
|                                       |            | mittent Inci            |               |                        |                 |   | Н  |
| Is the inspe                          |            |                         | <u>aont</u> . |                        |                 |   |    |
| · · · · · · · · · · · · · · · · · · · | > GO TO 8  |                         |               |                        |                 |   | 1  |
| •                                     | > Repair o | •                       |               |                        |                 |   |    |
| 8.REPLA                               | CE HEATE   | ED OXYGE                | N SENSOR      | 3                      |                 |   |    |
|                                       |            | gen sensor (            | 3.            |                        |                 |   | J  |
| • Discard                             | -          | or which h              | as been dr    | opped from             | n a height of   | more than 0.5 m (19.7 in) onto a hard                                       |    |
| surface                               | such as a  | concrete f              | loor; use a   | new one.               | -               |   | Κ  |
|                                       |            |                         |               |                        |                 | using oxygen sensor thread cleaner<br>oved anti-seize lubricant (commercial |    |
| service t                             |            |                         |               | 0- <del>4</del> 5057-1 |                 |   |    |
|                                       |            |                         |               |                        |                 |   |    |
| >:                                    | > INSPEC   | TION END                |               |                        |                 |   |    |
|                                       |            |                         |               |                        |                 |   | Μ  |
|                                       |            |                         |               |                        |                 |   |    |
|                                       |            |                         |               |                        |                 |   | Ν  |
|                                       |            |                         |               |                        |                 |   |    |
|                                       |            |                         |               |                        |                 |   |    |
|                                       |            |                         |               |                        |                 |   | 0  |
|                                       |            |                         |               |                        |                 |   |    |
|                                       |            |                         |               |                        |                 |   | Ρ  |
|                                       |            |                         |               |                        |                 |   |    |

[QR25DE]

### P0145 HO2S3

### Description

The heated oxygen sensor 3, after HC adsorption catalyst (Under floor), monitors the oxygen level in the exhaust gas.

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 3 is not used for engine control operation.

# Heater pad Heater pad F Circonia tube

### DTC Logic

DTC DETECTION LOGIC

The heated oxygen sensor 3 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 (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 3, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.

| oxy-<br>s the<br>ygen | ок<br>1V               | NG      |
|-----------------------|------------------------|---------|
| ygen<br>sen-<br>ondi- | $\gamma \wedge \gamma$ | /       |
|                       | ↓ ↓<br>₀v              | SEFJOZI |

| DTC No. | Trouble diagnosis name | DTC detecting condition                          | Possible cause  |
|---------|------------------------|--|---|
| P0145   | Heated oxygen sensor 3 | It takes more time for the sensor to respond be- | <ul> <li>Harness or connectors</li></ul>  |
|         | circuit slow response  | tween rich and lean than the specified time.     | (The sensor circuit is open or shorted) <li>Heated oxygen sensor 3</li> <li>Fuel pressure</li> <li>Fuel injector</li> <li>Intake air leaks</li> |

### 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. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine 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 (READY).
- 6. Repeat following procedure 3 times.



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### P0145 HO2S3

| < COMPO              |             |                             | >                  |                             |  | [QR25DE]               |
|----------------------|-------------|-----------------------------|--------------------|-----------------------------|--|------------------------|
| - Drive v            | ehicle at a |                             |                    | MPH) or me                  | ore for at least 3 consecutive minutes.      |                        |
| CAUTIO               |             | cle in safe                 | manner ac          | cordina to                  | traffic conditions and obey all traffic I    | aws.                   |
| NOTÉ:                |             |                             |                    | •                           | -  |                        |
|                      |             |                             |                    | is possible<br>600 rpm in 1 | during the cruising.                         |                        |
|                      |             |                             | ully and stop      |                             | ins step.                                    |                        |
| NOTE:                |             | ·                           |                    |                             |  |                        |
| Never tu<br>7. Check |             | n switch O                  | FF.                |                             |  |                        |
| s 1st trip D         | •           |                             |                    |                             |  |                        |
|                      |             |                             | <u>gnosis Proc</u> | edure".                     |  |                        |
|                      |             | TION END                    | <u></u>            | <u></u> .                   |  |                        |
| Diagnosi             | s Proce     | dure                        |                    |                             |  | INFOID:000000005441792 |
| CHECK                | GROUNE      | CONNEC                      |                    |                             |  |                        |
|                      | nition swit |                             |                    |                             |  |                        |
|                      |             |                             | 9. Refer to        | Ground Insp                 | ection in GI-45. "Circuit Inspection".       |                        |
|                      |             | ult normal?                 |                    |                             |  |                        |
|                      | GO TO 2     |                             |                    |                             |  |                        |
|                      | •           | • •                         | ound conne         |                             |  |                        |
| .CLEAR               | THE MIX     | TURE RATI                   | O SELF-LE          | ARNING VA                   | LUE  |                        |
|                      |             |                             |                    | ue. Refer to                | EC-18, "MIXTURE RATIO SELF-LEAR              | NING VALUE             |
|                      |             | Repair Re                   |                    | (104) to star               | rt engine, and let idle for at least 10 minu | itoc                   |
|                      |             |                             |                    |                             | ult to start engine?                         | nes.                   |
|                      |             |                             |                    |                             | or P0172. Refer to <u>EC-224, "DTC Logi</u>  | c" or EC-228           |
|                      | "DTC Lo     | <u>gic"</u> .               |                    |                             |  | <u> </u>               |
|                      | GO TO 3     |                             |                    |                             |  |                        |
| CHECK                | HO2S3 G     | ROUND C                     | IRCUIT FO          | R OPEN AN                   | D SHORT                                      |                        |
| . Turn ig            | nition swit | tch OFF.                    |                    |                             |  |                        |
|                      | -           |                             |                    | rness conne                 | ctor.  |                        |
|                      |             | l harness co<br>wity betwee |                    | arness conr                 | nector and ECM harness connector.            |                        |
| . Oneok              |             | iaity betwee                |                    |                             |  |                        |
| HO                   | 2S3         | E                           | СМ                 |                             |  |                        |
| Connector            | Terminal    | Connector                   | Terminal           | Continuity                  |  |                        |
| F202                 | 1           | F13                         | 35                 | Existed                     |  |                        |
| -                    |             |                             |                    | and short to                | power  |                        |
|                      |             | ult normal?                 | . to ground        |                             | Po   |                        |
|                      | > GO TO 5   |                             |                    |                             |  |                        |
|                      | • GO TO 4   |                             |                    |                             |  |                        |
| DETEC                | T MALFUI    |                             | G PART             |                             |  |                        |
| Check the            |             |                             |                    |                             |  |                        |
|                      |             | s F58, F20                  |                    |                             | and COM                                      |                        |
| Harness              | ior open o  | or snort betv               | veen neateo        | a oxygen sei                | nsor 3 and ECM                               |                        |
|                      | Densir      | non oire-it                 | or obout to -      | المراجع أحمر                | ort to now or in hornood or contractory      |                        |
|                      |             | •                           | -                  |                             | ort to power in harness or connectors.       |                        |
| J.CHECK              | HU2S3 II    | NPUT SIGN                   | IAL CIRCU          | I FOR OPE                   | IN AND SHORT                                 |                        |
| 1. Check             | the contin  | uity betwee                 | en HO2S3 h         | arness conr                 | nector and ECM harness connector.            |                        |

### P0145 HO2S3

| HO        | 2S3      | E         | CM       | Continuity |
|-----------|----------|-----------|----------|------------|
| Connector | Terminal | Connector | Terminal | Continuity |
| F202      | 4        | F13       | 34       | Existed    |

2. Check the continuity between HO2S3 harness connector or ECM harness connector and ground.

| НО        | 2S3      | E         | CM       | Ground   | Continuity  |
|-----------|----------|-----------|----------|----------|-------------|
| Connector | Terminal | Connector | Terminal | Circuita | Continuity  |
| F202      | 4        | F13       | 34       | Ground   | Not existed |

3. Also check harness for 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 F58, F201

• Harness for open or short between heated oxygen sensor 3 and ECM

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

### 7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace.

**8.**REPLACE HEATED OXYGEN SENSOR

Replace heated oxygen sensor 3.

#### CAUTION:

- Discard any 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 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

### P0146 HO2S3

### Description

DTC Logic

DTC DETECTION LOGIC

The heated oxygen sensor 3, after HC adsorption catalyst (Under floor), monitors the oxygen level in the exhaust gas.

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 3 is not used for engine control operation.

#### The heated oxygen sensor 3 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxy-OK NG gen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen 1.2V sensor 3, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut. Н 1V ٥v

| DTC No. | Trouble diagnosis name                                      | DTC detecting condition                         | Possible cause  | J |
|---------|---|---|---|---|
| P0146   | Heated oxygen sensor 3<br>circuit no activity detect-<br>ed | An avcassivally high voltage from the sensor is | <ul> <li>Harness or connectors<br/>(The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 3</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.
- Turn ignition switch ON. 2.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

### >> GO TO 2.

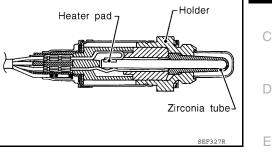
## 2. PERFORM DTC CONFIRMATION PROCEDURE

- Activate "INSPECTION MODE 1" (HBC-104) to start engine, and warm up engine to normal operating 1. temperature.
- Turn ignition switch OFF and wait at least 10 seconds. 2.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON (READY).
- 6. Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. **CAUTION:**

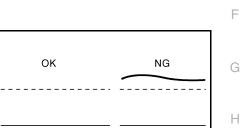
#### Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. NOTE:

### Keep the vehicle speed as steady as possible during the cruising.

Check 1st trip DTC.



|                       |  | PBIB1848E   |   |
|-----------------------|--|---|---|
| rouble diagnosis name | DTC detecting condition                        | Possible cause  | J |
| eated oxygen sensor 3 | An excessively high voltage from the sensor is | Harness or connectors     (The senser circuit is open or chorted) |   |



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Is 1st trip DTC detected?

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

### **Diagnosis Procedure**

**1**.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK HO2S3 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 3 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between HO2S3 harness connector and ECM harness connector.

| HO        | 2S3      | E         | CM       | Continuity |
|-----------|----------|-----------|----------|------------|
| Connector | Terminal | Connector | Terminal | Continuity |
| F202      | 1        | F13       | 35       | Existed    |

5. 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 F58, F201

• Harness for open or short between heated oxygen sensor 3 and ECM

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

### 4.CHECK HO2S3 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S3 harness connector and ECM harness connector.

| HO        | 2S3      | E         | СМ       | Continuity |
|-----------|----------|-----------|----------|------------|
| Connector | Terminal | Connector | Terminal | Continuity |
| F202      | 4        | F13       | 34       | Existed    |

2. Check the continuity between HO2S3 harness connector or ECM harness connector and ground.

| HO        | 2S3      | E         | CM       | Ground   | Continuity  |
|-----------|----------|-----------|----------|----------|-------------|
| Connector | Terminal | Connector | Terminal | Circuita | Continuity  |
| F202      | 4        | F13       | 34       | Ground   | Not existed |

3. Also check harness for 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 F58, F201

• Harness for open or short between heated oxygen sensor 3 and ECM

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### P0146 HO2S3

| Check connectors for water.   |                                     | E |
|---|-------------------------------------|---|
| Water should not exist.   | •                                   |   |
| s the inspection result normal?   |                                     | ( |
| YES >> GO TO 7.<br>NO >> Repair or replace harness or connectors.   |                                     |   |
| CHECK INTERMITTENT INCIDENT   |                                     |   |
| Refer to <u>GI-42, "Intermittent Incident"</u> .  |                                     |   |
| s the inspection result normal?   |                                     |   |
| YES >> GO TO 8.   |                                     |   |
| NO >> Repair or replace.  |                                     |   |
| <b>3.</b> REPLACE HEATED OXYGEN SENSOR  |                                     |   |
| Replace heated oxygen sensor 3.<br>CAUTION:   |                                     |   |
| Discard any sensor which has been dropped from a height of more than 0.5 m (19.7  | 7 in) onto a hard                   |   |
| surface such as a concrete floor; use a new one.  |                                     |   |
| Before installing new sensor, clean exhaust system threads using oxygen senso   | r thread cleaner                    |   |
| Before installing new sensor, clean exhaust system threads using oxygen senso [commercial service tool: (J-43897-18 or J-43897-12)] and approved anti-seize lubric                | r thread cleaner<br>ant (commercial |   |
| Before installing new sensor, clean exhaust system threads using oxygen senso [commercial service tool: (J-43897-18 or J-43897-12)] and approved anti-seize lubric service tool). | r thread cleaner<br>ant (commercial |   |
| [commercial service tool: (J-43897-18 or J-43897-12)] and approved anti-seize lubric service tool).   | r thread cleaner<br>ant (commercial |   |
| [commercial service tool: (J-43897-18 or J-43897-12)] and approved anti-seize lubric  | r thread cleaner<br>ant (commercial |   |
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| [commercial service tool: (J-43897-18 or J-43897-12)] and approved anti-seize lubric service tool).   | r thread cleaner<br>ant (commercial |   |
| [commercial service tool: (J-43897-18 or J-43897-12)] and approved anti-seize lubric service tool).   | r thread cleaner<br>ant (commercial |   |
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| [commercial service tool: (J-43897-18 or J-43897-12)] and approved anti-seize lubric service tool).   | r thread cleaner<br>ant (commercial |   |
| [commercial service tool: (J-43897-18 or J-43897-12)] and approved anti-seize lubric service tool).   | r thread cleaner<br>ant (commercial |   |
| [commercial service tool: (J-43897-18 or J-43897-12)] and approved anti-seize lubric service tool).   | r thread cleaner<br>ant (commercial |   |

#### < COMPONENT DIAGNOSIS >

### P0171 FUEL INJECTION SYSTEM FUNCTION

### DTC Logic

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[QR25DE]

#### DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

| Sensor       | Input signal to ECM   | ECM function           | Actuator      |
|--------------|---|------------------------|---------------|
| A/F sensor 1 | Density of oxygen in exhaust gas<br>(Mixture ratio feedback signal) | Fuel injection control | Fuel injector |

| DTC No. | Trouble diagnosis name            | DTC detecting condition   | Possible cause   |
|---------|-----------------------------------|---|--|
| P0171   | Fuel injection system too<br>lean | <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>Intake air leaks</li> <li>A/F sensor 1</li> <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 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-II

- 1. Clear the mixture ratio self-learning value. Refer to <u>EC-18</u>, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
- 2. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and let engine idle for at least 5 minutes.
- 3. Check 1st trip DTC.

#### Is 1st trip DTC detected?

- YES >> Go to EC-225, "Diagnosis Procedure".
- NO >> GO TO 3.

### **3.**PERFORM DTC CONFIRMATION PROCEDURE-III

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON (READY).
- 3. Maintain the following conditions for at least 10 consecutive minutes. Hold the accelerator pedal as steady as possible.

VECL SPEED SE 80 - 120 km/h (50 mph - 75 mph)

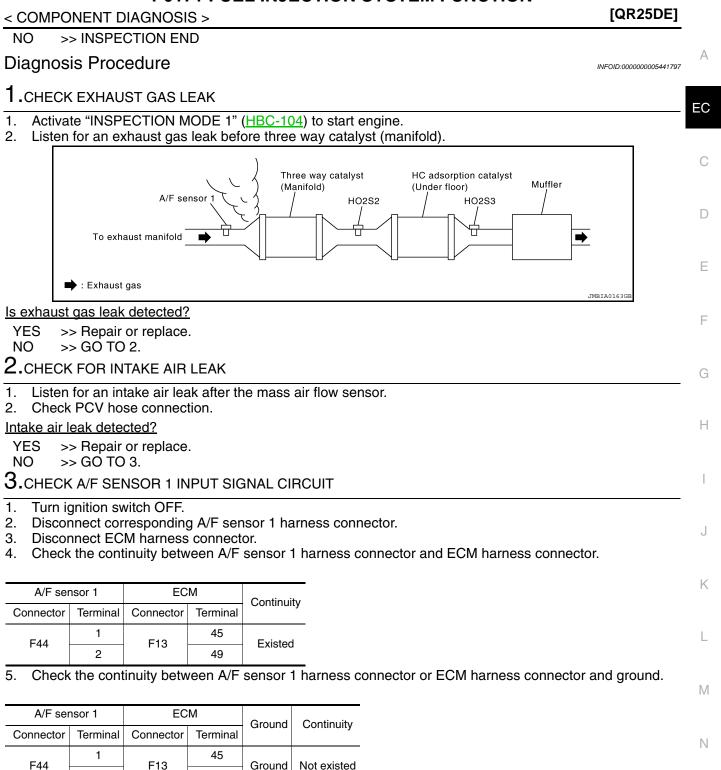
**CAUTION:** 

#### Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-225, "Diagnosis Procedure".



6. Also check harness for short to power.

Is the inspection result normal?

2

YES >> GO TO 4.

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

Not existed

Ground

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4.CHECK FUEL PRESSURE

1. Check fuel pressure. Refer to EC-465, "Inspection".

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5. Ρ

< COMPONENT DIAGNOSIS >

[QR25DE]

### 5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

#### Is the inspection result normal?

- YES >> Replace "fuel filter and fuel pump assembly".
- NO >> Repair or replace

### 6.CHECK MASS AIR FLOW SENSOR

#### With CONSULT-III

- 1. Install all removed parts.
- 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III.
- 3. For specification, refer to EC-470, "Mass Air Flow Sensor".

#### With GST

- 1. Install all removed parts.
- 2. Check mass air flow sensor signal in Service \$01 with GST.
- 3. For specification, refer to EC-470, "Mass Air Flow Sensor".

#### Is the measurement value within the specification?

- YES >> GO TO 7.
- NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to <u>EC-144</u>, "<u>DTC Logic</u>".

### 7. CHECK FUNCTION OF FUEL INJECTOR

#### With CONSULT-III

- 1. Turn ignition switch ON (READY).
- 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

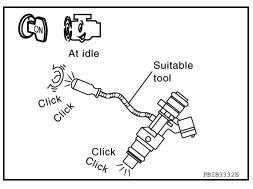
- 1. Activate "INSPECTION MODE 1" (HBC-104) to start engine.
- 2. Listen to each fuel injector operating sound.

#### Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to <u>EC-237, "Diagnosis Procedure"</u>.



### 8. CHECK FUEL INJECTOR

- 1. Turn ignition switch OFF.
- 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- Remove fuel tube assembly. Refer to <u>EM-35</u>. "<u>Removal and Installation</u>". Keep fuel hose and all fuel injectors connected to fuel tube.
- 5. Disconnect all ignition coil harness connectors.
- 6. Prepare pans or saucers under each fuel injector.
- 7. Turn ignition switch ON (READY).
- 8. Depress the accelerator pedal to crank engine.
  - NOTE:

#### < COMPONENT DIAGNOSIS >

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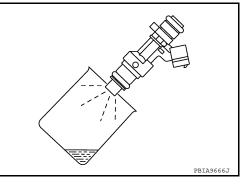
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If step 8 performed, a certain DTC may be detected.

#### Fuel should be sprayed evenly for each fuel injector.

#### Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones.



## 9. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

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#### < COMPONENT DIAGNOSIS >

### P0172 FUEL INJECTION SYSTEM FUNCTION

### DTC Logic

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#### DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

| Sensor       | Input signal to ECM   | ECM function           | Actuator      |
|--------------|---|------------------------|---------------|
| A/F sensor 1 | Density of oxygen in exhaust gas<br>(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 | <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 rich.)</li> </ul> | <ul> <li>A/F sensor 1</li> <li>Fuel injector</li> <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 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-II

- 1. Clear the mixture ratio self-learning value. Refer to <u>EC-18</u>, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
- 2. Activate "INSPECTION MODE 1" (HBC-104) to start engine, and let engine idle for at least 5 minutes.
- 3. Check 1st trip DTC.
- Is 1st trip DTC detected?
- YES >> Go to <u>EC-229</u>, "Diagnosis Procedure". NO >> GO TO 3.
- NO >> GO 10 3.

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

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON (READY).
- 3. Maintain the following conditions for at least 10 consecutive minutes. Hold the accelerator pedal as steady as possible.

VECL SPEED SE 80 - 120 km/h (50 mph - 75 mph)

#### **CAUTION:**

Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-229. "Diagnosis Procedure".

NO >> INSPECTION END

### < COMPONENT DIAGNOSIS >

### **Diagnosis** Procedure

[QR25DE]

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**1.**CHECK EXHAUST GAS LEAK

- Activate "INSPECTION MODE 1" (HBC-104) to start engine. 1. EC 2. Listen for an exhaust gas leak before three way catalyst (manifold). Three way catalyst HC adsorption catalyst Muffler (Manifold) (Under floor) A/F sensor 1 H02S2 H02S3 П To exhaust manifold ⇒ D 📫 : Exhaust gas JMBIA0163 Is exhaust gas leak detected? YES >> Repair or replace. NO >> GO TO 2. 2.CHECK FOR INTAKE AIR LEAK Listen for an intake air leak after the mass air flow sensor. Is intake air leak detected? YES >> Repair or replace. NO >> GO TO 3. Н  ${f 3}.$ CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT Turn ignition switch OFF. 1. 2. Disconnect corresponding A/F sensor 1 harness connector. 3. Disconnect ECM harness connector. Check the continuity between A/F sensor 1 harness connector and ECM harness connector. 4. A/F sensor 1 ECM Continuity Connector Terminal Connector Terminal Κ 45 1 F44 F13 Existed 2 49 5. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground. L A/F sensor 1 ECM Continuity Ground Μ Connector Terminal Connector Terminal 1 45 F44 F13 Ground Not existed 2 49 Ν Also check harness for short to power. 6. Is the inspection result normal? YES >> GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 4.CHECK FUEL PRESSURE P
- 1. Check fuel pressure. Refer to EC-465, "Inspection".
- Is the inspection result normal?
- YES >> GO TO 6.
- NO >> GO TO 5.
- ${f 5}$ . DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

< COMPONENT DIAGNOSIS >

- YES >> Replace "fuel filter and fuel pump assembly".
- NO >> Repair or replace

Is the inspection result normal?

### 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.
- 3. For specification, refer to EC-470, "Mass Air Flow Sensor".

#### With GST

- 1. Install all removed parts.
- 2. Check mass air flow sensor signal in "Service \$01" with GST.
- 3. For specification, refer to EC-470, "Mass Air Flow Sensor".

Is the measurement value within the specification?

#### YES >> GO TO 7.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to <u>EC-144, "DTC Logic"</u>.

### **7.**CHECK FUNCTION OF FUEL INJECTOR

#### With CONSULT-III

- 1. Turn ignition ON (READY).
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that each circuit produces a momentary engine speed drop.

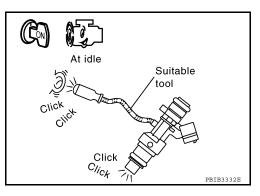
#### **⊗**Without CONSULT-III

- 1. Activate "INSPECTION MODE 1" (HBC-104) to start engine.
- 2. Listen to each fuel injector operating sound.

#### Clicking noise should be heard.

#### Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to <u>EC-237. "Diagnosis Procedure"</u>.



### 8. CHECK FUELINJECTOR

- 1. Remove fuel injector assembly. Refer to <u>EM-35</u>, "<u>Removal and Installation</u>". Keep fuel hose and all fuel injectors connected to fuel tube.
- 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- 4. Disconnect all ignition coil harness connectors.
- 5. Prepare pans or saucers under each fuel injectors.
- 6. Turn ignition switch ON (READY).
- 7. Depress the accelerator pedal to crank engine. Make sure fuel does not drip from fuel injector. NOTE:

If step 7 performed, a certain DTC may be detected.

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one.

**9.**CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

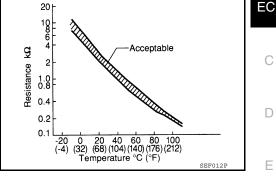
>> INSPECTION END

### 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<br>[°C (°F)] | Voltage*<br>(V) | Resistance<br>(kΩ |
|--------------------------------|-----------------|-------------------|
| 20 (68)                        | 3.5             | 2.3 - 2.7         |
| 50 (122)                       | 2.2             | 0.79 - 0.90       |



\*: These data are reference values and are measured between ECM terminal 95 (Fuel tank temperature sensor) and ground. CAUTION:

#### Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

### **DTC Logic**

### DTC DETECTION LOGIC

| DTC No.                | Trouble diagnosis name   | DTC detecting condition   | Possible cause  |
|------------------------|--|---|---|
| P0181                  | Fuel tank temperature<br>sensor circuit range/per-<br>formance | Rationally incorrect voltage from the sensor is<br>sent to ECM, compared with the voltage signals<br>from engine coolant temperature sensor and in-<br>take air temperature sensor. | <ul> <li>Harness or connectors<br/>(The sensor circuit is open or shorted)</li> <li>Fuel tank temperature sensor</li> </ul> |
| DTC CON                | FIRMATION PROC   | EDURE   |   |
| <b>1</b> .PRECO        | NDITIONING   |   |   |
| ing the nex 1. Turn ig | t test.  | as been previously conducted, always p<br>wait at least 10 seconds.   | perform the following before conduct-   |
|                        |  | wait at least 10 seconds.   |   |
| >>                     | > GO TO 2.   |   |   |
| 2.PERFO                | RM DTC CONFIRMAT   | ION PROCEDURE-I   |   |
|                        | nition switch ON and 1 1st trip DTC.                           | wait at least 10 seconds.   |   |
| <u>Is 1st trip D</u>   | DTC detected?  |   |   |
|                        | > Go to <u>EC-232, "Diag</u><br>> GO TO 3.                     | nosis Procedure".   |   |
| <b>3.</b> снеск        | ENGINE COOLANT   | TEMPERATURE   |   |
| 1. Select              | <b>NSULT-III</b><br>"COOLAN TEMP/S" ii                         | "DATA MONITOR" mode with CONSU  | LT-III.   |

2. Check "COOLAN TEMP/S" value.

#### With GST

Follow the procedure "With CONSULT-III" above.

### <u>"COOLAN TEMP/S" less than 60°C (140°F)?</u>

YES >> INSPECTION END

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|-------|---------|------|

NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

### With CONSULT-III

- 1. Cool engine down until "COOLAN TEMP/S" is less than 60°C (140°F).
- 2. Wait at least 10 seconds.
- 3. Check 1st trip DTC.

#### With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

- YES >> Go to EC-232, "Diagnosis Procedure".
- NO >> INSPECTION END

### **Diagnosis Procedure**

### 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

### 2.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between "fuel level sensor unit and fuel pump" harness connector and ground.

| Fuel level sensor unit and fuel pump |          | Ground | Voltage    |  |
|--------------------------------------|----------|--------|------------|--|
| Connector                            | Terminal | Ciouna | Vollage    |  |
| B42                                  | 4        | Ground | Approx. 5V |  |

Is the inspection result normal?

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

## **3.** DETECT MALFUNCTIONING PART

### Check the following.

Harness connectors E29, B10

Harness for open or short between ECM and "fuel level sensor unit and fuel pump"

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

**4.**CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Check the continuity between "fuel level sensor unit and fuel pump" harness connector and ECM harness connector.

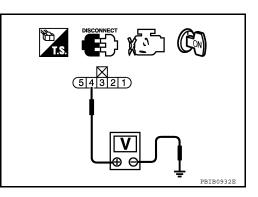
| Fuel level sensor unit and fuel<br>pump |          | ECM       |          | Continuity |
|---|----------|-----------|----------|------------|
| Connector                               | Terminal | Connector | Terminal |            |
| B42                                     | 5        | E10       | 104      | 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.

Revision: September 2009



INFOID:000000005441802

### **P0181 FTT SENSOR**

| < COMPONENT DIAGNOSIS >  | [QR25DE]               |
|--|------------------------|
| 5. DETECT MALFUNCTIONING PART  |                        |
| Check the following.<br>• Harness connectors B1, M6<br>• Harness connectors E30, M1<br>• Harness for open or short between "fuel level sensor unit and fuel pump" and ECM  | E                      |
| >> Repair open circuit or short to ground or short to power in harness or connector. $6.$ CHECK FUEL TANK TEMPERATURE SENSOR   | (                      |
| Refer to <u>EC-233. "Component Inspection"</u> .<br><u>Is the inspection result normal?</u>  |                        |
| YES >> GO TO 7.<br>NO >> Replace "fuel level sensor unit and fuel pump".<br>7.CHECK INTERMITTENT INCIDENT  | l                      |
| Refer to GI-42, "Intermittent Incident".   |                        |
| >> INSPECTION END  |                        |
| Component Inspection   | INFOID:000000005441803 |
| 1. CHECK FUEL TANK TEMPERATURE SENSOR  |                        |
| <ol> <li>Turn ignition switch OFF.</li> <li>Disconnect "fuel level sensor unit and fuel pump" harness connector.</li> <li>Remove fuel level sensor unit.</li> <li>Check resistance between "fuel level sensor unit and fuel pump"</li> </ol> |                        |

0.79 - 0.90 kΩ

terminals by heating with hot water as shown in the figure. Terminals Condition Resistance 20 (68) 2.3 - 2.7 kΩ

50 (122)

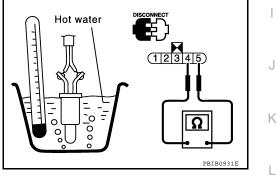
Is the inspection result normal?

Temperature°C (°F)

4 and 5

YES >> INSPECTION END

>> Replace "fuel level sensor unit and fuel pump". NO



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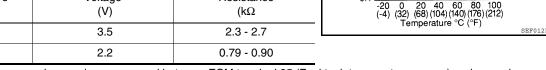


### P0182, P0183 FTT SENSOR

### 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<br>[°C (°F)] | e Voltage*<br>(V) | Resistance<br>(kΩ |
|--------------------------------|-------------------|-------------------|
| 20 (68)                        | 3.5               | 2.3 - 2.7         |
| 50 (122)                       | 2.2               | 0.79 - 0.90       |



201

10 8 6

2

1.0 0.8

0.4 0.2 0.

Resistance kΩ

\*: These data are reference values and are measured between ECM terminal 95 (Fuel tank temperature sensor) and ground. **CAUTION:** 

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

### DTC Logic

INFOID:000000005441805

### DTC DETECTION LOGIC

| DTC No. | Trouble diagnosis name                             | DTC detecting condition                                     | Possible cause   |
|---------|--|---|--|
| P0182   | Fuel tank temperature<br>sensor circuit low input  | An excessively low voltage from the sensor is sent to ECM.  | <ul> <li>Harness or connectors<br/>(The sensor circuit is open or shorted.)</li> </ul> |
| P0183   | Fuel tank temperature<br>sensor circuit high input | An excessively high voltage from the sensor is sent to ECM. | <ul> <li>Fuel tank 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.

- 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

- Turn ignition switch ON and wait at least 5 seconds. 1.
- Check 1st trip DTC.

#### Is 1st trip DTC detected?

- YES >> Go to EC-234, "Diagnosis Procedure".
- >> INSPECTION END NO

### Diagnosis Procedure

### 1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E9. Refer to Ground Inspection in GI-45. "Circuit Inspection". 2.

#### Is the inspection result normal?

YES >> GO TO 2. INFOID:000000005441806

INFOID:000000005441804

Acceptable

### P0182, P0183 FTT SENSOR

#### < COMPONENT DIAGNOSIS >

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#### NO >> Repair or replace ground connection. 2.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT 1. Disconnect "fuel level sensor unit and fuel pump" harness connector. Turn ignition switch ON. 2. Check the voltage between "fuel level sensor unit and fuel 3. pump" harness connector and ground. <u>54321</u>) Fuel level sensor unit and fuel pump Voltage Ground Terminal Connector B42 4 Ground Approx. 5V Is the inspection result normal? YES >> GO TO 4. >> GO TO 3. NO **3.**DETECT MALFUNCTIONING PART Check the following. Harness connectors E29, B10 Harness for open or short between ECM and "fuel level sensor unit and fuel pump" >> Repair open circuit or short to ground or short to power in harness or connector. ${f 4.}$ CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch OFF. Check the continuity between "fuel level sensor unit and fuel pump" harness connector and ECM harness 2. connector. Fuel level sensor unit and fuel ECM pump Continuity Terminal Connector Terminal Connector E10 104 B42 5 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 B1, M6

Harness connectors E30, M1

· Harness for open or short between "fuel level sensor unit and fuel pump" and ECM

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

### 6.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-236, "Component Inspection". Is the inspection result normal? YES Ρ >> GO TO 7. NO >> Replace "fuel level sensor unit and fuel pump". I.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

### P0182, P0183 FTT SENSOR

### < COMPONENT DIAGNOSIS >

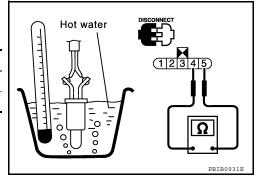
### **Component Inspection**

- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Remove fuel level sensor unit.
- 4. Check resistance between "fuel level sensor unit and fuel pump" terminals by heating with hot water as shown in the figure.

| Terminals | Condition          |          | Resistance     |
|-----------|--------------------|----------|----------------|
| 4 and 5   | Temperature°C (°F) | 20 (68)  | 2.3 - 2.7 kΩ   |
|           |                    | 50 (122) | 0.79 - 0.90 kΩ |

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace "fuel level sensor unit and fuel pump".



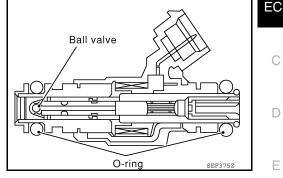
### P0201, P0202, P0203, P0204 FUEL INJECTOR

#### < COMPONENT DIAGNOSIS >

### P0201, P0202, P0203, P0204 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.



### DTC Logic

### DTC DETECTION LOGIC

DTC No. DTC detecting condition Possible cause Trouble diagnosis name Harness or connectors No. 1 cylinder fuel injector An excessively low voltage signal is sent P0201 (No. 1 fuel injector circuit is open or shorted.) to ECM through the No. 1 fuel injector circuit open · No. 1 fuel injector · Harness or connectors No. 2 cylinder fuel injector An excessively low voltage signal is sent P0202 (No. 2 fuel injector circuit is open or shorted.) circuit open to ECM through the No. 2 fuel injector No. 2 fuel injector Harness or connectors No. 3 cylinder fuel injector An excessively low voltage signal is sent P0203 (No. 3 fuel injector circuit is open or shorted.) to ECM through the No. 3 fuel injector circuit open · No. 3 fuel injector · Harness or connectors No. 4 cylinder fuel injector An excessively low voltage signal is sent P0204 (No. 4 fuel injector circuit is open or shorted.) to ECM through the No. 4 fuel injector circuit open · No. 4 fuel injector

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

### >> GO TO 2.

### 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON (READY) and wait at least 1 second.
- 2. Check DTC.

### Is DTC detected?

- YES >> Go to EC-237, "Diagnosis Procedure".
- NO >> INSPECTION END

### Diagnosis Procedure

#### 1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- Disconnect fuel injector harness connector. 2.
- Turn ignition switch ON. 3.

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### P0201, P0202, P0203, P0204 FUEL INJECTOR

Voltage

Battery voltage

#### < COMPONENT DIAGNOSIS >

Check the voltage between fuel injector harness connector and 4. ground.

Terminal

1

1

1

1

Fuel injector

Connector

F17

F18

F19

F20

| J E |                    |             |
|-----|--------------------|-------------|
|     | <b>*:</b> Et () () |             |
|     |                    | JMBIA1636ZZ |

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4 Is the inspection result normal?

Cylinder

1

2

3

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

DTC

P0201

P0202

P0203

P0204

2. DETECT MALFUNCTIONING PART

#### Check the following.

IPDM E/R harness connector F10

10A fuse (No. 35)

· Harness for open or short between fuel injector and fuse

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

Ground

Ground

## ${f 3.}$ CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Turn ignition switch OFF. 1.

2. Disconnect ECM harness connector.

3. Check the continuity between fuel injector harness connector and ECM harness connector.

| DTC   | Fuel injector |           | ECM      |           | Continuity |            |
|-------|---------------|-----------|----------|-----------|------------|------------|
| DIC   | Cylinder      | Connector | Terminal | Connector | Terminal   | Continuity |
| P0201 | 1             | F17       | 2        |           | 32         |            |
| P0202 | 2             | F18       | 2        | F14       | 31         | Existed    |
| P0203 | 3             | F19       | 2        | F 14      | 30         | Existed    |
| P0204 | 4             | F20       | 2        |           | 29         |            |

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

Is the inspection result normal?

YES >> GO TO 4.

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

#### **4.**CHECK FUEL INJECTOR

Refer to EC-238, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning fuel injector.

### 5. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.

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

### Component Inspection

**1.**CHECK FUEL INJECTOR

1. Turn ignition switch OFF. INFOID:000000005441811

### P0201, P0202, P0203, P0204 FUEL INJECTOR

#### < COMPONENT DIAGNOSIS >

#### 2. Disconnect fuel injector harness connector.

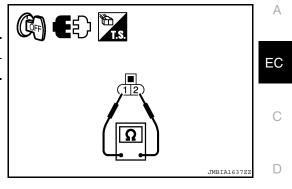
3. Check resistance between fuel injector terminals as follows.

| Terminals                        | Resistance                              |  |
|----------------------------------|---|--|
| 1 and 2                          | 11.1 - 14.3Ω [at 10 -60°C (50 - 140°F)] |  |
| Is the inspection result normal? |   |  |

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector.



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P0222, P0223 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 potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

#### 6.0 4.0 4.0 4.0 4.0 4.0 5 ensor 1 4.0 5 ensor 1 5 ensor 2 6 ensor 2

### DTC Logic

### DTC DETECTION LOGIC

INFOID:000000005441813

| DTC No. | Trouble diagnosis name                           | DTC detecting condition   | Possible cause   |
|---------|--|---|--|
| P0222   | Throttle position sensor<br>1 circuit low input  | An excessively low voltage from the TP sensor 1 is sent to ECM.     | Harness or connectors     (TP sensor 1 circuit is open or shorted.)      |
| P0223   | Throttle position sensor<br>1 circuit high input | An excessively high voltage from the TP sensor<br>1 is sent to ECM. | <ul> <li>Electric throttle control actuator<br/>(TP sensor 1)</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.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

### 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON (READY).
- 2. Depress the accelerator pedal to start engine, then keep engine running for at least 1 second.
- 3. Check DTC.

#### Is DTC detected?

- YES >> Go to EC-240. "Diagnosis Procedure".
- NO >> INSPECTION END

### Diagnosis Procedure

**1**.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.

### EC-240

INFOID:000000005441814

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INFOID:000000005441812

### P0222, P0223 TP SENSOR

#### < COMPONENT DIAGNOSIS >

- 2. Turn ignition switch ON.
- 3. Check the voltage between electric throttle control actuator harness connector and ground.

|   | Electric throttle  | control actuator | Ground | Voltage    |
|---|--------------------|------------------|--------|------------|
| _ | Connector Terminal |                  | Cround | voltage    |
|   | F57                | 1                | Ground | Approx. 5V |

Is the inspection result normal?

YES >> GO TO 3.

- NO >> Repair open circuit or short to ground or short to power in harness or connectors.
- **3.**CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT
- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

| Electric throttle | control actuator | E         | CM       | Continuity |
|-------------------|------------------|-----------|----------|------------|
| Connector         | Terminal         | Connector | Terminal | Continuity |
| F57               | 4                | F13       | 36       | Existed    |

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

Is the inspection result normal?

YES >> GO TO 4.

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

#### 4.CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1 Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

| Electric throttle control actuator |          | E                  | CM | Continuity |
|------------------------------------|----------|--------------------|----|------------|
| Connector                          | Terminal | Connector Terminal |    | Continuity |
| F57                                | 2        | F13                | 37 | Existed    |

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

Is the inspection result normal?

YES >> GO TO 5.

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

**5.**CHECK THROTTLE POSITION SENSOR

Refer to EC-242, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

 $\mathbf{6}$ .REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.

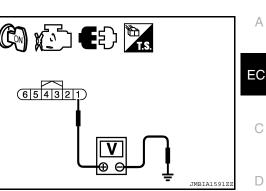
2. Go to EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

### >> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

#### >> INSPECTION END



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### P0222, P0223 TP SENSOR

### < COMPONENT DIAGNOSIS >

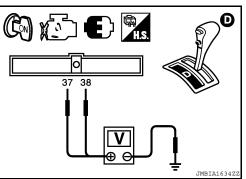
### Component Inspection

[QR25DE]

## 1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set shift lever to D position.
- 6. Check the voltage between ECM harness connector and ground.

| ECM                             |                  | Ground Condition         |                    | Voltage            |                  |
|---------------------------------|------------------|--------------------------|--------------------|--------------------|------------------|
| Connector                       | Terminal         | Giouna                   | Cont               |                    | vollage          |
|                                 | 37<br>(TP sensor |                          |                    | Fully<br>released  | More than 0.36 V |
| (1 F sensor<br>1 signal)<br>F13 | Creverd          | Ground Accelerator pedal | Fully<br>depressed | Less than 4.75 V   |                  |
| 115                             | 38<br>(TP sensor |                          | pedal              | Fully<br>released  | Less than 4.75 V |
|                                 | 2 signal)        |                          |                    | Fully<br>depressed | More than 0.36 V |



Is the inspection result normal?

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace electric throttle control actuator.
- 2. Go to EC-242, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000005441816

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

Refer to EC-15. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-16. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

#### < COMPONENT DIAGNOSIS >

### P0300, P0301, P0302, P0303, P0304 MISFIRE

### **DTC** Logic

INFOID:000000005441817

[QR25DE]

#### 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                  | 0 |
|----------------------------------|---------------------|-------------------------------|---|
| Crankshaft position sensor (POS) | Engine speed        | On board diagnosis of misfire |   |

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)

On the 1st trip, when a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.

When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.

When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off. If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink. When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on. If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.

 Two Trip Detection Logic (Exhaust quality deterioration) For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.

A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

| DTC No. | Trouble diagnosis name             | DTC detecting condition    | Possible cause  |   |
|---------|------------------------------------|----------------------------|---|---|
| P0300   | Multiple cylinder misfire detected | Multiple cylinder misfire. | Improper spark plug   | _ |
| P0301   | No.1 cylinder misfire detected     | No. 1 cylinder misfires.   | Insufficient compression     Incorrect fuel pressure  |   |
| P0302   | No. 2 cylinder misfire detected    | No. 2 cylinder misfires.   | The fuel injector circuit is open or shorted  | J |
| P0303   | No. 3 cylinder misfire detected    | No. 3 cylinder misfires.   | Fuel injector     Intake air leak   |   |
| P0304   | No. 4 cylinder misfire detected    | No. 4 cylinder misfires.   | <ul> <li>The ignition signal circuit is open or shorted</li> <li>Lack of fuel</li> <li>Signal plate</li> <li>A/F sensor 1</li> <li>Incorrect PCV hose connection</li> </ul> | k |

#### 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-I

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine 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.
- Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, then keep engine running for at least 15 minutes.
- 6. Check 1st trip DTC.

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< COMPONENT DIAGNOSIS >

Is 1st trip DTC detected?

YES >> Go to EC-244, "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. Turn ignition switch ON (READY) and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.

#### Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

```
CAUTION:
```

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

| Engine speed                   | Engine speed in the freeze frame data $\pm400$ rpm   |
|--------------------------------|--|
| Vehicle speed                  | Vehicle speed in the freeze frame data $\pm$ 10 km/h (6 MPH)   |
| Basic fuel schedule            | Basic fuel schedule in freeze frame data $\times$ (1 $\pm$ 0.1)  |
| Engine coolant temperature (T) | When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).                           |
| condition                      | When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F). |

The time to driving varies according to the engine speed in the freeze frame data.

| Engine speed        | Time                      |
|---------------------|---------------------------|
| Around 1,000 rpm    | Approximately 10 minutes  |
| Around 2,000 rpm    | Approximately 5 minutes   |
| More than 3,000 rpm | Approximately 3.5 minutes |

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to <u>EC-244, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

### Diagnosis Procedure

INFOID:000000005441818

### **1**.CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to 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

Turn ignition switch OFF and visually check exhaust tube, three way catalyst and muffler for dents.

Is the inspection result normal?

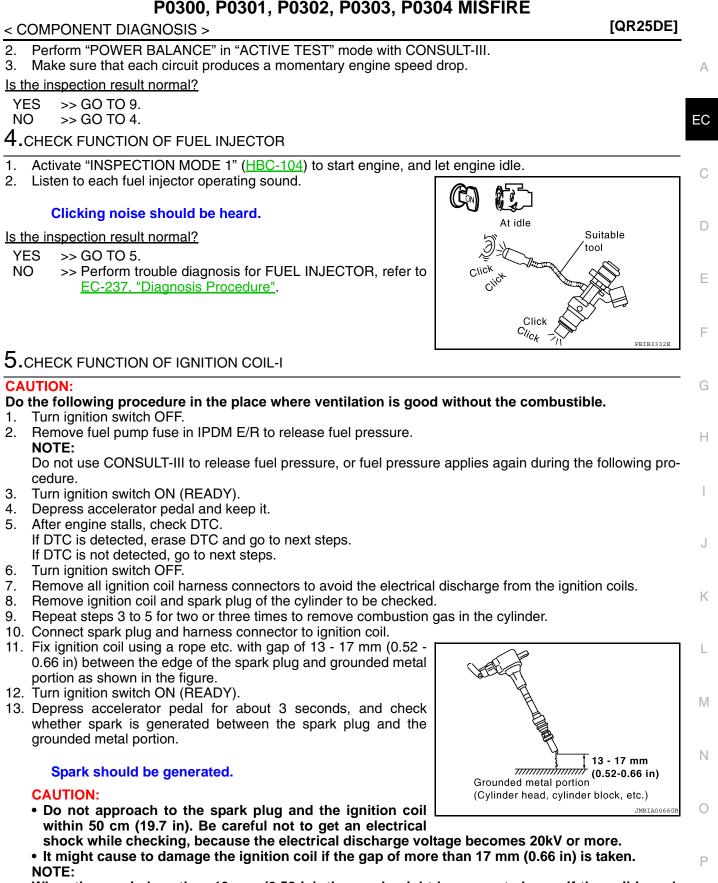
YES-1 >> With CONSULT-III: GO TO 3.

- YES-2 >> Without CONSULT-III: GO TO 4.
- NO >> Repair or replace it.

**3.**PERFORM POWER BALANCE TEST

#### With CONSULT-III

Turn ignition switch ON (READY).



When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is mal-functioning.

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 6.

#### < COMPONENT DIAGNOSIS >

[QR25DE]

6.CHECK FUNCTION OF IGNITION COIL-II

- 1. Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a known-good spark plug.
- 3. Turn ignition switch ON (READY).
- 4. Depress accelerator pedal for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

#### Spark should be generated.

Is the inspection result normal?

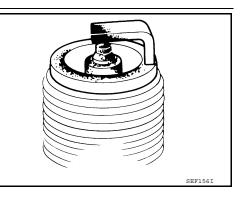
- YES >> GO TO 7.
- NO >> Check ignition coil, power transistor and their circuits. Refer to <u>EC-390. "Component Function</u> Check".

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>MA-20, "SPARK PLUG :</u> <u>Removal and Installation"</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. Turn ignition switch ON (READY).
- 3. Depress accelerator pedal 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>MA-20, "SPARK</u> <u>PLUG : Removal and Installation"</u>.

#### **9.**CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-22, "Compression Pressure".

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. Check fuel pressure. Refer to <u>EC-465. "Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

**11.** DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly".

NO >> Repair or replace.

| < COMPC        |                     |                                      | •               | 301, P           | 0302, P0                   | 030          | )3,         | P0;          | 304      | MIS    | FIR          | =          |         | [QR     | 25DE]     |
|----------------|---------------------|--------------------------------------|-----------------|------------------|----------------------------|--------------|-------------|--------------|----------|--------|--------------|------------|---------|---------|-----------|
|                |                     | SPEED A                              |                 |                  | MING                       |              |             |              |          |        |              |            |         |         |           |
| 1. Check       | idle spe            | ed.                                  |                 |                  |                            |              |             |              |          |        |              |            |         |         |           |
|                |                     | , refer to <u>E(</u><br>on, refer to |                 |                  | <u>ED : Specia</u><br>eed" | <u>lai R</u> | <u>{epa</u> | <u>air R</u> | equir    | remen  | <u>it"</u> . |            |         |         |           |
|                | ignition            |                                      | C-14 "IG        |                  | TIMING : S                 | Sner         | cial        | Bor          | nair F   | Roquir | omor         | +"         |         |         |           |
|                |                     | on, refer to                         |                 |                  |                            | Spec         |             | nep          |          | iequii | emer         | <u>.</u> . |         |         |           |
| Is the insp    |                     |                                      | <u> ?</u>       |                  |                            |              |             |              |          |        |              |            |         |         |           |
|                | > GO TC<br>> Follow |                                      | , "BASIC        | INSPEC           | CTION : Spe                | pecia        | al R        | lepa         | ir Re    | quirer | nent"        |            |         |         |           |
|                |                     | SENSOR 1                             |                 |                  |                            |              |             |              |          |        |              |            |         |         |           |
| 1. Turn ig     | gnition sv          | witch OFF.                           |                 |                  |                            |              |             |              |          |        |              |            |         |         |           |
|                |                     | rresponding<br>M harness             |                 |                  | arness conr                | nect         | tor.        |              |          |        |              |            |         |         |           |
|                |                     |                                      |                 |                  | 1 harness c                | conr         | nect        | tor a        | and E    | CM h   | arnes        | s cor      | inecto  | r.      |           |
| A/F sei        | nor 1               | EC                                   | •\\ /           |                  |                            |              |             |              |          |        |              |            |         |         |           |
| Connector      | Terminal            | Connector                            | Terminal        | Continui         | ty                         |              |             |              |          |        |              |            |         |         |           |
|                | 1                   |                                      | 45              | <b>–</b> · ·     |                            |              |             |              |          |        |              |            |         |         |           |
| F44            | 2                   | F13                                  | 49              | Existed          | 1                          |              |             |              |          |        |              |            |         |         |           |
| 5. Check       | the cont            | tinuity betw                         | veen A/F        | sensor           | 1 harness c                | conr         | nect        | tor o        | or EC    | M har  | ness         | conn       | ector a | and gro | ound.     |
| A/F ser        | nsor 1              | EC                                   | M               | Ground           | Continuity                 | _            |             |              |          |        |              |            |         |         |           |
| Connector      | Terminal            | Connector                            | Terminal        | around           |                            |              |             |              |          |        |              |            |         |         |           |
| F44            | 1                   | F13                                  | 45<br>49        | Ground           | Not existed                | d            |             |              |          |        |              |            |         |         |           |
| 6. Also c      |                     | ness for sł                          |                 | wer.             |                            | —            |             |              |          |        |              |            |         |         |           |
|                |                     | sult norma                           |                 | -                |                            |              |             |              |          |        |              |            |         |         |           |
| -              | > GO TC             |                                      | uit or chou     | t to arou        | ind or chord               | ort to       |             | wori         | in ha    | rnooo  | oroo         | nn00       | toro    |         |           |
|                | -                   | SENSOR 1                             |                 | -                | und or shor                | 11 10        | , hor       | weri         | III IIdi | 111655 |              | nnec       | .015.   |         |           |
| Refer to E     |                     |                                      |                 |                  |                            |              |             |              |          |        |              |            |         |         |           |
| Is the insp    |                     |                                      | -               |                  |                            |              |             |              |          |        |              |            |         |         |           |
|                | > GO TC             | ) 15.<br>ce A/F sens                 | oor 1           |                  |                            |              |             |              |          |        |              |            |         |         |           |
| _              |                     | S AIR FLO                            |                 | OR               |                            |              |             |              |          |        |              |            |         |         |           |
| With CO        |                     |                                      |                 |                  |                            |              |             |              |          |        |              |            |         |         |           |
| Check "MA      | ASS AIR             | FLOW" in                             |                 |                  | R" mode wit                |              | CON         | 1SUI         | LT-III.  |        |              |            |         |         |           |
| For specifi    |                     | er to <u>EC-</u>                     | <u>470, "Ma</u> | <u>ss Air Fi</u> | ow Sensor'                 | <u>)r"</u> . |             |              |          |        |              |            |         |         |           |
| Check ma       | ss air flov         |                                      |                 |                  | 01 with GS                 |              |             |              |          |        |              |            |         |         |           |
| -              |                     | eter to <u>EC-</u><br>nt value wit   |                 |                  | <u>ow Sensor'</u><br>ion?  | <u>)r</u> .  |             |              |          |        |              |            |         |         |           |
| YES >          | > GO TC             | 0 16.                                |                 |                  |                            |              |             |              |          |        |              |            |         |         |           |
| NO >           |                     | connector                            |                 |                  | nals or loos               | ose c        | conr        | nect         | ions     | in the | mas          | s air 1    | low se  | ensor c | ircuit or |
| <b>16.</b> CHE | -                   | PTOM TAE                             |                 |                  | <u>yıv</u> .               |              |             |              |          |        |              |            |         |         |           |
| -              |                     |                                      |                 | n in EC-         | 454, "Symp                 | nptor        | m Tr        | able         | "        |        |              |            |         |         |           |
|                |                     | cult norma                           |                 |                  |                            |              |             |              | -        |        |              |            |         |         |           |

Is the inspection result normal?

YES >> GO TO 17.

< COMPONENT DIAGNOSIS >

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-82. "Diagnosis Descrip-</u>tion".

>> GO TO 18.

**18.**CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

## P0327, P0328 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:000000005441820

### DTC DETECTION LOGIC

| DTC No.   | Trouble diagnosis name   | DTC detected condition  | Possible cause   |  |  |  |
|---|--|---|--|--|--|--|
| P0327   | Knock sensor circuit<br>low input  | An excessively low voltage from the sensor is sent to ECM.  | Harness or connectors     (The sensor circuit is open or shorted.) |  |  |  |
| P0328   | Knock sensor circuit An excessively high voltage from the sensor is knock sensor                   |   |  |  |  |  |
| DTC CON   | FIRMATION PRC  | CEDURE  |  |  |  |  |
| <b>1</b> .PRECO   | NDITIONING   |   |  |  |  |  |
| ing the nex<br>1. Turn ig<br>2. Turn ig<br>3. Turn ig<br><b>TESTING</b> | t test.<br>gnition switch OFF a<br>gnition switch ON.<br>gnition switch OFF a<br><b>CONDITION:</b> | e has been previously conducted, alway<br>and wait at least 10 seconds.<br>and wait at least 10 seconds.<br><b>ving procedure, confirm that battery</b> v | voltage is more than 10V at idle.                                  |  |  |  |
| •   | > GO TO 2.<br>RM DTC CONFIRM   | IATION PROCEDURE  |  |  |  |  |
| <ol> <li>Depres</li> <li>Check</li> </ol>                               | 1st trip DTC.  | READY).<br>redal to start engine, then keep engine r  | unning for at least 5 second.                                      |  |  |  |
| YES >:  | <u>)TC detected?</u><br>> Go to <u>EC-249, "D</u><br>> INSPECTION EN                               | iagnosis Procedure".<br>D   |  |  |  |  |
| Diagnosi  | is Procedure   |   | INFOID:000000005441821   |  |  |  |
| <b>1.</b> CHECK   | GROUND CONNE   | CTION   |  |  |  |  |
| 2. Check  | -  | E9. Refer to Ground Inspection in GI-4  | 5. "Circuit Inspection".   |  |  |  |
| YES >:  | <u>ection result normal</u><br>> GO TO 2.<br>> Repair or replace                                   | ground connection.  |  |  |  |  |
| <b>^</b>  |  | GROUND CIRCUIT FOR OPEN AND S   | SHORT  |  |  |  |
|   |  | harness connector and disconnect ECM<br>een knock sensor harness connector ar   |  |  |  |  |

| Knock     | sensor   | EC                 | Continuity |            |
|-----------|----------|--------------------|------------|------------|
| Connector | Terminal | Connector Terminal |            | Continuity |
| F45       | 2        | F13                | 67         | Existed    |

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

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YES >> GO TO 3.

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

**3.**CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

| Knock s   | sensor   | EC                 | Continuity |         |
|-----------|----------|--------------------|------------|---------|
| Connector | Terminal | Connector Terminal |            |         |
| F45       | 1        | F13                | 61         | Existed |

2. 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 KNOCK SENSOR

Refer to EC-250, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace knock sensor.

**5.**CHECK INTERMITTENT INCIDENT

Refer to GI-42, "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 follows. NOTE:

It is necessary to use an ohmmeter which can measure more than 10  $\text{M}\Omega.$ 

| Terminals | Resistance                            |
|-----------|---------------------------------------|
| 1 and 2   | Approx. 532 - 588 kΩ [at 20°C (68°F)] |

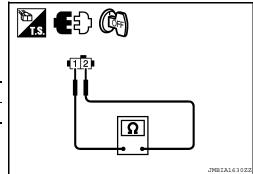
#### CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace knock sensor.



INFOID:000000005441822

### P0335 CKP SENSOR (POS)

#### < COMPONENT DIAGNOSIS >

### P0335 CKP SENSOR (POS)

### Description

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet and Hall IC.

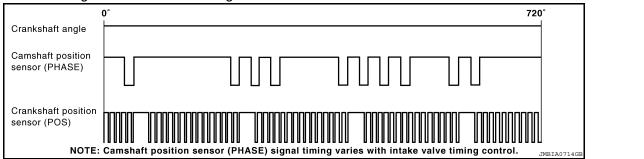
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

ECM receives the signals as shown in the figure.



### DTC Logic

INFOID:000000005441824

### DTC DETECTION LOGIC

| DTC No. | Trouble diagnosis name                        | DTC detecting condition   | Possible cause   |
|---------|---|---|--|
| P0335   | Crankshaft position sen-<br>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 running.</li> </ul> | <ul> <li>Harness or connectors<br/>[Crankshaft position sensor (POS) circuit<br/>is open or shorted.]<br/>(Refrigerant pressure sensor circuit is<br/>shorted.)<br/>(EVAP control system pressure sensor<br/>circuit is shorted.)</li> <li>Crankshaft position sensor (POS)</li> <li>Refrigerant pressure sensor</li> <li>EVAP control system pressure sensor</li> <li>Signal plate</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.
- TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

#### >> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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### P0335 CKP SENSOR (POS)

#### < COMPONENT DIAGNOSIS >

1. Turn ignition switch ON (READY).

- 2. Depress the accelerator pedal to start engine, then keep engine running for at least 5 seconds.
- 3. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-252, "Diagnosis Procedure".

NO >> INSPECTION END

#### Diagnosis Procedure

### **1**.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

### **2.**CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-I

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.

- 2. Turn ignition switch ON.
- 3. Check the voltage between CKP sensor (POS) harness connector and ground.

| CKP sen   | sor (POS) | Ground | Voltage    |  |
|-----------|-----------|--------|------------|--|
| Connector | Terminal  | Ciouna |            |  |
| F30       | 1         | Ground | Approx. 5V |  |

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 3.

## **3.**CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch ON.
- 2. Disconnect ECM harness connector.

3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

| CKP sen   | sor (POS) | E                  | Continuity |         |
|-----------|-----------|--------------------|------------|---------|
| Connector | Terminal  | Connector Terminal |            |         |
| F30       | 1         | F13                | 76         | Existed |

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

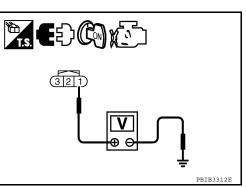
#### **4.**CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

| E         | СМ       | Sensor                                   |           |          |
|-----------|----------|--|-----------|----------|
| Connector | Terminal | Name                                     | Connector | Terminal |
| F13       | 72       | Refrigerant pressure sensor              | E219      | 1        |
|           | 76       | CKP sensor (POS)                         | F30       | 1        |
| E10       | 91       | EVAP control sys-<br>tem pressure sensor | B41       | 3        |

Is the inspection result normal?

YES >> GO TO 5.



INFOID:000000005441825

[QR25DE]

## P0335 CKP SENSOR (POS)

| < COMPONE                                       | NT DIAGNO                        | SIS >            |                      |                | [QR25DE]                         |
|---|----------------------------------|------------------|----------------------|----------------|----------------------------------|
| NO >> R   | epair short to                   | ground or sho    | rt to power in       | harness or co  | onnectors.                       |
| 5.снеск со                                      | OMPONENTS                        | 5                |                      |                |                                  |
|   | pressure sense<br>of system pres | ssure sensor (I  | Refer to <u>EC-2</u> | 86, "Compone   | ent Inspection".)                |
| Is the inspecti                                 |                                  | nal?             |                      |                | _                                |
|   | O TO 10.<br>eplace malfur        | nctioning comp   | onents               |                |                                  |
| •   | •                                | (POS) GROUN      |                      | FOR OPEN A     | ND SHORT                         |
|   | on switch OF                     |                  |                      |                |                                  |
|   |                                  |                  | ensor (POS) h        | arness conne   | ector and ECM harness connector. |
| CKP sens  | sor (POS)                        | EC               | M                    | Continuity     | -                                |
| Connector                                       | Terminal                         | Connector        | Terminal             | Continuity     |                                  |
| F30   | 2                                | F13              | 60                   | Existed        | -                                |
|   |                                  | short to groun   | d and short to       | power.         |                                  |
| Is the inspecti                                 |                                  | nal?             |                      |                |                                  |
|   | O TO 7.<br>epair open cir        | cuit or short to | around or sh         | ort to power i | n harness or connectors.         |
| _   | • •                              |                  | •                    | •              | PEN AND SHORT                    |
|   | ct ECM harne                     |                  |                      |                |                                  |
|   |                                  |                  | ensor (POS) h        | arness conne   | ector and ECM harness connector. |
| CKP sens  | sor (POS)                        | EC               | M                    | Orationity     | -                                |
| Connector                                       | Terminal                         | Connector        | Terminal             | Continuity     |                                  |
| F30   | 3                                | F13              | 65                   | Existed        | -                                |
|   |                                  | short to groun   | d and short to       | o power.       |                                  |
| Is the inspecti                                 |                                  | nal?             |                      |                |                                  |
|   | O TO 8.<br>epair open cir        | cuit or short to | around or sh         | ort to power i | n harness or connectors.         |
| 8. CHECK CF                                     | • •                              |                  | •                    | •              |                                  |
|   |                                  | ent Inspection"  | · ·                  | )              |                                  |
| Is the inspecti                                 |                                  |                  |                      |                |                                  |
|   | O TO 9.                          |                  |                      |                |                                  |
| NO >> Replace crankshaft position sensor (POS). |                                  |                  |                      |                |                                  |
| 9.CHECK GE                                      | EAR TOOTH                        |                  |                      |                |                                  |
| -   |                                  | signal plate ge  | ar tooth.            |                |                                  |
| Is the inspecti                                 |                                  | nal?             |                      |                |                                  |
|   | O TO 10.<br>eplace the sig       | inal nlate       |                      |                |                                  |
|   | •                                | NT INCIDENT      |                      |                |                                  |
| Refer to <u>GI-42</u>                           |                                  |                  |                      |                |                                  |
|   | ISPECTION E                      |                  |                      |                |                                  |
| >> IN   |                                  |                  |                      |                |                                  |
| >> IN<br>Componen                               |                                  |                  |                      |                | INFOID:00000005441826            |
| Componen  | t Inspectio                      |                  | NSOR (POS            | )-I            | INFOID:00000005441826            |

## P0335 CKP SENSOR (POS)

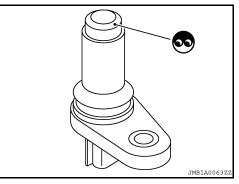
#### < COMPONENT DIAGNOSIS >

- 3. Disconnect crankshaft position sensor (POS) harness connector.
- 4. Remove the sensor.
- 5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

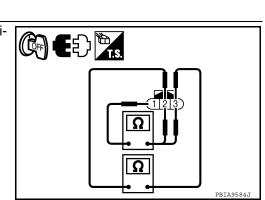
NO >> Replace crankshaft position sensor (POS).



## 2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as follows.

| Terminals (Polarity) | Resistance $\Omega$ [at 25°C (77°F)] |
|----------------------|--------------------------------------|
| 1 (+) - 2 (-)        |                                      |
| 1 (+) - 3 (-)        | Except 0 or ∞                        |
| 2 (+) - 3 (-)        |                                      |



Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace crankshaft position sensor (POS).

#### < COMPONENT DIAGNOSIS >

## P0340 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.

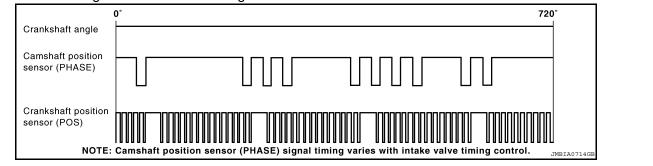
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

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

DTC DETECTION LOGIC

#### NOTE:

If DTC P0340 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-321. "DTC Logic".

| DTC No. | Trouble diagnosis name                        | DTC detecting condition  | Possible cause |   |
|---------|---|--|----------------|---|
| P0340   | Camshaft position sen-<br>sor (PHASE) circuit | <ul> <li>The cylinder No. signal is not sent to ECM for<br/>the first few seconds during engine cranking.</li> <li>The cylinder No. signal is not sent to ECM<br/>during engine running.</li> <li>The cylinder No. signal is not in the normal<br/>pattern during engine running.</li> </ul> |                | L |

#### DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

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

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

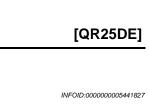
Turn ignition switch OFF and wait at least 10 seconds. 3.

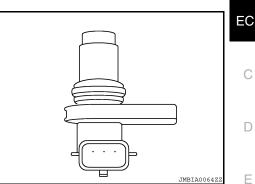
#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

Turn ignition switch ON (READY). 1.





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2. Depress the accelerator pedal to start engine, then keep engine running for at least 5 seconds.

3. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to <u>EC-256, "Diagnosis Procedure"</u>. NO >> GO TO 3.

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

- 1. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-256. "Diagnosis Procedure".

NO >> INSPECTION END

## Diagnosis Procedure

#### **1.**CHECK STARTING SYSTEM

- 1. Turn ignition switch ON (READY).
- 2. Depress accelerator pedal and keep it.

Does the engine turn over? Does the starter motor operate?

- YES >> GO TO 2.
- NO >> Check starting system.

2. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

#### Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

## **3.**CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.

- 2. Turn ignition switch ON.
- 3. Check the voltage between CMP sensor (PHASE) harness connector and ground.

| CMP sense | or (PHASE) | Ground | Voltage    |  |
|-----------|------------|--------|------------|--|
| Connector | Terminal   | Ground |            |  |
| F55       | 1          | Ground | Approx. 5V |  |

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 CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

| - | CMP sense | or (PHASE) | ECM       |          | Continuity |
|---|-----------|------------|-----------|----------|------------|
|   | Connector | Terminal   | Connector | Terminal | Continuity |
|   | F55       | 2          | F13       | 64       | Existed    |

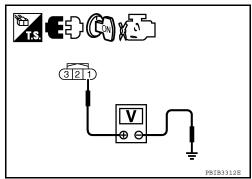
3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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





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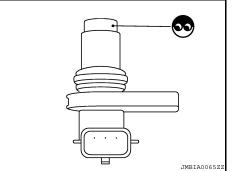
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# **5.**CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect ECM harness connector.
- 2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

| 2. Check the         | e continuity be                     | etween CMP s       | ensor (PHAS    | E) harness co   | nnector and ECM harness connector.    |    |
|----------------------|-------------------------------------|--------------------|----------------|-----------------|---------------------------------------|----|
| CMP sens             | or (PHASE)                          | EC                 | CM             |                 |                                       | EC |
| Connector            | Terminal                            | Connector          | Terminal       | - Continuity    |                                       |    |
| F55                  | 3                                   | F13                | 69             | Existed         |                                       | С  |
| 3. Also cheo         | ck harness for                      | short to grour     | id and short t | o power.        |                                       |    |
|                      | ion result norn                     | nal?               |                |                 |                                       | D  |
|                      | 30 TO 6.<br>Senair open cir         | cuit or short to   | around or s    | hort to nower i | n harness or connectors.              |    |
| •                    | AMSHAFT PC                          |                    | -              | •               | in namess of connectors.              | _  |
| 1                    | 257, "Compone                       |                    |                | -)              |                                       | E  |
|                      | ion result norn                     | -                  |                |                 |                                       |    |
|                      | GO TO 7.                            | <u>idi.</u>        |                |                 |                                       | F  |
|                      | Replace camsh                       | aft position se    | ensor (PHASI   | Ξ).             |                                       |    |
| 7. СНЕСК С           | AMSHAFT (IN                         | T)                 |                |                 |                                       | G  |
| Check the fol        |                                     |                    |                |                 |                                       | G  |
|                      | on of debris to<br>gnal plate of ca |                    |                | ft (1) rear end | i i i i i i i i i i i i i i i i i i i |    |
|                      | ion result norn                     |                    |                |                 |                                       | Н  |
| YES >> 0             | GO TO 8.                            |                    |                |                 |                                       |    |
|                      | Remove debris<br>ear end or repl    |                    |                | e of camshaft   |                                       |    |
|                      | ear end or rep                      | ace camonan        |                |                 |                                       |    |
|                      |                                     |                    |                |                 |                                       | 1  |
|                      |                                     |                    |                |                 |                                       | J  |
| 0                    |                                     |                    |                |                 | JMBIA0096ZZ                           |    |
|                      | ITERMITTEN                          |                    |                |                 |                                       | Κ  |
| Refer to <u>GI-4</u> | 2, "Intermittent                    | <u>Incident"</u> . |                |                 |                                       |    |
|                      | NSPECTION E                         |                    |                |                 |                                       | L  |
|                      |                                     |                    |                |                 |                                       |    |
| Componer             | nt Inspectio                        | n                  |                |                 | INFOID:000000005441830                | ъл |
| <b>1.</b> CHECK C    | AMSHAFT PC                          | SITION SENS        | SOR (PHASE     | E)-I            |                                       | Μ  |
|                      | tion switch OF                      |                    |                |                 |                                       |    |
|                      | he fixing bolt o<br>ect camshaft p  |                    | (PHASF) ha     | rness connecto  | or.                                   | Ν  |
| 4. Remove            | the sensor.                         |                    | . ,            |                 |                                       |    |
|                      | check the sens                      |                    | <b>g</b> .     |                 |                                       | 0  |
|                      | <u>ion result norn</u><br>30 TO 2.  | <u>nal?</u>        |                |                 |                                       |    |
|                      | Replace camsh                       | aft position se    | ensor (PHASI   | Ξ).             |                                       | _  |

NO >> Replace camshaft position sensor (PHASE).



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## 2.CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check resistance camshaft position sensor (PHASE) terminals as follows.

| Terminals (Polarity) |
|----------------------|
| 1 (+) - 2 (-)        |
| 1 (+) - 3 (-)        |
| 2 (+) - 3 (-)        |

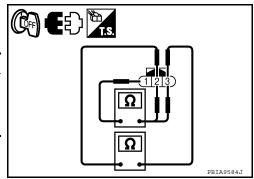
Except 0 or ∞Ω [at 25°C (77°F)]

Resistance

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace camshaft position sensor (PHASE).



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## P0420 THREE WAY CATALYST FUNCTION

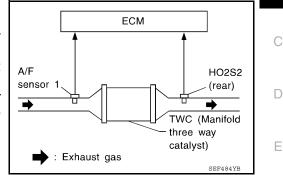
## **DTC Logic**

#### DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2.

A three way catalyst (manifold) 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 (manifold) malfunction is diagnosed.



| DTC No. | Trouble diagnosis name                          | DTC detecting condition   | Possible cause  |   |
|---------|---|---|---|---|
| P0420   | Catalyst system efficien-<br>cy below threshold | <ul> <li>Three way catalyst (manifold) does not oper-<br/>ate properly.</li> <li>Three way catalyst (manifold) does not have<br/>enough oxygen storage capacity.</li> </ul> | <ul> <li>Three way catalyst (manifold)</li> <li>Exhaust tube</li> <li>Intake air leaks</li> <li>Fuel injector</li> <li>Fuel injector leaks</li> <li>Spark plug</li> <li>Improper ignition timing</li> </ul> | G |

#### 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

#### **CAUTION:**

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

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON (READY).
- 6. Repeat following procedure 2 times.
- Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. **NOTE:**

#### Keep the vehicle speed as steady as possible during the cruising.

Stop vehicle.

#### NOTE:

## Never turn ignition switch OFF.

- 7. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-III.
- 8. Drive vehicle at a speed of 80 km/h (50 MPH) or more until "INCMP" of "CATALYST" changes to "CMPLT". NOTE:
  - Keep the vehicle speed as steady as possible during the cruising.

## EC-259

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#### • It will take at most 3 minutes until "INCMP" of "CATALYST" changes to "CMPLT".

9. Check 1st trip DTC.

#### With GST

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine 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 (READY).
- 6. Repeat following procedure 3 times.
- Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. NOTE:

#### Keep the vehicle speed as steady as possible during the cruising.

- Stop vehicle.
- NOTE:

#### Never turn ignition switch OFF.

- 7. Check 1st trip DTC.
- Is 1st tip DTC detected?

## YES >> Go to <u>EC-260, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

## Diagnosis Procedure

#### **1.**CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dent.

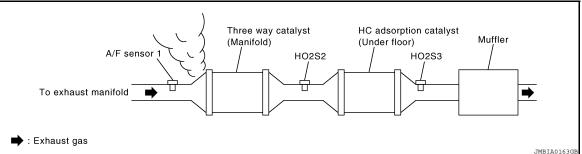
Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

## 2. CHECK EXHAUST GAS LEAK

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine.
- 2. Listen for an exhaust gas leak before the three way catalyst (manifold).



#### Is exhaust gas leak detected?

YES >> Repair or replace. NO >> GO TO 3. **3.**CHECK INTAKE AIR LEAK

**O**.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

#### 1. Check idle speed.

- For procedure, refer to EC-14, "IDLE SPEED : Special Repair Requirement".
- For specification, refer to <u>EC-470. "Idle Speed"</u>.
- 2. Check ignition timing.
- For procedure, refer to EC-14, "IGNITION TIMING : Special Repair Requirement".

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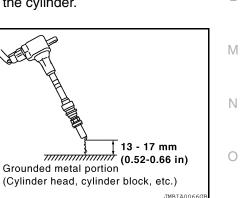
For specification, refer to EC-470, "Ignition Timing". A Is the inspection result normal? YES >> GO TO 5. NO >> Follow the EC-11, "BASIC INSPECTION : Special Repair Requirement". EC 5. CHECK FUEL INJECTOR 1. Turn ignition switch OFF and then turn ON. Check the voltage between ECM harness connector and 2. ground. ECM lo D Voltage Ground 29, 30, 31, 32 Connector Terminal 29 Е 30 F14 Ground Battery voltage 31 32 JMBIA1593 Is the inspection result normal? >> GO TO 6. YES NO >> Perform EC-237, "Diagnosis Procedure". **6.**CHECK FUNCTION OF IGNITION COIL-I **CAUTION:** Н Do the following procedure in the place where ventilation is good without the combustible. Turn ignition switch OFF. 1. Remove fuel pump fuse in IPDM E/R to release fuel pressure. 2. NOTE: Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure. Turn ignition switch ON (READY). 4. Depress accelerator pedal and keep it. 5. After engine stalls, check DTC. If DTC is detected, erase DTC and go to next steps. If DTC is not detected, go to next steps. Κ 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. L Repeat steps 3 to 5 for two or three times 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 M portion as shown in the figure. 12. Turn ignition switch ON (READY). 13. Depress accelerator pedal for about 3 seconds, and check Ν whether spark is generated between the spark plug and the grounded metal portion. . 13 - 17 mm Spark should be generated. ากกกกก้ากกก่า (0.52-0.66 in)

#### CAUTION:

- Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical
- shock while checking, because the electrical discharge voltage becomes 20kV or more. • It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken. NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctionina.

Is the inspection result normal?



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NO >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

- 1. Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a known-good spark plug.
- 3. Turn ignition switch ON (READY).
- 4. Depress the accelerator pedal to 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.

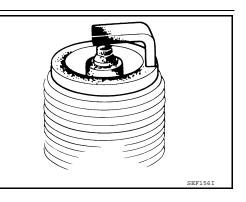
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-390, "Diagnosis Procedure".

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-12, "Removal and Installa-tion"</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. Turn ignition switch ON (READY).
- 3. Depress the accelerator pedal to 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-12, "Removal</u> <u>and Installation"</u>.

## **10.**CHECK FUEL INJECTOR

- 1. Turn ignition switch OFF.
- Remove fuel injector assembly. Refer to <u>EM-35</u>, "<u>Removal and Installation</u>". Keep fuel hose and all fuel injectors connected to fuel tube.
- 3. Disconnect all ignition coil harness connectors.
- 4. Reconnect all fuel injector harness connectors disconnected.
- 5. Turn ignition switch ON.

#### Does fuel drip from fuel injector?

YES >> GO TO 11.

NO >> Replace the fuel injector(s) from which fuel is dripping.

#### **11.**CHECK INTERMITTENT INCIDENT

#### Refer to GI-42, "Intermittent Incident".

#### Is the inspection result normal?

- YES >> Replace three way catalyst assembly.
- NO >> Repair or replace harness or connector.

## **P0441 EVAP CONTROL SYSTEM**

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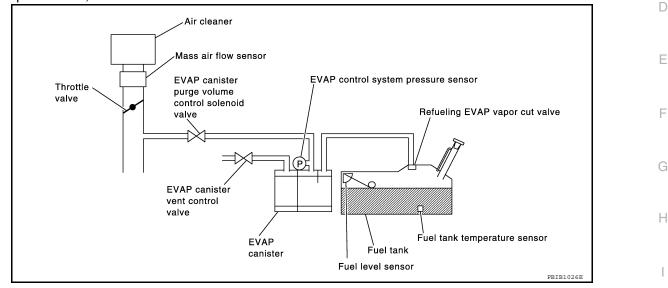
## P0441 EVAP CONTROL SYSTEM

## **DTC Logic**

#### DTC DETECTION LOGIC

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-<br>correct purge flow | EVAP control system does not operate proper-<br>ly, EVAP control system has a leak between in-<br>take manifold and EVAP control system<br>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>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 4.

2.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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.

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#### >> GO TO 3.

## **3.**PERFORM DTC CONFIRMATION PROCEDURE-I

#### ()With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine 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 (READY).
- 6. Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CON-SULT-III.
- 7. Touch "START".
- 8. Depress the accelerator pedal to start engine, then keep engine running until "TESTING" changes to "COMPLETED". (It will take at most 10 seconds.)
- 9. Touch "SELF-DIAG RESULT".

#### Which is displayed on CONSULT-III screen?

OK >> INSPECTION END

NG >> Go to EC-265, "Diagnosis Procedure".

#### 4. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-264, "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-265, "Diagnosis Procedure".

#### **Component Function Check**

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#### **1.**PERFORM COMPONENT FUNCTION CHECK

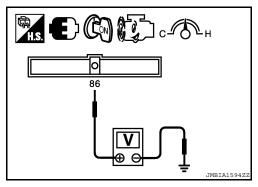
#### **Without CONSULT-III**

- 1. Lift up the vehicle.
- 2. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and wait at least 150 seconds.
- 7. Set voltmeter probes to ECM harness connector and ground.

| ECM       |  |        |
|-----------|--|--------|
| Connector | Terminal   | Ground |
| E10       | 86<br>(EVAP control system pressure sensor signal) | Ground |

- 8. Check EVAP control system pressure sensor value when vehicle is stopped and note it.
- 9. Establish and maintain the following conditions for at least 1 minute.

Vehicle speed70 km/h (43 MPH) or moreShift leverD position



## P0441 EVAP CONTROL SYSTEM

#### < COMPONENT DIAGNOSIS > 10. Verify that EVAP control system pressure sensor value stays 0.1V less than the value when vehicle is stopped (measured at step 8) for at least 1 second. А Is the inspection result normal? YES >> INSPECTION END NO >> Go to EC-265, "Diagnosis Procedure". EC Diagnosis Procedure INFOID:000000005441835 1.CHECK EVAP CANISTER 1. Turn ignition switch OFF. Check EVAP canister assembly for cracks. 2. D Is the inspection result normal? YES-1 >> With CONSULT-III: GO TO 2. YES-2 >> Without CONSULT-III: GO TO 3. Е NO >> Replace EVAP canister. 2.CHECK PURGE FLOW F With CONSULT-III 1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-63, "System Diagram". Turn ignition switch ON (READY). Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Rev engine up to 2,000 rpm. Н Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG VOL CONT/V" opening and check vacuum 5 existence. PURG VOL CONT/V Vacuum 100% Existed 0% Not existed Is the inspection result normal? YES >> GO TO 7. NO >> GO TO 4. Κ 3.CHECK PURGE FLOW 🕅 Without CONSULT-III L Activate "INSPECTION MODE 1" (HBC-104) to start engine, and warm up engine to normal operating 1. temperature. 2. Turn ignition switch OFF. 3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP ser-М vice port and install vacuum gauge. For the location of EVAP service port, refer to EC-63, "System Diagram". 4. Lift up the vehicle. Ν 5. Activate "INSPECTION MODE 1" (HBC-104) to start engine, and let engine idle. Wait at least 150 seconds. 6. Vehicle speed is 0 km/h (0 MPH). 7. Check vacuum hose for vacuum. 8 Vacuum should not exist. Ρ Drive vehicle at a speed of 70 km/h (43 MPH) or more. Check vacuum hose for vacuum. Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 4. [QR25DE]

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**4.**CHECK EVAP PURGE LINE

- 1. Turn ignition switch OFF.
- Check EVAP purge line for improper connection or disconnection. Refer to <u>EC-63, "System Diagram"</u>.

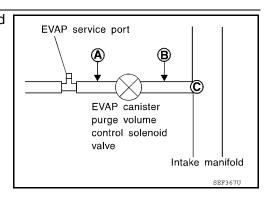
Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair it.

 ${f 5.}$ CHECK EVAP PURGE HOSE AND PURGE PORT

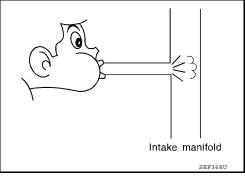
- 1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.
- Blow air into each hose and EVAP purge port C.



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

- Turn ignition switch ON (READY).
- 2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-271, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP canister purge volume control solenoid valve.

#### $\mathbf{8}$ . CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

- 1. Disconnect EVAP control system pressure sensor harness connector.
- 2. Check connectors for water.

#### Water should not exist.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP control system pressure sensor.

## **P0441 EVAP CONTROL SYSTEM**

| < COMPONENT DIAGNOSIS >  | [QR25DE] |    |
|--|----------|----|
| 9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION  |          | Λ  |
| Refer to EC-288. "DTC Logic" for DTC P0452, EC-293. "DTC Logic" for DTC P0453.   |          | A  |
| Is the inspection result normal?   |          |    |
| YES >> GO TO 10.<br>NO >> Replace EVAP control system pressure sensor.   |          | EC |
| NO >> Replace EVAP control system pressure sensor.<br>10.CHECK RUBBER TUBE FOR CLOGGING  |          |    |
|  |          | С  |
| <ol> <li>Disconnect rubber tube connected to EVAP canister vent control valve.</li> <li>Check the rubber tube for clogging.</li> </ol> |          |    |
| Is the inspection result normal?   |          |    |
| YES >> GO TO 11.   |          | D  |
| NO >> Clean the rubber tube using an air blower.   |          |    |
| 11.CHECK EVAP CANISTER VENT CONTROL VALVE  |          | Е  |
| Refer to EC-278, "Component Inspection"  |          |    |
| Is the inspection result normal?   |          | F  |
| YES >> GO TO 12.<br>NO >> Replace EVAP canister vent control valve.  |          | Г  |
| 12.CHECK EVAP PURGE LINE   |          |    |
| Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.   |          | G  |
| Refer to <u>EC-63. "System Diagram"</u> .  |          |    |
| Is the inspection result normal?   |          | Н  |
| YES >> GO TO 13.   |          |    |
| NO >> Replace it.<br>13.CLEAN EVAP PURGE LINE  |          |    |
|  |          | I  |
| Clean EVAP purge line (pipe and rubber tube) using air blower.   |          |    |
| >> GO TO 14.   |          | J  |
| 14. CHECK INTERMITTENT INCIDENT  |          |    |
| Refer to GI-42, "Intermittent Incident".   |          | К  |
|  |          |    |
| >> INSPECTION END  |          |    |
|  |          | L  |
|  |          |    |
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|  |          | Р  |
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## P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE < COMPONENT DIAGNOSIS > [QR25DE]

## P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

## Description

The EVAP canister purge volume control solenoid valve uses a ON/ OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

#### INFOID:000000005441837

INFOID:000000005441836

## DTC Logic

## DTC DETECTION LOGIC

| DTC No. | Trouble diagnosis name                                  | DTC detecting condition  | Possible cause  |
|---------|---|--|---|
| P0443   | EVAP canister purge<br>volume control solenoid<br>valve | The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed. | <ul> <li>EVAP control system pressure sensor</li> <li>EVAP canister purge volume control solenoid valve<br/>(The valve is stuck open.)</li> <li>EVAP canister vent control valve</li> <li>EVAP canister</li> <li>Hoses<br/>(Hoses are connected incorrectly or clogged.)</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.

#### **TESTING CONDITION:**

#### Always perform test at a temperature of 5°C (41°F) or more.

Do you have CONSULT-III

YES >> GO TO 2.

NO >> GO TO 3.

2. PERFORM DTC CONFIRMATION PROCEDURE

#### With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine 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 (READY).
- 6. Depress the accelerator pedal to start engine, then keep engine running for at least 10 seconds.
- Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 8. Check that "COMPLETED" is displayed after touching "START". If "COMPLETED" is not displayed, retry from step 1.
- 9. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT-III?

| <b>P0443</b><br>< COMPONE   |  |                              | URGE V      |  | NTROL SOLENOID VALVE<br>[QR25DE]                                    |
|---|--|------------------------------|-------------|--|---|
|   | SPECTION I<br>to <u>EC-269,</u>                      | END<br>"Diagnosis P          | rocedure".  |  |   |
| 3.perform   | DTC CONFI  | RMATION P                    | ROCEDURI    | E  | _   |
| temperatu   | re.  |                              |             | -  | and warm up engine to normal operating                              |
| <ol> <li>Turn ignition</li> <li>Turn ignition</li> <li>Activate "I</li> </ol> | on switch ON<br>on switch OF<br>NSPECTION            | F and wait at                | least 10 se | econds.                                  | d let engine idle for at least 20 seconds.                          |
|   | displayed?   | "Diagnosis P                 | rocedure".  |  |   |
| -   |  |                              |             |  |   |
| Diagnosis F   | Tocedure   |                              |             |  | INFOID:000000005441838  |
|   | AP CANISTE   |                              | OLUME CO    | ONTROL SOLEN                             | OID VALVE POWER SUPPLY CIRCUIT                                      |
| <ol> <li>Disconnec</li> <li>Turn ignition</li> </ol>                          | t EVAP canis   | ster purge vol<br>I.         |             | ol solenoid valve l<br>je volume control | harness connector.  |
|   |  | connector ar                 | nd ground.  |  |   |
| EVAP canister p   | urge volume co<br>loid valve                         |                              | Ground      | Voltage                                  |   |
| Connector   | Termi  |                              | around      | Vollage                                  |   |
| F29   | 1  |                              | Ground      | Battery voltage                          |   |
| NO >> G(  | 0 TO 3.<br>0 TO 2.                                   |                              |             |  | EF206W  |
|   | wing.<br>k E44, E45<br>nectors E80,<br>open or short | F84<br>t between EV          |             |  | ontrol solenoid valve and IPDM E/R<br>ontrol solenoid valve and ECM |
| •   | AP CANISTE   |                              | •           | •  | in harness or connectors.<br>NOID VALVE OUTPUT SIGNAL CIRCUIT       |
| <ol> <li>Turn ignition</li> <li>Disconnect</li> <li>Check the</li> </ol>      | on switch OF<br>t ECM harne                          | ess connector<br>etween EVAP |             | urge volume cont                         | rol solenoid valve harness connector and                            |
| EVAP canister   | ourge volume<br>noid valve                           | E                            | ECM         | Continuity                               | -   |
| control 3016  |  |                              |             |  |   |
| Connector   | Terminal   | Connector                    | Termina     | I  | _   |

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

Is the inspection result normal?

YES >> GO TO 4.

## P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

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

**4.**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 5.

NO >> Replace EVAP control system pressure sensor.

**5.**CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-286, "Component Inspection".

Is the inspection result normal?

- YES-1 >> With CONSULT-III: GO TO 6.
- YES-2 >> Without CONSULT-III: GO TO 7.
- NO >> Replace EVAP control system pressure sensor.

 ${f 6}.$ CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### With CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Turn ignition switch ON (READY).
- 4. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

#### **/**.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-271, "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Replace EVAP canister purge volume control solenoid valve.

**8.**CHECK RUBBER TUBE FOR CLOGGING

- 1. Disconnect rubber tube connected to EVAP canister vent control valve.
- 2. Check the rubber tube for clogging.

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Clean the rubber tube using an air blower.

9.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-278, "Component Inspection".

#### Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Replace EVAP canister vent control valve.

**10.**CHECK IF EVAP CANISTER SATURATED WITH WATER

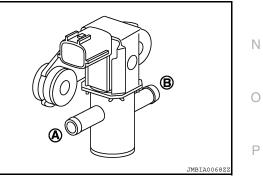
1. Remove EVAP canister assembly with EVAP canister vent control valve and EVAP control system pressure sensor attached.

[QR25DE]

## P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[QR25DE] < COMPONENT DIAGNOSIS > 2. Check if water will drain from EVAP canister. А Does water drain from the EVAP canister? YES >> GO TO 11. NO >> GO TO 13. EC ALBIA0158Z **11.**CHECK EVAP CANISTER D Weigh the EVAP canister assembly with the EVAP canister vent control valve and EVAP control system pressure sensor attached. Е The weight should be less than 2.8 kg (6.2 lb). Is the inspection result normal? YES >> GO TO 13. NO >> GO TO 12. 12. DETECT MALFUNCTIONING PART Check the following. EVAP canister for damage EVAP hose between EVAP canister and vehicle frame for clogging or poor connection Н >> Repair hose or replace EVAP canister. 13. CHECK INTERMITTENT INCIDENT Refer to GI-42, "Intermittent Incident". >> INSPECTION END Component Inspection INFOID:000000005441839 **1.**CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE Κ (P)With CONSULT-III 1. Turn ignition switch OFF. L Reconnect all harness connectors disconnected. 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve. 4. Turn ignition switch ON (READY). 5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. M Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG 6. VOL CONT/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

| Condition<br>(PURG VOL CONT/V value) | Air passage continuity between (A) and (B) |
|--------------------------------------|--|
| 100%                                 | Existed                                    |
| 0%                                   | Not existed                                |



#### Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.



#### **P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE** [QR25DE]

## < COMPONENT DIAGNOSIS >

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

#### P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< COMPONENT DIAGNOSIS >

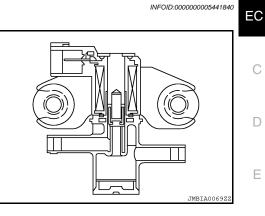
## [QR25DE]

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# P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

## Description

The EVAP canister purge volume control solenoid valve uses a ON/ OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



INFOID:000000005441841

## DTC Logic

## DTC DETECTION LOGIC

| DTC No. | Trouble diagnosis name  | DTC detecting condition   | Possible cause  | G |
|---------|---|---|---|---|
| P0444   | EVAP canister purge volume<br>control solenoid valve circuit<br>open    | An excessively low voltage signal is sent to ECM through the valve  | <ul> <li>Harness or connectors<br/>(The solenoid valve circuit is open or<br/>shorted.)</li> <li>EVAP canister purge volume control so-<br/>lenoid valve</li> </ul> | Η |
| P0445   | EVAP canister purge volume<br>control solenoid valve circuit<br>shorted | An excessively high voltage signal is sent to ECM through the valve | <ul> <li>Harness or connectors<br/>(The solenoid valve circuit is shorted.)</li> <li>EVAP canister purge volume control so-<br/>lenoid valve</li> </ul>             |   |

## DTC CONFIRMATION PROCEDURE

## 1.CONDITIONING

| If DTC Confirmation Procedure has been previously conducted, always perform the following before conduct         | - K     |
|--|---------|
| ing the next test.   |         |
| 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></ol>   |         |
| TESTING CONDITION:   |         |
| Before performing the following procedure, confirm battery voltage is more than 11V at idle.                     | M       |
|  |         |
| >> GO TO 2.  |         |
| 2. PERFORM DTC CONFIRMATION PROCEDURE  | Ν       |
|  | _       |
| 1. Activate "INSPECTION MODE 1" ( <u>HBC-104</u> ) to start engine, and let engine idle for at least 13 seconds. |         |
| 2. Check 1st trip DTC.   | $\circ$ |
| Is 1st trip DTC detected?  | 0       |
| YES >> Go to EC-273, "Diagnosis Procedure".  |         |
| NO >> INSPECTION END   | _       |
|  | Р       |
| Diagnosis Procedure  | 2       |
| 1  |         |
| 1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT                                  |         |

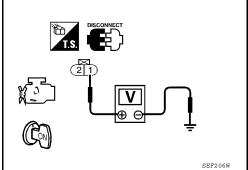
- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Turn ignition switch ON.

## P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### < COMPONENT DIAGNOSIS >

4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

|                   | e volume control so-<br>d valve | Ground | Voltage         |
|-------------------|---------------------------------|--------|-----------------|
| Connector         | Terminal                        |        |                 |
| F29 1             |                                 | Ground | Battery voltage |
| Is the inspection | result normal?                  |        |                 |



[QR25DE]

YES >> GO TO 3.

NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

#### Check the following.

- Junction block E44, E45
- Harness connectors E80, F84
- · Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 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<br>control solenoid valve |          | ECM       |          | Continuity |
|--|----------|-----------|----------|------------|
| Connector  | Terminal | Connector | Terminal |            |
| F29  | 2        | F14       | 25       | 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 4.

YES-2 >> Without CONSULT-III: GO TO 5.

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

**4.**CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

#### With CONSULT-III

- 1. Reconnect all harness connectors disconnected.
- 2. Turn ignition switch ON (READY).
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

NO >> GO TO 5. -

**5.**CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-275, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace EVAP canister purge volume control solenoid valve.

**6.**CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

#### P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### < COMPONENT DIAGNOSIS >

#### [QR25DE]

>> INSPECTION END

## Component Inspection

## 1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### (P)With CONSULT-III

- Turn ignition switch OFF. 1.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- Turn ignition switch ON (READY). 4.
- 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 CONT/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

| Condition<br>(PURG VOL CONT/V value) | Air passage continuity between (A) and (B) |
|--------------------------------------|--|
| 100%                                 | Existed                                    |
| 0%                                   | Not existed                                |

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#### 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

>> Replace EVAP canister purge volume control solenoid valve NO

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## P0447 EVAP CANISTER VENT CONTROL VALVE

#### < COMPONENT 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.

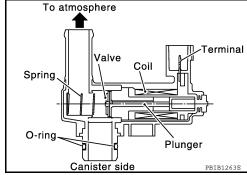
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

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:000000005441845

| DTC No. | Trouble diagnosis name                             | DTC detecting condition   | Possible cause  |
|---------|--|---|---|
| P0447   | EVAP canister vent con-<br>trol valve circuit open | An improper voltage signal is sent to ECM through EVAP canister vent control valve. | <ul> <li>Harness or connectors<br/>(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 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 11V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON (READY).
- 2. Depress the accelerator pedal to start engine, then keep engine running for at least 8 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-276, "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

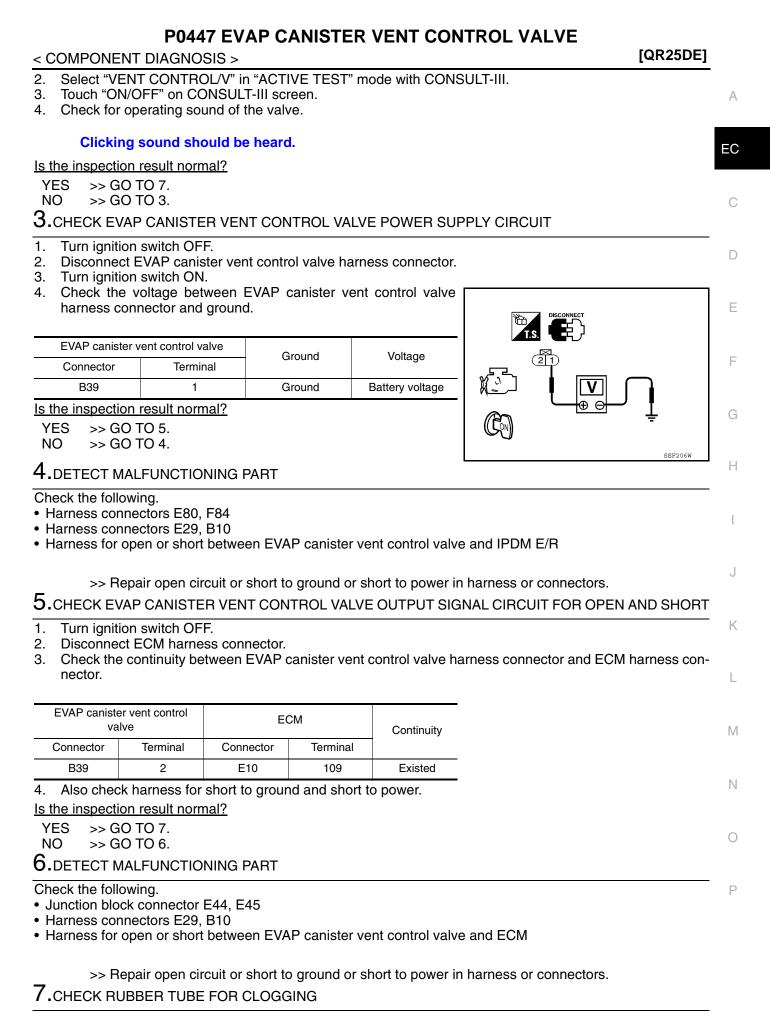
#### With CONSULT-III

1. Turn ignition switch OFF and then turn ON.

INFOID:000000005441846

[QR25DE]

INFOID:000000005441844



## P0447 EVAP CANISTER VENT CONTROL VALVE

< COMPONENT DIAGNOSIS >

- 1. Disconnect rubber tube connected to EVAP canister vent control valve.
- 2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Clean the rubber tube using an air blower.

**8.**CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-278, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP canister vent control valve.

**9.**CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

#### >> INSPECTION END

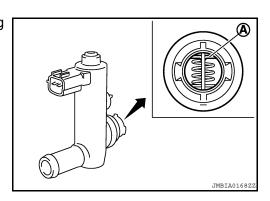
Component Inspection

## 1.CHECK EVAP CANISTER VENT CONTROL VALVE-I

- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister.
- Check portion (A) of EVAP canister vent control valve for being rusted.

#### Is it rusted?

- YES >> Replace EVAP canister vent control valve
- NO >> GO TO 2.



## 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 new O-ring is installed properly.

| Condition VENT CONTROL/V | Air passage continuity between (A) and (B) |
|--------------------------|--|
| ON                       | Not existed                                |
| OFF                      | Existed                                    |

Operation takes less than 1 second.

#### Without CONSULT-III

Check air passage continuity and operation delay time under the following conditions.

#### Make sure new O-ring is installed properly.

| E. |  |
|----|--|
|    |  |

| Condition   | Air passage continuity between (A) and (B) |
|---|--|
| 12V direct current supply between terminals (1) and (2) | Not existed                                |
| OFF   | Existed                                    |

Operation takes less than 1 second.

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[QR25DE]

INFOID:000000005441847

## **P0447 EVAP CANISTER VENT CONTROL VALVE**

< COMPONENT DIAGNOSIS >

Is the inspection result normal? YES >> INSPECTION END

NO >> GO TO 3.

3. CHECK EVAP CANISTER VENT CONTROL VALVE-III

#### (B)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 new O-ring is installed properly.

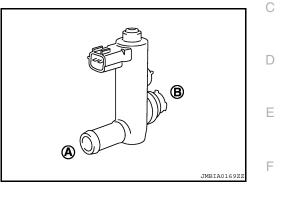
| Condition VENT CONTROL/V Air passage continuity between (A) ar |             |
|--|-------------|
| ON   | Not existed |
| OFF  | Existed     |

Operation takes less than 1 second.

#### Without CONSULT-III

- Clean the air passage [portion (A) to (B)] of EVAP canister vent Ĩ. control valve using an air blower.
- 2. Check air passage continuity and operation delay time under the following conditions.

#### Make sure new O-ring is installed properly.



| Condition   | Air passage continuity between (A) and (B) |
|---|--|
| 12V direct current supply between terminals (1) and (2) | Not existed                                |
| OFF   | Existed                                    |

EC-279

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve



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## P0448 EVAP CANISTER VENT CONTROL VALVE

#### < COMPONENT 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.

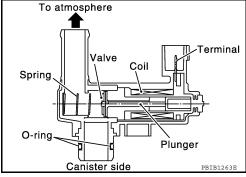
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid 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:000000005441849

| DTC No. | Trouble diagnosis name                      | DTC detecting condition   | Possible cause  |
|---------|---|---|---|
| P0448   | EVAP canister vent con-<br>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<br/>and the circuit</li> <li>Blocked rubber tube to EVAP canister<br/>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 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 this test is conducted with the drive wheels lifted, activate "INPSECTION MODE 1" (<u>HBC-104</u>). If a road test is expected to be easier, it is unnecessary to lift up the vehicle.

#### >> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON (READY) and wait at least 150 seconds.
- Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. CAUTION:

#### Always drive vehicle at a safe speed. NOTE:

#### Never fully release accelerator pedal during the cruising.

3. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-280, "Diagnosis Procedure".

NO >> INSPECTION END

#### Diagnosis Procedure

**1.**CHECK RUBBER TUBE

INFOID:000000005441850

[QR25DE]

INFOID:000000005441848

| P0448 EVAP CANISTER VENT CONTROL VALVE  |   |
|---|---|
| < COMPONENT DIAGNOSIS > [QR25DE]  |   |
| <ol> <li>Turn ignition switch OFF.</li> <li>Disconnect rubber tube connected to EVAP canister vent control valve.</li> <li>Check the rubber tube for clogging.</li> </ol> |   |
| Is the inspection result normal?<br>YES >> GO TO 2.<br>NO >> Clean rubber tube using an air blower.   | Е |
| 2. CHECK EVAP CANISTER VENT CONTROL VALVE   |   |
| Refer to EC-278, "Component Inspection".  | - |
| Is the inspection result normal?  |   |
| YES >> GO TO 3.   |   |
| NO >> Replace EVAP canister vent control valve.<br>3.CHECK IF EVAP CANISTER SATURATED WITH WATER  |   |
|   | r |
| <ol> <li>Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure senso<br/>attached.</li> </ol>                                       | ſ |
| 2. Check if water will drain from the EVAP canister.  | ] |
| Does water drain from EVAP canister?  |   |
| YES >> GO TO 4.<br>NO >> GO TO 6.   |   |
|   | ( |
|   |   |
|   |   |
|   |   |
| ALBIA015822   | 1 |
| 4.CHECK EVAP CANISTER   | _ |
| Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure senso attached.  | r |
| The weight should be less than 2.8 kg (6.2 lb).   |   |
| Is the inspection result normal?  |   |
| YES >> GO TO 6.<br>NO >> GO TO 5.   |   |
| 5. DETECT MALFUNCTIONING PART   |   |
| Check the following.  | - |
| EVAP canister for damage  |   |
| <ul> <li>EVAP hose between EVAP canister and vehicle frame for clogging or poor connection</li> </ul>   |   |
| >> Repair hose or replace EVAP canister.  | I |
| 6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR  |   |
| Disconnect EVAP control system pressure sensor harness connector.   | - |
| <ol> <li>Check connectors for water.</li> </ol>   |   |
| Water should not exist.   | ( |
| Is the inspection result normal?  |   |
| YES >> GO TO 7.   |   |
| NO >> Replace EVAP control system pressure sensor.  |   |
| CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR   | _ |
| Refer to EC-286. "Component Inspection".  | - |
| le the inequestion regult normal?   |   |

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP control system pressure sensor.

## P0448 EVAP CANISTER VENT CONTROL VALVE

#### < COMPONENT DIAGNOSIS >

[QR25DE]

INFOID:000000005441851

## 8. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

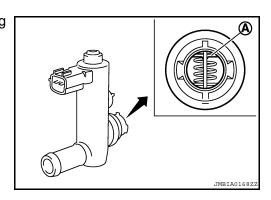
#### **Component Inspection**

## 1.CHECK EVAP CANISTER VENT CONTROL VALVE-I

- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister.
- Check portion (A) of EVAP canister vent control valve for being rusted.

#### Is it rusted?

- YES >> Replace EVAP canister vent control valve
- NO >> GO TO 2.



## 2.CHECK EVAP CANISTER VENT CONTROL VALVE-II

#### (B) 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 new O-ring is installed properly.

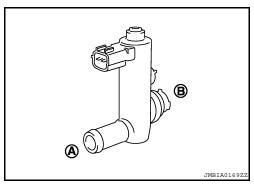
| Condition VENT CONTROL/V Air passage continuity between (A) and |             |
|---|-------------|
| ON  | Not existed |
| OFF   | Existed     |

Operation takes less than 1 second.

#### Without CONSULT-III

Check air passage continuity and operation delay time under the following conditions.

#### Make sure new O-ring is installed properly.



| Condition   | Air passage continuity between (A) and (B) |  |
|---|--|--|
| 12V direct current supply between terminals (1) and (2) | Not existed                                |  |
| OFF   | Existed                                    |  |
| Operation takes loss than 4 accord                      |  |  |

#### Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

## **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.

## P0448 EVAP CANISTER VENT CONTROL VALVE

#### < COMPONENT DIAGNOSIS >

3. Check air passage continuity and operation delay time. Make sure new O-ring is installed properly.

| Condition VENT CONTROL/V | dition VENT CONTROL/V Air passage continuity between (A) and (E |  |
|--------------------------|---|--|
| 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.

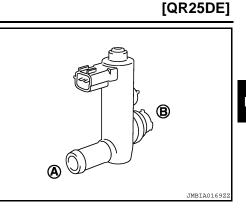
Make sure new O-ring is installed properly.

| Condition   | Air passage continuity between (A) and (B) |
|---|--|
| 12V direct current supply between terminals (1) and (2) | Not existed                                |
| OFF   | Existed                                    |

Operation takes less than 1 second.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace EVAP canister vent control valve



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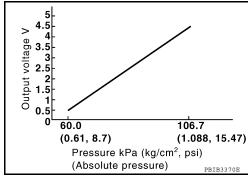
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#### < COMPONENT DIAGNOSIS >

## 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:000000005441853

[QR25DE]

INFOID:000000005441852

| DTC No. | Trouble diagnosis name                                  | DTC detecting condition  | Possible cause   |
|---------|---|--|--|
| P0451   | EVAP control system<br>pressure sensor perfor-<br>mance | ECM detects a sloshing signal from the EVAP control system pressure sensor | <ul> <li>Harness or connectors<br/>(EVAP control system pressure sensor<br/>circuit is shorted.)<br/>[Crankshaft position sensor (POS) circuit<br/>is shorted.]<br/>(Refrigerant pressure sensor circuit is<br/>shorted.)</li> <li>EVAP control system pressure sensor</li> <li>Crankshaft position sensor (POS)</li> <li>Refrigerant pressure sensor</li> </ul> |

## DTC CONFIRMATION PROCEDURE

## **1**.PRECONDITIONING

#### TESTING CONDITIONING: Perform "DTC CONFIRMATION PROCEDURE" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.

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 OFF and wait at least 10 seconds.
- Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and wait at least 100 seconds. NOTE:

## Do not depress accelerator pedal even slightly.

- 3. Check 1st trip DTC.
- Is 1st trip DTC detected?
- YES >> Go to EC-285, "Diagnosis Procedure".
- NO >> GO TO 3.

## **3.**PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and wait at least 100 seconds.

| P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR   |                        |
|---|------------------------|
| < COMPONENT DIAGNOSIS >   | [QR25DE]               |
| NOTE:<br>Do not depress accelerator pedal even slightly.<br>3. Check 1st trip DTC.  | А                      |
| Is 1st trip DTC detected?   |                        |
| YES >> Go to <u>EC-285, "Diagnosis Procedure"</u> .<br>NO >> GO TO 4.   | EC                     |
| 4.PERFORM DTC CONFIRMATION PROCEDURE  |                        |
| <ol> <li>Turn ignition switch OFF and wait at least 10 seconds.</li> <li>Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and wait at least 100 seconds.<br/>NOTE:</li> </ol> | C                      |
| Do not depress accelerator pedal even slightly.<br>3. Check 1st trip DTC.   | D                      |
| Is 1st trip DTC detected?   |                        |
| YES >> Go to <u>EC-285, "Diagnosis Procedure"</u> .<br>NO >> GO TO 5.   | E                      |
| 5. PERFORM DTC CONFIRMATION PROCEDURE   | _                      |
| <ol> <li>Turn ignition switch OFF and wait at least 10 seconds.</li> <li>Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and wait at least 100 seconds.<br/>NOTE:</li> </ol> | F                      |
| Do not depress accelerator pedal even slightly.<br>3. Check 1st trip DTC.   | G                      |
| Is 1st trip DTC detected?   |                        |
| YES >> Go to <u>EC-285, "Diagnosis Procedure"</u> .<br>NO >> GO TO 6.   | Н                      |
| 6.PERFORM DTC CONFIRMATION PROCEDURE  |                        |
| <ol> <li>Turn ignition switch OFF and wait at least 10 seconds.</li> <li>Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and wait at least 100 seconds.<br/>NOTE:</li> </ol> | 1                      |
| <ul><li>Do not depress accelerator pedal even slightly.</li><li>3. Check 1st trip DTC.</li></ul>  | J                      |
| Is 1st trip DTC detected?   | K                      |
| YES >> Go to <u>EC-285, "Diagnosis Procedure"</u> .<br>NO >> INSPECTION END   |                        |
| Diagnosis Procedure   | INFOID:000000005441854 |
| 1. CHECK GROUND CONNECTION  |                        |
| <ol> <li>Turn ignition switch OFF.</li> <li>Check ground connection E9. Refer to Ground Inspection in <u>GI-45, "Circuit Inspection"</u>.</li> </ol>  | M                      |
| Is the inspection result normal?  |                        |
| YES >> GO TO 2.   | Ν                      |
| NO >> Repair or replace ground connection.  |                        |
| 2. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER  |                        |
| <ol> <li>Disconnect EVAP control system pressure sensor harness connector.</li> <li>Check sensor harness connector for water.</li> </ol>  | 0                      |
| Water should not exist.   | P                      |
| Is the inspection result normal?  |                        |
| YES >> GO TO 3.<br>NO >> Repair or replace harness connector.   |                        |
| NO >> Repair or replace harness connector.<br>3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT  |                        |
| 1. Turn ignition switch ON.   |                        |
|   |                        |

#### < COMPONENT DIAGNOSIS >

2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

| EVAP control syste | em pressure sensor | Ground | Voltage    |
|--------------------|--------------------|--------|------------|
| <br>Connector      | Terminal           | Cround |            |
| <br>B41            | 3                  | Ground | Approx. 5V |

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 4.

#### 4.CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

| ECM       |          | Sensor                                   |           |          |
|-----------|----------|--|-----------|----------|
| Connector | Terminal | Name                                     | Connector | Terminal |
| F13       | 72       | Refrigerant pressure sensor              | E219      | 1        |
| 115       | 76       | CKP sensor (POS)                         | F30       | 1        |
| E10       | 91       | EVAP control system pres-<br>sure sensor | B41       | 3        |

Is the inspection result normal?

YES >> GO TO 5.

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

## 5. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to EC-253. "Component Inspection".)
- Refrigerant pressure sensor

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning component.

6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-286, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace EVAP control system pressure sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

#### >> INSPECTION END

#### Component Inspection

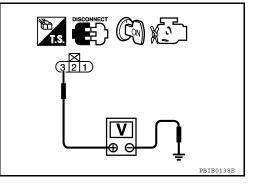
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## **1.**CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.

2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. Always replace O-ring with a new one.

3. Install a vacuum pump to EVAP control system pressure sensor.



[QR25DE]

#### < COMPONENT DIAGNOSIS >

Terminal

86

(EVAP control

system pressure

sensor signal)

ECM

4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

Condition [Applied vacuum kPa

> (kg/cm<sup>2</sup>, psi) Not applied

-26.7 (-0.272, -3.87)

|   | 🕅 🕑 🚱 💭 |             |
|---|---------|-------------|
| - |         |             |
|   | 86      |             |
|   |         |             |
| - |         |             |
| - |         |             |
|   |         |             |
|   |         |             |
| • | -       | JMBIA1595ZZ |

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[QR25DE]

#### **CAUTION:**

Connector

E10

- Always calibrate the vacuum pump gauge when using it.
- 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).

Voltage

1.8 - 4.8V

2.1 to 2.5V lower than

above value

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace EVAP control system pressure sensor

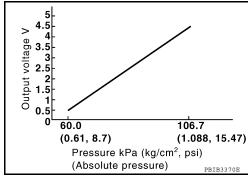
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#### < COMPONENT DIAGNOSIS >

## P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

## Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



## DTC Logic

## DTC DETECTION LOGIC

INFOID:000000005441857

| DTC No. | Trouble diagnosis name                                | DTC detecting condition                                    | Possible cause   |
|---------|---|--|--|
| P0452   | EVAP control system<br>pressure sensor low in-<br>put | An excessively low voltage from the sensor is sent to ECM. | <ul> <li>Harness or connectors<br/>(EVAP control system pressure sensor<br/>circuit is open or shorted.)<br/>[Crankshaft position sensor (POS) circuit<br/>is shorted.)<br/>(Refrigerant pressure sensor circuit is<br/>shorted.)</li> <li>EVAP control system pressure sensor</li> <li>Crankshaft position sensor (POS)</li> <li>Refrigerant pressure 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.

#### **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. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Select "DATA MONITOR" mode with CONSULT-III.
- 5. Make sure that "FUEL T/TMP SE" is more than 0°C (32°F).
- 6. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and wait at least 20 seconds.
- 7. Check 1st trip DTC.

#### With GST

1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.

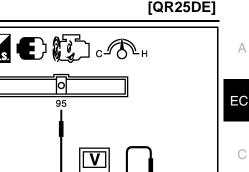
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Ground

Ground

### < COMPONENT DIAGNOSIS >

2. Set voltmeter probes to ECM harness connector and ground as follows.



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3. Make sure that the voltage is less than 4.2V.

ECM

- 4. Turn ignition switch OFF and wait at least 10 seconds.
- Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine and wait at least 20 seconds.

Terminal 95

(Fuel tank temperature sensor signal)

6. Check 1st trip DTC.

Connector

E10

### Is 1st trip DTC detected?

- YES >> Go to EC-289, "Diagnosis Procedure".
- NO >> INSPECTION END

## Diagnosis Procedure

# **1.**CHECK GROUND CONNECTION

- Turn ignition switch OFF.
   Check ground connection E9. Refer to Ground Inspection in <u>GI-45, "Circuit Inspection"</u>.
- 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.

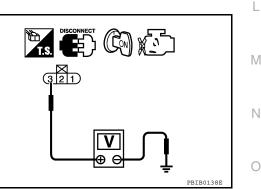
 ${
m 3.}$  CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch ON.
- Check the voltage between EVAP control system pressure sensor harness connector and ground.

| EVAP control syste | em pressure sensor | Ground | Voltage    |
|--------------------|--------------------|--------|------------|
| Connector          | Terminal           | Cround | voltage    |
| B41 3              |                    | Ground | Approx. 5V |
|                    |                    |        |            |

Is the inspection result normal?

YES >> GO TO 8. 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.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

### < COMPONENT DIAGNOSIS >

[QR25DE]

|           | EVAP control system pressure sensor |           | ECM      |         |
|-----------|-------------------------------------|-----------|----------|---------|
| Connector | Terminal                            | Connector | Terminal |         |
| B41       | 3                                   | E10       | 91       | Existed |

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors B10, E29

• Harness for open or short between EVAP control system pressure sensor and ECM

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

### 6.CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

| ECM       |          | Sensor                                   |           |          |  |
|-----------|----------|--|-----------|----------|--|
| Connector | Terminal | Name                                     | Connector | Terminal |  |
| F13       | 72       | Refrigerant pressure sensor              | E219      | 1        |  |
| FIJ       | 76       | CKP sensor (POS)                         | F30       | 1        |  |
| E10       | 91       | EVAP control system pres-<br>sure sensor | B41       | 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-253. "Component Inspection".)

Refrigerant pressure sensor

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace malfunctioning component.

 ${f 8}$ .CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

|           | EVAP control system pressure sensor |           | ECM      |         |
|-----------|-------------------------------------|-----------|----------|---------|
| Connector | Terminal                            | Connector | Terminal |         |
| B41       | 1                                   | E10       | 96       | Existed |

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

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

**9.** DETECT MALFUNCTIONING PART

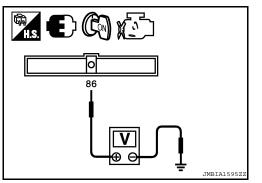
Check the following.

|   |   |  | TROL SY       | STEM PRE      | ESSURE SENSO          |                        |
|---|---|--|---------------|---------------|-----------------------|------------------------|
| < COMPONE   |   |  |               |               |                       | [QR25DE]               |
| <ul><li>Harness con</li><li>Harness for</li></ul> |   |  | P control sys | tem pressure  | sensor and ECM        |                        |
| 10.CHECK<br>SHORT                                 | EVAP CONT                                 | ROL SYSTEM                                   | PRESSURE      | SENSOR IN     | n harness or connecto | T FOR OPEN AND         |
| 1. Check the ness cont                            |   | etween EVAP                                  | control syste | em pressure s | sensor harness conne  | ector and ECM har-     |
|   | system pressure<br>nsor                   | EC   | М             | Continuity    | •                     |                        |
| Connector   | Terminal                                  | Connector                                    | Terminal      |               |                       |                        |
| B41   | 2   | E10  | 86            | Existed       | -                     |                        |
| Is the inspect<br>YES >> G<br>NO >> G             | ion result norn<br>iO TO 12.<br>iO TO 11. | short to groun<br><u>nal?</u><br>IONING PART |               |               |                       |                        |
| Check the foll<br>• Harness con<br>• Harness for  | owing.<br>nnectors B10,<br>open or short  | E29<br>between EVA                           | -             | ·             | sensor and ECM        | Drs.                   |
|   |   | ROL SYSTEM                                   | •             |               |                       |                        |
| Refer to EC-2                                     |   | ent Inspection"                              |               |               |                       |                        |
| NO >> R   | •   | control system                               | n pressure se | ensor.        |                       |                        |
| Refer to <u>GI-42</u>                             |   |  |               |               |                       |                        |
|   | NSPECTION E                               |  |               |               |                       |                        |
| Componen  | it Inspectio                              | n  |               |               |                       | INFOID:000000005441859 |
| 1.CHECK EV  |   | DL SYSTEM PI                                 | RESSURE S     | ENSOR         |                       |                        |
| 1. Turn ignit                                     | ion switch OF                             | F.   |               |               |                       |                        |

2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. 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 and ground under the following conditions.

|           | ECM  | Condition   |                                    |
|-----------|--|---|------------------------------------|
| Connector | Terminal   | [Applied vacuum kPa<br>(kg/cm <sup>2</sup> , psi) | Voltage                            |
|           | 86   | Not applied                                       | 1.8 - 4.8V                         |
| E10       | (EVAP control<br>system pressure<br>sensor signal) | -26.7 (-0.272, -3.87)                             | 2.1 to 2.5V lower than above value |
| CALIT     |  |   |                                    |



### CAUTION:

• Always calibrate the vacuum pump gauge when using it.

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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).

Is the inspection result normal?

YES >> INSPECTION END

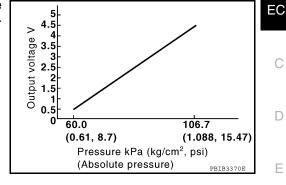
NO >> Replace EVAP control system pressure sensor

### < COMPONENT 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. DTC detecting condition Possible cause Trouble diagnosis name Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit Н is shorted.] (Refrigerant pressure sensor circuit is EVAP control system shorted.) An excessively high voltage from the sensor is P0453 pressure sensor high insent to ECM. EVAP control system pressure sensor put Crankshaft position sensor (POS) · Refrigerant pressure sensor · EVAP canister vent control valve EVAP canister Rubber hose from EVAP canister vent control valve to vehicle frame Κ

### 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.

### **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. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Select "DATA MONITOR" mode with CONSULT-III.
- 5. Make sure that "FUEL T/TMP SE" is more than  $0^{\circ}C$  (32°F).
- 6. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and wait at least 20 seconds.
- 7. Check 1st trip DTC.

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### < COMPONENT DIAGNOSIS >

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Set voltmeter probes to ECM harness connector and ground as follows.

|           | ECM   | Ground |
|-----------|---|--------|
| Connector | Terminal                                    | Ground |
| E10       | 95<br>(Fuel tank temperature sensor signal) | Ground |

- 3. Make sure that the voltage is less than 4.2V.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and wait at least 20 seconds.
- 6. Check 1st trip DTC.

### Is 1st trip DTC detected?

- YES >> Go to EC-294, "Diagnosis Procedure".
- NO >> INSPECTION END

### **Diagnosis** Procedure

# **1**.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E9. Refer to Ground Inspection in GI-45, "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.

 $\mathbf{3}$ . CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

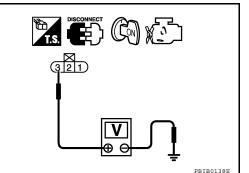
- 1. Turn ignition switch ON.
- 2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

| EVAP control syste | em pressure sensor | Ground   | Voltage    |
|--------------------|--------------------|----------|------------|
| Connector          | Terminal           | Circuita | vollage    |
| B41                | 3                  | Ground   | Approx. 5V |

Is the inspection result normal?

YES >> GO TO 8.

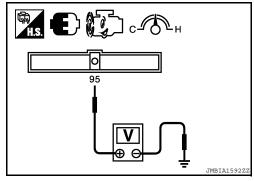
NO >> GO TO 4.



## **4.**CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.



### < COMPONENT DIAGNOSIS >

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|   | ol system pre<br>sensor     | 55018                | EC                          | СМ             |                 | Continuity    |                                      |
|---|-----------------------------|----------------------|-----------------------------|----------------|-----------------|---------------|--------------------------------------|
| Connector   | r Termi                     | nal                  | Connector                   | Te             | erminal         | -             | _                                    |
| B41   | 3                           |                      | E10                         |                | 91              | Existed       | -                                    |
|   | ection resul                |                      | <u>ll?</u>                  |                |                 |               |                                      |
| NO >>   | • GO TO 6.<br>• GO TO 5.    | ,                    |                             |                |                 |               |                                      |
|   | T MALFUN                    | CTION                | ING PART                    |                |                 |               |                                      |
|   | connectors                  |                      |                             | P coi          | ntrol syste     | m pressure    | sensor and ECM                       |
| ~ `   | - Renair on                 | en circi             | uit or short to             | aroi           | und or sho      | rt to nower i | in harness or connectors.            |
|   |                             |                      | R SUPPLY C                  | -              |                 |               | Thamess of connectors.               |
|   |                             |                      |                             |                |                 | atwoon the f  | following terminals                  |
| JIECK Haff  | 1622 101 200                | л юрс                |                             | 511 10         | ground, De      | siween ine i  | following terminals.                 |
| E   | CM                          |                      |                             | Sens           | sor             |               | -                                    |
| Connector   | Terminal                    |                      | Name                        |                | Connector       | Terminal      | -                                    |
| E10   | 72                          | Refrige              | rant pressure s             | ensor          | E219            | 1             | -                                    |
| F13   | 76                          | CKP se               | ensor (POS)                 |                | F30             | 1             | -                                    |
| E10   | 91                          | EVAP of sure se      | control system  <br>nsor    | ores-          | B41             | 3             | -                                    |
|   | ection resul<br>GO TO 7.    |                      | <u>ll?</u>                  |                |                 |               |                                      |
|   |                             |                      | round or sho                | ort to p       | oower in h      | arness or co  | onnectors.                           |
| -   | COMPON                      |                      |                             |                |                 |               |                                      |
| Check the   |                             |                      |                             |                |                 |               |                                      |
|   | aft position<br>nt pressure |                      | (POS) (Refe                 | er to <u>E</u> | <u>-253, "C</u> | omponent I    | nspection".)                         |
| •   | ection resul                |                      |                             |                |                 |               |                                      |
|   | - GO TO 18                  |                      | <u></u>                     |                |                 |               |                                      |
| NO >>   | •                           |                      | tioning comp                |                |                 |               |                                      |
| <b>3.</b> CHECK   | EVAP CO                     | NTROL                | SYSTEM P                    | RESS           | SURE SEN        | NSOR GRO      | UND CIRCUIT FOR OPEN AND SHORT       |
|   | nition swite                |                      |                             |                |                 |               |                                      |
|   |                             |                      | s connector.<br>ween EVAP   | cont           | rol system      | Dressure s    | sensor harness connector and ECM har |
|   | onnector.                   | arry bot             |                             | 00111          | ior cyclon      |               |                                      |
|   |                             |                      |                             |                |                 |               | _                                    |
| EVAP contr  | ol system pre<br>sensor     | ssure                | EC                          | CM             |                 | Continuity    |                                      |
|   |                             | nal                  | Connector                   | Te             | erminal         | Continuity    |                                      |
| Connecto  |                             |                      | E10                         |                | 96              | Existed       | -                                    |
|   | 1                           |                      |                             | nd and         |                 |               | -                                    |
| Connector<br>B41  | -                           | ss for sl            | hort to arour               |                |                 |               |                                      |
| Connector<br>B41<br>4. Also ch  | -                           |                      | hort to grour<br><u>Il?</u> |                |                 |               |                                      |
| Connector<br>B41<br>4. Also ch<br>s the inspe<br>YES >>                 | neck harnes<br>ection resul | <u>t norma</u><br>D. | -                           |                |                 |               |                                      |
| Connector<br>B41<br>4. Also ch<br><u>s the inspe</u><br>YES >><br>NO >> | neck harne                  | <u>t norma</u><br>). | <u>.1?</u>                  |                |                 |               |                                      |

Revision: September 2009

< COMPONENT DIAGNOSIS >

• Harness connectors B10, E29

• Harness for open or short between EVAP control system pressure sensor and ECM

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

10. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

|           | EVAP control system pressure sensor |           | ECM      |         |  |
|-----------|-------------------------------------|-----------|----------|---------|--|
| Connector | Terminal                            | Connector | Terminal |         |  |
| B41       | 2                                   | E10       | 86       | Existed |  |

2. 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 B10, E29
- Harness for open or short between EVAP control system pressure sensor and ECM

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

# **12.**CHECK 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 13.
- NO >> Clean the rubber tube using an air blower, repair or replace rubber tube.

13. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-278, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace EVAP canister vent control valve.

14. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-297, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace EVAP control system pressure sensor.

**15.**CHECK IF EVAP CANISTER SATURATED WITH WATER

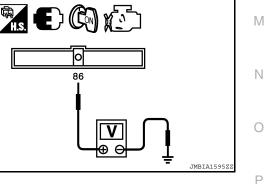
 Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

### < COMPONENT DIAGNOSIS >

### [QR25DE]

|                 |                            | in from the EVAP canis                    | ster.                                 | A Contraction of the second se |
|-----------------|----------------------------|---|---------------------------------------|--|
|                 | r drain from EVA           | AP canister?                              |                                       |  |
|                 | > GO TO 16.                |   |                                       |  |
| NO >>           | > GO TO 18.                |   |                                       |  |
|                 |                            |   |                                       |  |
|                 |                            |   |                                       |  |
|                 |                            |   |                                       |  |
|                 |                            |   |                                       | 0<br>.A  |
|                 |                            |   |                                       | 0°   |
|                 |                            |   |                                       | ALBIA0158ZZ  |
| <b>16.</b> CHEC | CK EVAP CANIS              | STER                                      |                                       |  |
| -               | EVAP canister v            | vith the EVAP canister                    | vent control valve ar                 | nd EVAP control system pressure sensor   |
| attached.       | t should be les            | s than 2.8 kg (6.2 lb)                    |                                       |  |
| -               | ection result nor          | • • • •                                   | •                                     |  |
| -               |                            | <u>IIIal ?</u>                            |                                       |  |
|                 | > GO TO 18.<br>> GO TO 17. |   |                                       |  |
| ·               |                            |   |                                       |  |
| I/.DEIE         | CT MALFUNC                 | IONING PART                               |                                       |  |
| Check the t     |                            |   |                                       |  |
|                 | nister for damag           |   |                                       |  |
| • EVAP no:      | se between EVA             | AP canister and vehicle                   | e frame for clogging o                | •  |
|                 | - Renair hose o            | r replace EVAP caniste                    | or                                    |  |
|                 | CK INTERMITTE              |   |                                       |  |
|                 | -42, "Intermitter          |   |                                       |  |
|                 | 42, momutor                | <u>it indiaditt</u> .                     |                                       |  |
| >>              | > INSPECTION               | END                                       |                                       |  |
| Compon          | ent Inspectio              | on  |                                       | INFOID:000000005441863   |
|                 |                            | OL SYSTEM PRESSU                          |                                       |  |
|                 |                            |   | INE SENSON                            |  |
|                 | nition switch OI           |   | 111 11 I                              |  |
|                 |                            | system pressure sens<br>g with a new one. | sor with its harness co               | onnector connected from EVAP canister.   |
|                 |                            | to EVAP control syste                     | em pressure sensor                    |  |
|                 |                            | N and check output vo                     |                                       |  |
|                 |                            | d ground under the foll                   |                                       |  |
|                 | ECM                        | Condition                                 |                                       |  |
|                 |                            | [Applied vacuum kPa                       | Voltage                               |  |
| Connector       | Terminal                   | (kg/cm <sup>2</sup> , psi)                | , , , , , , , , , , , , , , , , , , , | I Ĩ I  |

| Connector | Terminal   | (kg/cm <sup>2</sup> , psi) | Voltage                            |  |  |  |
|-----------|--|----------------------------|------------------------------------|--|--|--|
|           | 86   | Not applied                | 1.8 - 4.8V                         |  |  |  |
| E10       | (EVAP control<br>system pressure<br>sensor signal) | -26.7 (-0.272, -3.87)      | 2.1 to 2.5V lower than above value |  |  |  |
|           |  |                            |                                    |  |  |  |



### CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- 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).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP control system pressure sensor

# P0456 EVAP CONTROL SYSTEM

# **DTC Logic**

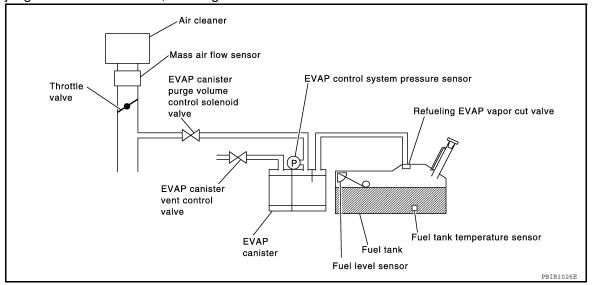
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[QR25DE]

### 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 canister vent control valve and the circuit</li> <li>Loose or disconnected rubber tube</li> <li>EVAP canister vent control valve and the circuit</li> <li>EVAP canister vent control valve and the circuit</li> <li>EVAP canister vent control valve is missing or damaged</li> <li>EVAP canister is saturated with water</li> <li>EVAP control system pressure sensor</li> <li>ORVR system leaks</li> <li>Fuel level sensor and the circuit</li> <li>Foreign matter caught in EVAP canister purge volume control 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

< COMPONENT DIAGNOSIS >

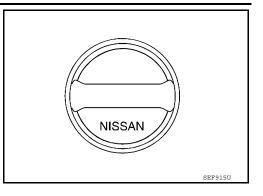
| I.PRECONDITIONING   | А  |
|---|----|
| If DTC Confirmation Procedure has been previously conducted, always perform the following before conduct-<br>ing the next test.   | A  |
| 1. Turn ignition switch OFF and wait at least 10 seconds.   | EC |
| <ol> <li>Turn ignition switch ON.</li> <li>Turn ignition switch OFF and wait at least 10 seconds.</li> </ol>  |    |
| Do vou have CONSULT-III?  |    |
| YES >> GO TO 2.   | С  |
| NO >> GO TO 4.  |    |
| 2.PERFORM DTC CONFIRMATION PROCEDURE-I  | D  |
| With CONSULT-III  |    |
| <ol> <li>Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine.</li> <li>Select "EVAP DIAG READY" in "DATA MONITOR" mode with CONSULT-III.</li> </ol>             | _  |
| <ol> <li>Wait at idle until "OFF" of "EVAP DIAG READY" changes to "ON".</li> </ol>  | Е  |
| NOTE:<br>It will take at most 2 hours until "OFE" of "EVAD DIAC BEADY" shanges to "ON"  |    |
| <ul> <li>It will take at most 2 hours until "OFF" of "EVAP DIAG READY" changes to "ON".</li> <li>4. Turn ignition switch OFF and wait at least 90 minutes.</li> </ul>     | F  |
| NOTE:   |    |
| <ul> <li>Never turn ignition switch ON during 90 minutes.</li> <li>Turn ignition switch ON and select "EVAP LEA DIAG" in "DATA MONITOR" mode with CONSULT-III.</li> </ul> | 0  |
| 6. Check that "EVAP LEA DIAG" indication.   | G  |
| Which is displayed on CONSULT-III?  |    |
| CMPLT >> GO TO 3.   | Н  |
| YET >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 1.   |    |
| 3.PERFORM DTC CONFIRMATION PROCEDURE-II   |    |
| Check 1st trip DTC.   | 1  |
| <u>Is 1st trip DTC detected?</u><br>YES >> Go to <u>EC-299, "Diagnosis Procedure"</u> .   |    |
| NO >> INSPECTION END.   | J  |
| 4.PERFORM DTC CONFIRMATION PROCEDURE  |    |
| With GST  | Κ  |
| 1. Activate "INSPECTION MODE 1" ( <u>HBC-104</u> ) to start engine.   |    |
| <ol> <li>Wait engine idle for at least 2 hours.</li> <li>Turn ignition switch OFF and wait at least 90 minutes.</li> </ol>  | 1  |
| NOTE:   |    |
| <ul><li>Never turn ignition switch ON during 90 minutes.</li><li>4. Turn ignition switch ON.</li></ul>  |    |
| 5. Check 1st trip DTC.  | M  |
| Is 1st trip DTC detected?   |    |
| YES >> Go to EC-299, "Diagnosis Procedure".   | Ν  |
| NO >> INSPECTION END.   | IN |
| Diagnosis Procedure   |    |
| 1. CHECK FUEL FILLER CAP DESIGN   | 0  |
| 1. Turn ignition switch OFF.  |    |
|   | Р  |

### < COMPONENT DIAGNOSIS >

### 2. Check for genuine NISSAN fuel filler cap design.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace with genuine NISSAN fuel filler cap.



[QR25DE]

# 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.

# $\mathbf{3.}$ 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-303, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel filler cap with a genuine one.

**5.**CHECK FOR EVAP LEAK

Refer to EC-466, "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>EC-468</u>, "Exploded View".
- EVAP canister vent control valve. Refer to <u>EC-278, "Component Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 7.

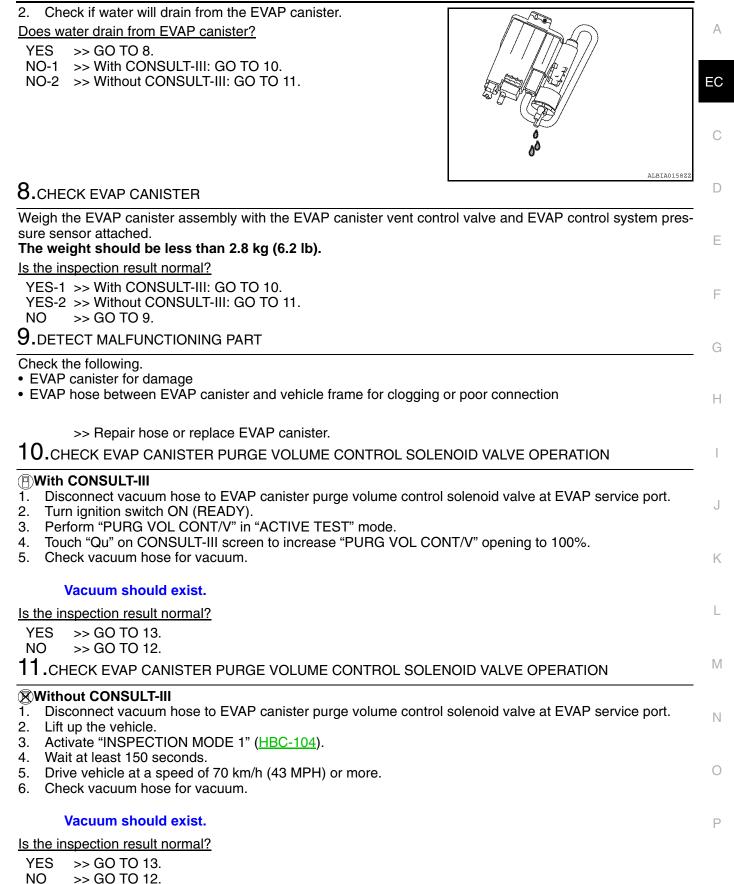
NO >> Repair or replace EVAP canister vent control valve and O-ring.

**1.**CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister assembly with EVAP canister vent control valve and EVAP control system pressure sensor attached.

### < COMPONENT DIAGNOSIS >

### [QR25DE]



12. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-63, "System Diagram".

< COMPONENT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or reconnect the hose.

**13.**CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-271, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace EVAP canister purge volume control solenoid valve.

14.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-233, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace fuel level sensor unit.

15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-286, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace EVAP control system pressure sensor.

**16.**CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to <u>EC-65, "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-396, "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-399, "Component Inspection".

Is the inspection result normal?

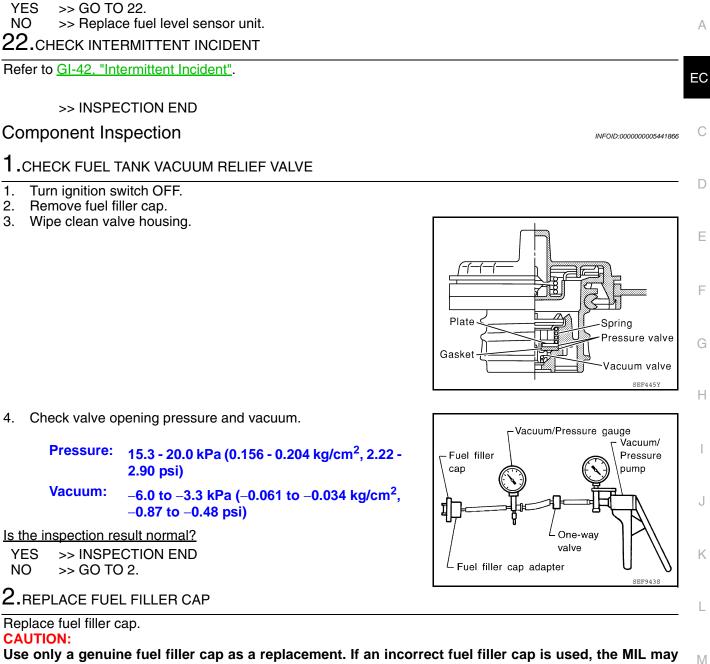
YES >> GO TO 21.

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

21.CHECK FUEL LEVEL SENSOR

Refer to MWI-44, "Component Inspection".

Is the inspection result normal?



Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.



< COMPONENT DIAGNOSIS >

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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 through CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

### DTC Logic

INFOID:000000005441868

## 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-320, "DTC Logic"</u>.

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

| DTC No. | Trouble diagnosis name          | DTC detecting condition   | Possible cause   |
|---------|---------------------------------|---|--|
| P0460   | Fuel level sensor circuit noise | Even though the vehicle is parked, a signal be-<br>ing varied is sent from the fuel level sensor to<br>ECM. | <ul> <li>Harness or connectors<br/>(The CAN communication line is open or<br/>shorted)</li> <li>Harness or connectors<br/>(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 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. Activate "INSPECTION MODE 1" (HBC-104) to start engine, and wait maximum of 2 consecutive minutes.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-304, "Diagnosis Procedure".

NO >> INSPECTION END

## Diagnosis Procedure

**1.**CHECK COMBINATION METER FUNCTION

Refer to MWI-43, "Component Function Check".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to <u>MWI-35</u>, "Diagnosis Description"

2. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

INFOID:000000005441869

| < COMPONENT DIAGNOSIS > |
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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 through CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

### DTC Logic

INFOID:000000005441871

## 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-320, "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<br>not change within the specified range even<br>though the vehicle has been driven a long dis-<br>tance. | <ul> <li>Harness or connectors<br/>(The CAN communication line is open or<br/>shorted)</li> <li>Harness or connectors<br/>(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-306, "Component Function Check"</u>.

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-307, "Diagnosis Procedure".

### **Component Function Check**

INFOID:000000005441872

# **1**.PRECONDITIONING

### WARNING:

When performing following procedure, be sure to observe the handling of the fuel. Refer to <u>FL-11,</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

| < COMPONENT DIAGNOSIS >  | [QR25DE]             |     |
|--|----------------------|-----|
| <ol> <li>Release fuel pressure from fuel line, refer to <u>EC-465, "Inspection"</u>.</li> <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>Turn ignition switch OFF and wait at least 10 seconds then turn ON (engine stopped).</li> <li>Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-III.</li> <li>Check "FUEL LEVEL SE" output voltage and note it.</li> <li>Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-III.</li> </ol> |                      | EC  |
| <ol> <li>Touch "ON" and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.</li> <li>Check "FUEL LEVEL SE" output voltage and note it.</li> <li>Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).</li> <li>Check "FUEL LEVEL SE" output voltage and note it.</li> </ol>        |                      | С   |
| 13. Confirm whether the voltage changes more than 0.03V during step 7 to 10 and 10 to 12.  |                      | D   |
| Is the inspection result normal?   |                      |     |
| YES >> INSPECTION END<br>NO >> Go to <u>EC-307, "Diagnosis Procedure"</u> .  |                      | Е   |
| 3. PERFORM COMPONENT FUNCTION CHECK  |                      |     |
| Without CONSULT-III<br>NOTE:   |                      | F   |
| Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 $\ell$ (7-7/8 U  | S gal, 6-5/8         |     |
| <ul><li>Imp gal) in advance.</li><li>1. Prepare a fuel container and a spare hose.</li></ul>   |                      | G   |
| 2. Release fuel pressure from fuel line. Refer to EC-465, "Inspection".  |                      | G   |
| <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>  |                      |     |
| 5. Turn ignition switch ON.  |                      | Η   |
| 6. Drain fuel by 30 $\ell$ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.  |                      |     |
| <ol> <li>Confirm that the fuel gauge indication varies.</li> <li>Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).</li> </ol>   |                      | I   |
| 9. Confirm that the fuel gauge indication varies.  |                      |     |
| Is the inspection result normal?   |                      |     |
| YES >> INSPECTION END<br>NO >> Go to <u>EC-307, "Diagnosis Procedure"</u> .  |                      | J   |
| Diagnosis Procedure  |                      |     |
|  | FOID:000000005441873 | Κ   |
| 1.CHECK COMBINATION METER FUNCTION   |                      |     |
| Refer to MWI-43, "Component Function Check".   |                      | L   |
| Is the inspection result normal?   |                      |     |
| YES >> GO TO 2.<br>NO >> Go to <u>MWI-35, "Diagnosis Description"</u>  |                      | Μ   |
| 2. CHECK INTERMITTENT INCIDENT   |                      | IVI |
| Refer to GI-42, "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 through CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

### DTC Logic

INFOID:000000005441875

### 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-320, "DTC Logic"</u>.

This diagnosis indicates the former, to detect open or short circuit malfunction.

| DTC No. | Trouble diagnosis name                  | DTC detecting condition                                     | Possible cause  |
|---------|---|---|---|
| P0462   | Fuel level sensor circuit<br>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<br>high input | An excessively high voltage from the sensor is sent to ECM. | <ul> <li>shorted)</li> <li>Harness or connectors<br/>(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 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 11V and 16V 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-308, "Diagnosis Procedure".

NO >> INSPECTION END

# **Diagnosis Procedure**

### **1.**CHECK COMBINATION METER FUNCTION

Refer to MWI-43, "Component Function Check".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to <u>MWI-35</u>, "Diagnosis Description"

2. CHECK INTERMITTENT INCIDENT

INFOID:000000005441874

# P0462, P0463 FUEL LEVEL SENSOR

| <pre>&lt; COMPONENT DIAGNOSIS &gt;</pre> | [QR25DE] |
|--|----------|
| Refer to GI-42, "Intermittent Incident". | A        |
| >> INSPECTION END                        |          |
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# P0500 VSS

# Description

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from hybrid vehicle control ECU, and the other is from brake ECU. The ECM uses these signals for engine control.

## DTC Logic

INFOID:000000005441878

INFOID:000000005441877

# 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-320, "DTC Logic"</u>.

| DTC No. | Trouble diagnosis name | DTC detecting condition   | Possible cause   |
|---------|------------------------|---|--|
| P0500   | Vehicle speed sensor   | ECM detects a difference between two vehicle speed signals is out of the specified range. | <ul> <li>Harness or connectors<br/>(The CAN communication line is open or short-<br/>ed)</li> <li>Hybrid vehicle control ECU</li> <li>Brake ECU</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.

### TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If this test is conducted with the drive wheels lifted, activate "INPSECTION MODE 1" (<u>HBC-104</u>). If a road test is expected to be easier, it is unnecessary to lift up the vehicle.

>> GO TO 2.

# 2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON (READY).
- 2. Drive the vehicle at more than 40 km/h (25 MPH) for at least 2 minutes.

### CAUTION: Always drive vehicle at a safe speed.

3. Check 1st trip DTC.

### Is 1st trip DTC detected?

YES >> Go to EC-310. "Diagnosis Procedure".

NO >> INSPECTION END

# **Diagnosis Procedure**

### **1.**CHECK DTC WITH HYBRID VEHICLE CONTROL ECU

Refer to HBC-597, "DTC Index".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

2.CHECK BARAKE ECU

Refer to BRC-143, "DTC Index".

>> INSPECTION END

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Revision: September 2009

# P0506 ISC SYSTEM

# Description

INFOID:000000005441880

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 and deceleration.

# DTC Logic

INFOID:000000005441881

## 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-<br>tem RPM lower than ex-<br>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 before conducting the next test.

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

If the target idle speed is out of the specified value, perform <u>EC-16, "IDLE AIR VOLUME LEARNING :</u> <u>Special Repair Requirement"</u>, before conducting DTC Confirmation Procedure.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.
- Always perform the test at a temperature above -10°C(14°F).

### >> GO TO 2.

# 2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>.) to start engine, and warm up engine 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. Activate "INSPECTION MODE 1" (<u>HBC-104</u>.) to start engine, and let engine idle for at least 1 minute.
- 6. Check 1st trip DTC.

### Is 1st trip DTC detected?

- YES >> Go to <u>EC-312</u>, "<u>Diagnosis Procedure</u>". NO >> INSPECTION END
- NO >> INSPECTION EN

# Diagnosis Procedure

## **1.**CHECK INTAKE AIR LEAK

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start.
- 2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

# **P0506 ISC SYSTEM**

| < COMPONENT DIAGNOSIS > [QR25D  | E]  |
|---|-----|
| YES >> Discover air leak location and repair.<br>NO >> GO TO 2.   | A   |
| 2.REPLACE ECM   |     |
| <ol> <li>Replace ECM.</li> <li>Go to <u>EC-14</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requi<br/>ment".</li> </ol> | re- |
| >> INSPECTION END   | С   |
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# P0507 ISC SYSTEM

# Description

INFOID:000000005441883

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 and deceleration.

# DTC Logic

INFOID:000000005441884

# 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-<br>tem RPM higher than<br>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 before conducting the next test.

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

If the target idle speed is out of the specified value, perform <u>EC-16, "IDLE AIR VOLUME LEARNING :</u> <u>Special Repair Requirement"</u>, before conducting DTC Confirmation Procedure.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.
- Always perform the test at a temperature above -10°C(14°F).

### >> GO TO 2.

# 2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>.) to start engine, and warm up engine 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. Activate "INSPECTION MODE 1" (<u>HBC-104</u>.) to start engine, and let engine idle for at least 1 minute.
- 6. Check 1st trip DTC.

### Is 1st trip DTC detected?

YES >> Go to <u>EC-314</u>, "<u>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**

| < COMPONENT DIAGNOSIS > [QR25DE]  |    |
|---|----|
| NO >> Repair or replace.  |    |
| 2.CHECK INTAKE AIR LEAK   | А  |
| <ol> <li>Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine.</li> <li>Listen for an intake air leak after the mass air flow sensor.</li> </ol> | EC |
| <u>Is intake air leak detected?</u><br>YES >> Discover air leak location and repair.  |    |
| NO >> GO TO 3.  | С  |
| 3.REPLACE ECM   |    |
| <ol> <li>Replace ECM.</li> <li>Go to <u>EC-14</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".</li> </ol>              | D  |
| >> INSPECTION END   | Е  |
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# 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 · Harness or connectors ECM power supply cir-ECM back-up RAM system does not function [ECM power supply (back-up) circuit is P0603 cuit properly. open or shorted.] ECM

## DTC CONFIRMATION PROCEDURE

### **1**.PRECONDITIONING

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

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

### >> GO TO 2.

# 2.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 10 seconds. 1.
- 2. Turn ignition switch OFF and wait at least 5 minutes
- З. Turn ignition switch ON and wait at least 10 seconds.
- Repeat steps 2 and 3 for five times. 4.
- Check 1st trip DTC. 5.

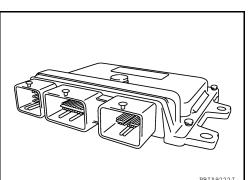
### Is 1st trip DTC detected?

- YES >> Go to EC-316. "Diagnosis Procedure".
- NO >> INSPECTION END

# **Diagnosis** Procedure

# **1.**CHECK ECM POWER SUPPLY

- Turn ignition switch OFF. 1.
- Disconnect ECM harness connector. 2.



[QR25DE]

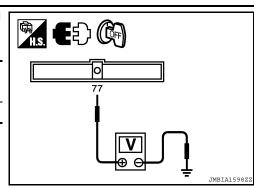
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# P0603 ECM POWER SUPPLY

### < COMPONENT DIAGNOSIS >

Check the voltage between ECM harness connector and ground.



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| E         | CM       | Ground | Voltage         |  |
|-----------|----------|--------|-----------------|--|
| Connector | Terminal | Cround | voltage         |  |
| F13       | 77       | Ground | Battery voltage |  |
|           |          |        |                 |  |

### Is the inspection result normal?

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

### 2. DETECT MALFUNCTIONING PART

- Check the following.
- 15A fuse (No. 42)
- IPDM E/R harness connector F10
- · Harness for open or short between ECM and battery

>> Repair or replace harness or connectors.

# **3.**CHECK INTERMITTENT INCIDENT

| Refer to GI-42, "Intermittent Incident". |
|--|
| le the increation regult normal?         |

| <u>Is the ir</u> | nspection result normal? |  |
|------------------|--------------------------|--|
| YES              | >> GO TO 4.              |  |

NO >> Repair or replace harness or connectors.

### **4.**PERFORM DTC CONFIRMATION PROCEDURE

# With CONSULT-III Turn ignition switch ON. Select "SELF-DIAG RESULTS" mode with CONSULT-III. Touch "ERASE". Perform DTC CONFIRMATION PROCEDURE. See EC-316, "DTC Logic". With GST Turn ignition switch ON. Select Service \$04 with GST. Perform DTC CONFIRMATION PROCEDURE. See EC-316, "DTC Logic".

Is the 1st trip DTC P0603 displayed again?

### YES >> GO TO 5.

### NO >> INSPECTION END

### 5.REPLACE ECM

- 1. Replace ECM.
- Go to <u>EC-14, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Require-</u> <u>ment"</u>.

>> INSPECTION END

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# 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 |  |
|---------|------------------------|-------------------------|---|----------------|--|
|         |                        | A)                      | ECM calculation function is malfunctioning.   |                |  |
| P0605   | Engine control module  | B)                      | ECM EEP-ROM system is malfunctioning.         | • ECM          |  |
|         |                        | C)                      | ECM self shut-off function is malfunctioning. |                |  |
|         |                        |                         |   |                |  |

# DTC CONFIRMATION PROCEDURE

# **1**.PRECONDITIONING

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

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

### >> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Turn ignition switch ON.
- 2. Check 1st trip DTC.
- Is 1st trip DTC detected?
- YES >> Go to EC-319, "Diagnosis Procedure".
- NO >> GO TO 3.

# **3.** PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
- 3. Check 1st trip DTC.

### Is 1st trip DTC detected?

YES >> Go to EC-319. "Diagnosis Procedure".

NO >> GO TO 4.

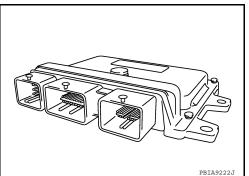
### **4.**PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
- 3. Repeat step 2 for 32 times.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

INFOID:000000005441890

[QR25DE]



| < COMPONENT DIAGNOSIS > [QR25DE]   |    |
|--|----|
| YES >> Go to <u>EC-319, "Diagnosis Procedure"</u> .<br>NO >> INSPECTION END  | A  |
| Diagnosis Procedure  | 1  |
| 1.INSPECTION START   | EC |
| <ul> <li>With CONSULT-III</li> <li>1. Turn ignition switch ON.</li> <li>2. Select "SELF-DIAG RESULTS" mode with CONSULT-III.</li> <li>3. Touch "ERASE".</li> <li>4. Perform DTC CONFIRMATION PROCEDURE.</li> </ul> | С  |
| See <u>EC-318, "DTC Logic"</u> .   | D  |
| <ul> <li>With GST</li> <li>1. Turn ignition switch ON.</li> <li>2. Select Service \$04 with GST.</li> <li>3. Perform DTC CONFIRMATION PROCEDURE.<br/>See EC-318. "DTC Logic".</li> </ul>                           | E  |
| Is the 1st trip DTC P0605 displayed again?<br>YES >> GO TO 2.<br>NO >> INSPECTION END  | F  |
| 2.REPLACE ECM  | G  |
| <ol> <li>Replace ECM.</li> <li>Go to <u>EC-14</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".</li> </ol>   | _  |
| >> INSPECTION END  | I  |
|  | J  |
|  | K  |
|  | L  |
|  | Μ  |
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|  | 0  |
|  |    |

# P0607 ECM

# 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:000000005441893

# DTC DETECTION LOGIC

| DTC No.        | Trouble diagnosis name  | DTC detecting condition   | Possible cause |
|----------------|---|---|----------------|
| CAN controller | When detecting error during the initial diagnosis of CAN controller of ECM. | • FCM   |                |
| F0007          | HEV SYSTEM CAN controller   | When detecting error during the initial diagno-<br>sis of HEV SYSTEM CAN controller of ECM. |                |

# 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 >> Go to EC-320. "Diagnosis Procedure".
- NO >> INSPECTION END

### Diagnosis Procedure

**1**.INSPECTION START

### With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "SELF-DIAG RESULTS" mode with CONSULT-III.
- 3. Touch "ERASE".
- 4. Perform DTC CONFIRMATION PROCEDURE. See <u>EC-320, "DTC Logic"</u>.
- 5. Check DTC.

### With GST

- Turn ignition switch ON.
- 2. Select "Service \$04" with GST.
- 3. Perform DTC CONFIRMATION PROCEDURE. See <u>EC-320, "DTC Logic"</u>.
- 4. Check DTC.

Is the DTC P0607 displayed again?

- YES >> GO TO 2.
- NO >> INSPECTION END
- 2.REPLACE ECM
- 1. Replace ECM.
- 2. Go to EC-14. "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

INFOID:000000005441892

# P0643 SENSOR POWER SUPPLY

### < COMPONENT DIAGNOSIS >

# P0643 SENSOR POWER SUPPLY

# DTC Logic

Α

EC

INFOID:000000005441895

[QR25DE]

# DTC DETECTION LOGIC

| P0643   | Sensor power supply circuit short   |   | Harness or connectors   |
|---|---|---|---|
|   |   | ECM detects a voltage of power source for sensor is excessively low or high.                        | <ul> <li>(TP sensor circuit is shorted.)</li> <li>[Camshaft position sensor (PHASE) circuit is shorted.]</li> <li>Throttle position sensor</li> <li>Camshaft position sensor (PHASE)</li> </ul> |
|   | FIRMATION PROC  | CEDURE  |   |
|   | NDITIONING  |   |   |
| ing the next<br>1. Turn igr<br>2. Turn igr<br>3. Turn igr<br><b>TESTING C</b> | : test.<br>nition switch OFF an<br>nition switch ON.<br>nition switch OFF an<br><b>CONDITION:</b> | nd wait at least 10 seconds.<br>Id wait at least 10 seconds.<br>Ing procedure, confirm that battery | ays perform the following before conduct-   |
| _   | GO TO 2.  |   |   |
| 2.PERFOF  | RM DTC CONFIRMA   | ATION PROCEDURE   |   |
| 2. Depres<br>3. Check I<br>Is DTC dete  | DTC.  | dal to start engine, then keep engine   | running for at least 1 second.  |
| NO >>   | INSPECTION END  | <u>gnosis i locedure</u> .  |   |
| Diagnosi  | s Procedure   |   | INFOID:000000005441896  |
|   | GROUND CONNEC   | TION  |   |
| 2. Check g<br>Is the inspe  | ction result normal?  | E9. Refer to Ground Inspection in <u>GI-</u>  | 45, "Circuit Inspection".   |
|   | GO TO 2.<br>Repair or replace g   | round connection  |   |
| ~   | SENSOR POWER  |   |   |
|   |   | er and short to ground, between the f   | following terminals   |

| E         | CM       | Sensor                             |           |          |
|-----------|----------|------------------------------------|-----------|----------|
| Connector | Terminal | Name                               | Connector | Terminal |
| F13       | 47       | Electric throttle control actuator | F57       | 1        |
| 115       | 59       | CMP sensor (PHASE)                 | F55       | 1        |

Is the inspection result normal?

YES >> GO TO 3.

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

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# P0643 SENSOR POWER SUPPLY

< COMPONENT DIAGNOSIS >

[QR25DE]

**3.**CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-257, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace malfunctioning component.

**4.**CHECK TP SENSOR

Refer to EC-171, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

**5.**REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.

2. Go to EC-322, "Special Repair Requirement".

>> INSPECTION END

**6.**CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Special Repair Requirement

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

Refer to EC-15. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-16. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

# **P0AC4 HV MIL ON REQUEST**

# [QR25DE] < COMPONENT DIAGNOSIS > P0AC4 HV MIL ON REQUEST Description INFOID:000000005441898 This DTC is displayed when a malfunction is detected by HV ECU. EC Check DTC for HV ECU and perform the trouble diagnosis. Refer to HBC-597. "DTC Index". After repair work, erase DTC in ECM.

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# P1148 CLOSED LOOP CONTROL

DTC Logic

INFOID:000000005441899

[QR25DE]

### DTC DETECTION LOGIC NOTE: DTC P1148 is displayed with another DTC for A/F sensor 1. Perform the trouble diagnosis for the corresponding DTC.

| DTC No. | Trouble diagnosis name       | DTC detecting condition   | Possible cause  |
|---------|------------------------------|---|---|
| P1148   | Closed loop control function | The closed loop control function for bank 1 does<br>not operate even when vehicle is driving in the<br>specified condition. | <ul> <li>Harness or connectors<br/>(The A/F sensor 1 circuit is open or short-<br/>ed.)</li> <li>A/F sensor 1</li> <li>A/F sensor 1 heater</li> </ul> |

## P1195 ENGINE DOES NOT START

< COMPONENT DIAGNOSIS >

## P1195 ENGINE DOES NOT START

## **DTC Logic**

DTC DETECTION LOGIC

#### NOTE:

- If DTC P1195 is displayed with DTC P0201, P0202, P0203, P0204, first perform the trouble diagnosis for DTC P0201, P0202, P0203, P0204. Refer to <u>EC-237, "DTC Logic"</u>.
- If DTC P1195 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to <u>EC-251, "DTC Logic"</u>.
- If DTC P1195 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to <u>EC-255, "DTC Logic"</u>.
- If DTC P1195 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-318, "DTC Logic"</u>.

| DTC No. | Trouble diagnosis name | DTC detecting condition                                     | Possible cause   |        |
|---------|------------------------|---|--|--------|
| P1195   | Engine does not start  | When the engine is abnormal, and the engine does not start. | <ul> <li>Intake air leaks</li> <li>Incorrect PCV hose connection</li> <li>Mass air flow sensor</li> <li>Electric throttle control actuator</li> <li>Fuel injector</li> <li>Fuel run out</li> <li>Incorrect fuel pressure</li> <li>Spark plug</li> <li>Ignition coil</li> <li>Ignition signal circuit is open or shorted</li> <li>Insufficient compression</li> </ul> | F<br>G |

## 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 (READY).
- 2. Depress accelerator pedal and wait at least 15 seconds.
- 3. Check DTC.

## Is DTC detected?

YES >> Go to <u>EC-325</u>, "Diagnosis Procedure". NO >> INSPECTION END

## Diagnosis Procedure

- **1.**CHECK FOR INTAKE AIR LEAK
- 1. Visually check for the cause of intake air leak after the mass air flow sensor.
- 2. Check PCV hose connection.

## Intake air leak detected?

YES >> Repair or replace.

2. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.

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INFOID:000000005441900

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## P1195 ENGINE DOES NOT START

## < COMPONENT DIAGNOSIS >

- Check if foreign matter is caught between the throttle valve (1) and the housing.
  - 2. Electric throttle control actuator
  - <□ : Vehicle front

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside.
- **3.**CHECK FUEL PUMP FUNCTION

Refer to EC-386, "Component Function Check".

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Go to EC-386, "Diagnosis Procedure".

**4.**CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-147, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace mass air flow sensor.

**5.**CHECK FUEL PRESSURE

1. Check fuel pressure. Refer to EC-465, "Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

**6.** DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly".

NO >> Repair or replace

7.CHECK FUEL INJECTOR

Check fuel injector. Refer to EC-238, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace malfunctioning fuel injector.

**8.**CHECK SPARK PLUG

Check spark plug. Refer to EM-12, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Clean or replace spark plug.

 ${f 9.}$ CHECK IGNITION COIL AND CIRCUIT

Check ignition coil and circuit. Refer to EC-390. "Component Function Check".

Is the inspection result normal?

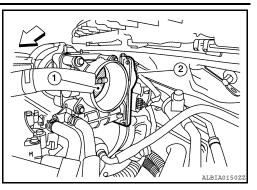
YES >> GO TO 10.

NO >> Go to EC-390, "Diagnosis Procedure".

**10.**CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-22, "Compression Pressure".

Is the inspection result normal?



#### [QR25DE]

## AND ENCINE DOES NOT START

| P1195 ENGINE DOES NOT START   |          |
|---|----------|
| < COMPONENT DIAGNOSIS >   | [QR25DE] |
| YES >> GO TO 11.  |          |
| NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.                           | A        |
| 11.CHECK SYMPTOM TABLE  |          |
| Check items on the no start symptom in <u>EC-454. "Symptom Table"</u> .<br>Is the inspection result normal? | EC       |
| YES $>>$ GO TO 12.  |          |
| NO >> Repair or replace.  | С        |
| 12. CHECK INTERMITTENT INCIDENT   | 0        |
| Refer to GI-42, "Intermittent Incident".  |          |
|   | D        |
| >> INSPECTION END   |          |
|   | E        |
|   |          |
|   | -        |
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## **P1196 POOR ENGINE POWER**

< COMPONENT DIAGNOSIS >

## P1196 POOR ENGINE POWER

## DTC Logic

INFOID:000000005441902

[QR25DE]

## DTC DETECTION LOGIC

NOTE:

- If DTC P1196 is displayed with DTC P0201, P0202, P0203, P0204, first perform the trouble diagnosis for DTC P0201, P0202, P0203, P0204. Refer to <u>EC-237, "DTC Logic"</u>.
- If DTC P1196 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to <u>EC-251, "DTC Logic"</u>.
- If DTC P1196 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to <u>EC-255, "DTC Logic"</u>.
- If DTC P1196 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-318, "DTC Logic"</u>.

ECM calculates the target torque based on the engine power request signal and the engine speed request signal sent from HV ECU.

HV ECU calculates the estimated torque based on the generator torque.

ECM compares the calculated target torque with the estimated torque sent from HV ECU.

| DTC No. | Trouble diagnosis name | DTC detecting condition   | Possible cause   |
|---------|------------------------|---|--|
| P1196   | Poor engine power      | The estimated torque is excessively low compared with the target torque | <ul> <li>Intake air leaks</li> <li>Incorrect PCV hose connection</li> <li>Mass air flow sensor</li> <li>Electric throttle control actuator</li> <li>Fuel injector</li> <li>Fuel run out</li> <li>Incorrect fuel pressure</li> <li>Spark plug</li> <li>Ignition coil</li> <li>Ignition signal circuit is open or shorted</li> <li>Insufficient compression</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.

#### Do you have CONSULT-III?

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

2. PERFORM DTC CONFIRMATION PROCEDURE

#### With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10seconds.
- 5. Turn ignition switch ON (READY).
- 6. Select "POOR ENG PWR P1196" of "ENGINE PERFORMANCE" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 7. Touch "START".
- Drive vehicle at a speed of 60 km/h (37 MPH) or more until "TESTING" on CONSULT-III changes to "COMPLETED". (It will take approximately 10 seconds.)
   CAUTION:

Always drive vehicle at a safe speed. NOTE:

## P1196 POOR ENGINE POWER

| P1196 POOR ENGINE POWER  |    |
|--|----|
| < COMPONENT DIAGNOSIS > [QR25DE]   |    |
| Keep the vehicle speed as steady as possible during the cruising.<br>9. Touch "SELF-DIAG RESULT".  | А  |
| Which is displayed on CONSULT-III?   | A  |
| OK >> INSPECTION END   |    |
| NG >> Go to <u>EC-329, "Diagnosis Procedure"</u> .   | EC |
| 3.PERFORM DTC CONFIRMATION PROCEDURE   |    |
| <ul> <li>With GST</li> <li>Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.</li> </ul>   | С  |
| <ol> <li>Turn ignition switch OFF and wait at least 10seconds.</li> <li>Turn ignition switch ON.</li> <li>Turn ignition switch OFF and wait at least 10seconds.</li> </ol>   | D  |
| <ol> <li>Turn ignition switch ON (READY).</li> <li>Drive vehicle at a speed of 60 km/h (37 MPH) or more for at least 10 seconds.</li> <li>CAUTION:</li> </ol>  | E  |
| Always drive vehicle at a safe speed.<br>NOTE:<br>Keep the vehicle speed as steady as possible during the cruising.  | F  |
| 7. Check DTC.  |    |
| Is DTC detected?<br>YES >> Go to <u>EC-329, "Diagnosis Procedure"</u> .<br>NO >> INSPECTION END  | G  |
| Diagnosis Procoduro  |    |
|  | Н  |
| 1.CHECK FOR INTAKE AIR LEAK  |    |
| <ol> <li>Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and let engine idle.</li> <li>Listen for an intake air leak after the mass air flow sensor.</li> <li>Check PCV hose connection.</li> </ol> | I  |
| Intake air leak detected?  | J  |
| YES >> Repair or replace.<br>NO >> GO TO 2.  |    |
| 2. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY   | Κ  |
| <ol> <li>Turn ignition switch OFF.</li> <li>Remove the intake air duct.</li> </ol>   |    |
| <ol> <li>Remove the intake air duct.</li> <li>Check if foreign matter is caught between the throttle valve (1) and the housing.</li> </ol>   | L  |
| 2. Electric throttle control actuator  | M  |
| Is the inspection result normal?   |    |
| YES >> GO TO 3.  | Ν  |
| NO >> Remove the foreign matter and clean the electric throttle control actuator inside.   | 0  |
| 3. CHECK FUEL PUMP FUNCTION  |    |
| Refer to EC-386, "Component Function Check".   | Р  |
| Is the inspection result normal?   | 1  |
| YES >> GO TO 4.<br>NO >> Go to <u>EC-386, "Diagnosis Procedure"</u> .  |    |
| 4 CHECK MASS AIB FLOW SENSOB   |    |

4.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-147, "Component Inspection".

Is the inspection result normal?

## P1196 POOR ENGINE POWER

[QR25DE] < COMPONENT DIAGNOSIS > YES >> GO TO 5. NO >> Replace mass air flow sensor. 5. CHECK FUEL PRESSURE 1. Check fuel pressure. Refer to EC-465, "Inspection". Is the inspection result normal? YES >> GO TO 7. NO >> GO TO 6. DETECT MALFUNCTIONING PART Check fuel hoses and fuel tubes for clogging. Is the inspection result normal? >> Replace "fuel filter and fuel pump assembly". YES NO >> Repair or replace 7. CHECK FUEL INJECTOR Check fuel injector. Refer to EC-238, "Component Inspection". Is the inspection result normal? YES >> GO TO 8. NO >> Replace malfunctioning fuel injector. 8.CHECK SPARK PLUG Check spark plug. Refer to EM-12, "Removal and Installation". Is the inspection result normal? YES >> GO TO 9. NO >> Clean or replace spark plug.  ${f 9.}$  CHECK IGNITION COIL AND CIRCUIT Check ignition coil and circuit. Refer to EC-390, "Component Function Check". Is the inspection result normal? YES >> GO TO 10. NO >> Go to EC-390, "Diagnosis Procedure". 10. CHECK COMPRESSION PRESSURE Check compression pressure. Refer to EM-22, "Compression Pressure". Is the inspection result normal? >> GO TO 11. YES NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets. **11.**CHECK SYMPTOM TABLE Check items on the lack of power symptom in EC-454, "Symptom Table". Is the inspection result normal? YES >> GO TO 12. >> Repair or replace. NO 12. CHECK INTERMITTENT INCIDENT Refer to GI-42, "Intermittent Incident". >> INSPECTION END

## P1197 FUEL RUN OUT

## < COMPONENT DIAGNOSIS >

## P1197 FUEL RUN OUT

## DTC Logic

# DTC DETECTION LOGIC **NOTE**:

This DTC may be detected if the vehicle continues turning counterclockwise over a certain speed for a length of time.

| DTC No.          | Trouble diagnosis name    | DTC detecting condition   | Possible cause                       |  |
|------------------|---------------------------|---|--------------------------------------|--|
| P1197            | Fuel run out              | Detecting condition for P1195 or P1196<br>is satisfied and low voltage from the fuel<br>level sensor is sent to ECM | Out of fuel                          |  |
| DTC CO           | VERMATION PROC            | CEDURE  |                                      |  |
| <b>1</b> .REFILI | L FUEL                    |   |                                      |  |
| Refill the f     | fuel until low fuel warn  | ing light turned OFF.   |                                      |  |
|                  |                           |   |                                      |  |
| <b>^</b>         | >> GO TO 2.               |   |                                      |  |
| <b>∠.</b> PERFC  | DRM DTC CONFIRM           | ATION PROCEDURE FOR DTC F   | ²1195                                |  |
| Perform D        | TC CONFIRMATION           | PROCEDURE for DTC P1195. R  | efer to <u>EC-325, "DTC Logic"</u> . |  |
| Is the insp      | pection result normal?    |   |                                      |  |
| -                | > GO TO 3.                |   |                                      |  |
| <b>^</b>         | So to <u>EC-325, "Dia</u> | -   |                                      |  |
| J.PERFC          | ORM DTC CONFIRM           | ATION PROCEDURE FOR DTC F   | ²1196                                |  |
| Perform D        | TC CONFIRMATION           | PROCEDURE for DTC P1196. R  | efer to <u>EC-328, "DTC Logic"</u> . |  |
| Is the insp      | pection result normal?    |   |                                      |  |
| -                | > INSPECTION END          |   |                                      |  |
| NO >             | So to <u>EC-329, "Dia</u> | <u>gnosis Procedure"</u> .  |                                      |  |
|                  |                           |   |                                      |  |

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## < COMPONENT DIAGNOSIS >

## P1217 ENGINE OVER TEMPERATURE

## DTC Logic

## DTC DETECTION LOGIC

#### NOTE:

- If DTC P1217 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1217 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-320, "DTC Logic"</u>.

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

| DTC No. | Trouble diagnosis name                  | DTC detecting condition   | Possible cause  |
|---------|---|---|---|
| P1217   | Engine over tempera-<br>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<br/>(The cooling fan circuit is open or short-<br/>ed.)</li> <li>IPDM E/R</li> <li>Cooling fan relays-1</li> <li>Cooling fan motors</li> <li>Radiator hose</li> <li>Radiator</li> <li>Radiator cap</li> <li>Reservoir tank</li> <li>Water pump</li> <li>Thermostat</li> <li>Water control valve</li> </ul> |

#### **CAUTION:**

When a malfunction is indicated, be sure to replace the coolant. Refer to <u>MA-13</u>, <u>"ENGINE COOLANT :</u> <u>Changing Engine Coolant"</u>. Also, replace the engine oil. Refer to <u>MA-18</u>, <u>"ENGINE OIL : Changing Engine Oil"</u>.

- 1. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to <u>MA-11, "Fluids and Lubricants"</u>.
- 2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

#### DTC CONFIRMATION PROCEDURE

## **1.**PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-332, "Component Function Check".

#### NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-333, "Diagnosis Procedure".

#### Component Function Check

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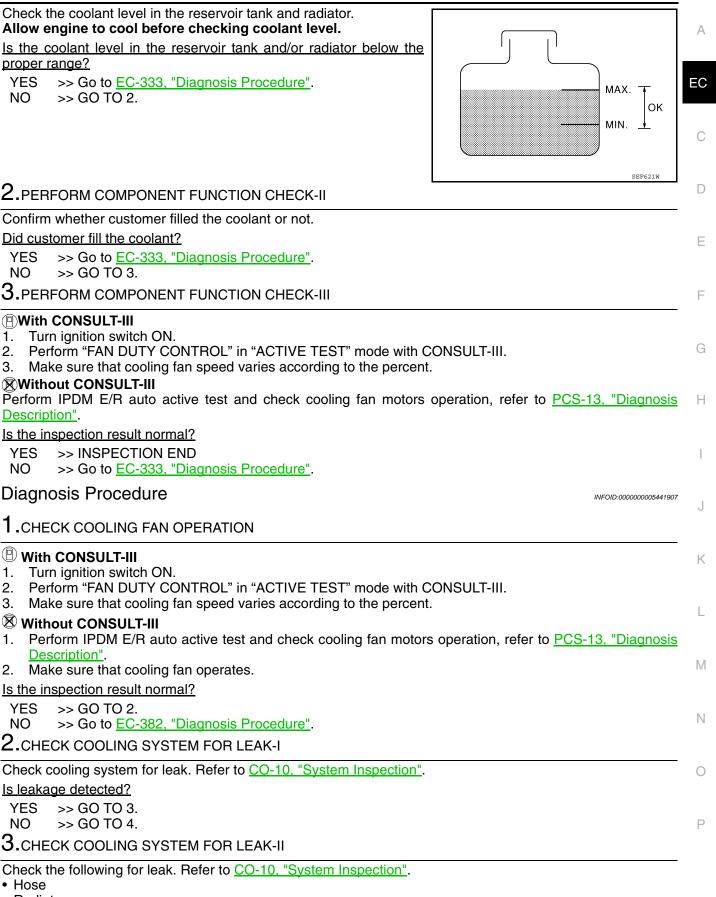
**1.**PERFORM COMPONENT FUNCTION CHECK-I

#### WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

[QR25DE]



- Radiator
- Water pump

< COMPONENT DIAGNOSIS >

< COMPONENT DIAGNOSIS >

>> Repair or replace malfunctioning part.

## 4.CHECK RADIATOR CAP

Check radiator cap. Refer to CO-14, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace radiator cap.

**5.**CHECK THERMOSTAT

Check thermostat. Refer to CO-19. "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace thermostat.

6.CHECK WATER CONTROL VALVE

Check water control valve. Refer to CO-21, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace water control valve

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-167. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace engine coolant temperature sensor.

8. CHECK MAIN 13 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-11, "Fluids and Lubrica   | ants"   |
| -                 | 3    | Coolant level  | Visual                                       | Coolant up to MAX level in reservoir tank and radiator filler neck | MA-13, "ENGINE COOL-<br>ANT : Changing Engine<br>Coolant" |
|                   | 4    | Radiator cap   | Pressure tester                              | CO-14, "Removal and Inst   | allation"   |
| ON⁺²              | 5    | Coolant leaks  | Visual                                       | No leaks   | CO-10, "System Inspec-<br>tion"                           |
| ON⁺ <sup>2</sup>  | 6    | Thermostat   | Touch the upper and<br>lower radiator hoses  | Both hoses should be hot   | CO-19, "Removal and In-<br>stallation"                    |
| ON* <sup>1</sup>  | 7    | Cooling fan motor  | CONSULT-III                                  | Operating  | EC-382, "Component<br>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-<br>ervoir tank  | Visual                                       | No overflow during driving and idling                              | CO-10, "System Inspec-<br>tion"                           |
| OFF* <sup>4</sup> | 10   | Coolant return from res-<br>ervoir tank to radiator  | Visual                                       | Should be initial level in reservoir tank                          | CO-10, "System Inspec-<br>tion"                           |
| OFF               | 11   | Water control valve  | Remove and inspect<br>the valve              | Within the specified value   | CO-21, "Removal and In-<br>stallation"                    |

#### < COMPONENT DIAGNOSIS >

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| Engine      | Step          | Inspection item                 | Equipment   | Standard  | Reference page                           | ٨  |
|-------------|---------------|---------------------------------|---|---|--|----|
| OFF         | 12            | Cylinder head                   | <ul> <li>Straight gauge feeler<br/>gauge</li> </ul> | 0.1 mm (0.004 in) Maxi-<br>mum distortion (warping) | EM-66, "Inspection After<br>Disassembly" | A  |
|             | 13            | Cylinder block and pis-<br>tons | Visual  | No scuffing on cylinder walls or piston             | EM-84, "Inspection After<br>Disassembly" | EC |
| *1: Turn th | e ignition sv | vitch ON.                       |   |   |  |    |

\*2: Engine running at 2,500 rpm for 10 minutes.

\*3: Drive at 90 km/h (56 MPH) for 30 minutes and then let idle for 10 minutes.

\*4: After 60 minutes of cool down time.

For more information, refer to <u>CO-8, "Troubleshooting Chart"</u>.

#### >> INSPECTION END

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## < COMPONENT DIAGNOSIS >

## P1225 TP SENSOR

## Description

DTC Logic

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

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

#### 

## DTC DETECTION LOGIC

INFOID:000000005441909

| DTC No. | Trouble diagnosis name                        | DTC detecting condition                                     | Possible cause  |
|---------|---|---|---|
| P1225   | Closed throttle position learning performance | Closed throttle position learning value is excessively low. | Electric throttle control actuator<br>(TP sensor 1 and 2) |

## 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.

#### TESTING CONDITION:

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

>> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

- 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.

## Is 1st trip DTC detected?

- YES >> Go to EC-336, "Diagnosis Procedure".
- NO >> INSPECTION END

## **Diagnosis Procedure**

#### INFOID:000000005441910

## **1.**CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Turn ignition switch OFF.
- 2. Remove the intake air duct.

## P1225 TP SENSOR

## < COMPONENT DIAGNOSIS >

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- 3. Check if foreign matter is caught between the throttle valve (1) and the housing.
  - 2. Electric throttle control actuator
  - <□ : Vehicle front

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

 $2. {\tt REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR}$ 

- 1. Replace electric throttle control actuator.
- 2. Go to EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

| >> INSPECTION END   |                        |   |
|---|------------------------|---|
| Special Repair Requirement  | INFOID:000000005441911 | F |
| <b>1.</b> PERFORM THROTTLE VALVE CLOSED POSITION LEARNING                         |                        |   |
| Refer to EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Require | ement"                 | G |
| >> GO TO 2.   |                        | Н |
| 2.PERFORM IDLE AIR VOLUME LEARNING  |                        | 1 |
| Refer to EC-16, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"           |                        | 1 |
| >> END  |                        |   |
|   |                        | J |
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|   |                        | K |
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## < COMPONENT DIAGNOSIS >

## P1226 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.

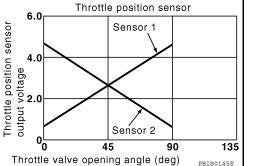
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

## DTC Logic

## DTC DETECTION LOGIC

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|----------------------|----|
|                      |    |

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INFOID:000000005441913

| DTC No. | Trouble diagnosis name                        | DTC detecting condition   | Possible cause  |
|---------|---|---|---|
| P1226   | Closed throttle position learning performance | Closed throttle position learning is not per-<br>formed successfully, repeatedly. | Electric throttle control actuator<br>(TP sensor 1 and 2) |

## 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.

#### **TESTING CONDITION:**

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

>> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Repeat steps 2 and 3 for 32 times.
- 5. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-338, "Diagnosis Procedure".

NO >> INSPECTION END

## Diagnosis Procedure

INFOID:000000005441914

## **1.**CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Turn ignition switch OFF.
- 2. Remove the intake air duct.

## P1226 TP SENSOR

#### < COMPONENT DIAGNOSIS >

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- 3. Check if foreign matter is caught between the throttle valve (1) and the housing.
  - 2. Electric throttle control actuator

Is the inspection result normal?

YES >> GO TO 2.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

 $2. {\tt REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR}$ 

- 1. Replace electric throttle control actuator.
- 2. Go to EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

| >> INSPECTION END   |                        |   |
|---|------------------------|---|
| Special Repair Requirement  | INFOID:000000005441915 | F |
| <b>1.</b> PERFORM THROTTLE VALVE CLOSED POSITION LEARNING                         |                        |   |
| Refer to EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Require | ement"                 | G |
| >> GO TO 2.   |                        | Н |
| 2.PERFORM IDLE AIR VOLUME LEARNING  |                        |   |
| Refer to EC-16, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"           |                        | 1 |
| >> END  |                        | 1 |
|   |                        | J |
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## P1421 COLD START CONTROL

## Description

ECM controls ignition timing and engine speed when engine is started with prewarming up condition. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

## DTC Logic

NOTE:

## DTC DETECTION LOGIC

## If DTC P1421 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

| DTC No. | Trouble diagnosis name                            | DTC detecting condition   | Possible cause  |
|---------|---|---|---|
| P1421   | Cold start emission reduction strategy monitoring | ECM does not control ignition timing and engine<br>speed properly when engine is started with pre-<br>warming up condition. | <ul><li>Lack of intake air volume</li><li>Fuel injection system</li><li>ECM</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.

#### TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

#### >> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

#### With CONSULT-III

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Set selector lever to P position.
- 3. Turn ignition switch ON.
- 4. Make sure that air conditioner switch and electric load switches (lights, heater fan, rear window defogger) are OFF.
- 5. Select "DATA MONITOR" mode with CONSULT-III.
- Check that the "COOLAN TEMP/S" indication is between 4°C (39°F) and 36°C (97°F). If "COOLAN TEMP/S" indication is within the specified value, go to the following step. If "COOLAN TEMP/S" indication is out of the specified value, cool engine down or warm engine up and go to step 1.
- 7. Confirm that the "SOC" indication in "DATA MONITOR" mode of "HYBRID SYSTEM" is between 40 and 70 %.
- 8. Turn ignition switch ON (READY) and wait for 70 seconds.
- 9. Check 1st trip DTC.

#### With GST

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Set selector lever to P position.
- 3. Turn ignition switch ON.
- 4. Make sure that air conditioner switch and electric load switches (lights, heater fan, rear window defogger) are OFF.
- 5. Check engine coolant temperature with Service \$01 of GST and confirm that the indication is between 4°C (39°F) and 36°C (97°F).

If the indication is within the specified value, go to the following step.

If the indication is out of the specified value, cool engine down or warm engine up and go to step 1.

INFOID:000000005441916

## P1421 COLD START CONTROL

#### < COMPONENT DIAGNOSIS >

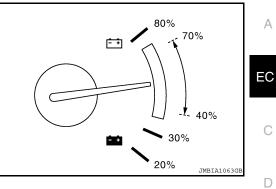
## [QR25DE]

- 6. Check high voltage battery status meter in combination meter and confirm that the indication is between 40 and 70 % as shown in the figure.
- 7. Turn ignition switch ON (READY) and wait for 70 seconds.
- 8. Check 1st trip DTC.

## Is 1st trip DTC detected?

.

- YES >> Go to EC-341, "Diagnosis Procedure".
- NO >> INSPECTION END



Diagnosis Procedure

INFOID:000000005441918

| <b>1</b> .PERFORM IDLE AIR VOLUME LEARNING   | E   |
|--|-----|
| Perform EC-16, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".  |     |
| Is Idle Air Volume Learning carried out successfully?  |     |
| YES >> GO TO 2.  | F   |
| 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.  | G   |
| Crushed intake air passage   |     |
| Intake air passage clogging     In the inerception result normal?  | Н   |
| <u>Is the inspection result normal?</u><br>YES >> GO TO 3.   |     |
| NO >> Repair or replace malfunctioning part  |     |
| 3. CHECK FUEL INJECTION SYSTEM FUNCTION  |     |
|  |     |
| Perform DTC CONFIRMATION PROCEDURE for DTC P0171. Refer to <u>EC-224, "DTC Logic"</u> .  |     |
| Is the inspection result normal?   | J   |
| YES >> GO TO 4.<br>NO >> Go to <u>EC-225, "Diagnosis Procedure"</u> for DTC P0171.   |     |
| 4. PERFORM DTC CONFIRMATION PROCEDURE  | Κ   |
|  |     |
| With CONSULT-III  Understand Strength |     |
| <ol> <li>Turn ignition switch ON.</li> <li>Select "SELF DIAG RESULTS" mode with CONSULT-III.</li> </ol>  | L   |
| 3. Touch "ERASE".  |     |
| 4. Perform DTC CONFIRMATION PROCEDURE.   |     |
| See <u>EC-340, "DTC Logic"</u> .<br>(a) With GST   | Μ   |
| 1. Turn ignition switch ON.  |     |
| 2. Select Service \$04 with GST.   | Ν   |
| 3. Perform DTC CONFIRMATION PROCEDURE.   | 1.4 |
| See <u>EC-340. "DTC Logic"</u> .   |     |
| Is the 1st trip DTC P1421 displayed again?   | 0   |
| YES >> GO TO 5.<br>NO >> INSPECTION END  |     |
| 5. REPLACE ECM   |     |
|  | Ρ   |
| <ol> <li>Replace ECM.</li> <li>Go toEC-14, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Require-</li> </ol>  |     |
| 2. do to <u>EO-14, ADDITIONAL OETITIOE WHEN HET EAGING CONTINCE ONT : opecial riegali riegali e-</u>   |     |

<u>ment"</u>.

>> INSPECTION END

< COMPONENT DIAGNOSIS >

## P1564 ASCD STEERING SWITCH

## Description

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated. Refer to EC-45, "System Description" for the ASCD function.

## DTC Logic

## DTC DETECTION LOGIC

#### NOTE:

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-318, "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<br/>(The switch circuit is open or shorted.)</li> <li>ASCD steering switch</li> <li>ECM</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 10 seconds.
- 2. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 3. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 5. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 6. Check DTC.
- Is DTC detected?
- YES >> Go to EC-342, "Diagnosis Procedure".
- NO >> INSPECTION END

## **Diagnosis** Procedure

## **1**.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E9. Refer to Ground Inspection in <u>GI-45, "Circuit Inspection"</u>.

## Is the inspection result normal?

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

2. CHECK ASCD STEERING SWITCH CIRCUIT

## With CONSULT-III

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## P1564 ASCD STEERING SWITCH

< COMPONENT DIAGNOSIS >

#### 1. Turn ignition switch ON.

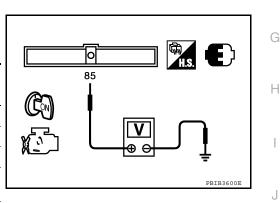
- Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW" and "SET SW" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check each item indication under the following conditions.

| Monitor item  | Condition                | Indication |     |
|---------------|--------------------------|------------|-----|
| MAIN SW       | MAIN switch              | Pressed    | ON  |
| MAIN 3W       |                          | Released   | OFF |
| CANCEL SW     | CANCEL switch            | Pressed    | ON  |
|               |                          | Released   | OFF |
| RESUME/ACC SW | RESUME/ACCELERATE switch | Pressed    | ON  |
| RESUME/ACC SW | TESOWE/ACCELENATE SWICH  | Released   | OFF |
| SET SW        | SET/COAST switch         | Pressed    | ON  |
|               |                          | Released   | OFF |

#### **Without CONSULT-III**

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

| ECM       |   | Ground      | Condition                               | Voltage     |
|-----------|---|-------------|---|-------------|
| Connector | Terminal  | Ground      | Condition                               | voltage     |
|           | 85<br>(ASCD<br>steering Ground<br>switch sig-<br>nal) |             | MAIN switch: Pressed                    | Approx. 0 V |
| E10       |   |             | CANCEL switch: Pressed                  | Approx. 1 V |
|           |   |             | SET/COAST switch: Pressed               | Approx. 2 V |
|           |   | switch sig- | RESUME/ACCELERATE<br>switch: Pressed    | Approx. 3 V |
|           |   |             | All ASCD steering switches:<br>Released | Approx. 4 V |



#### Is the inspection result normal?

YES >> GO TO 8.

 ${f 3.}$  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 M88.

4. Check the continuity between combination switch and ECM harness connector.

| Combination<br>switch | EC        | CM       | Continuity |
|-----------------------|-----------|----------|------------|
| Terminal              | Connector | Terminal |            |
| 16                    | E10       | 92       | Existed    |

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

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

#### **4.**DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M1, E30

Combination switch (spiral cable)

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## P1564 ASCD STEERING SWITCH

#### < COMPONENT DIAGNOSIS >

· Harness for open and short between ECM and combination switch

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

5. Check ascd steering switch input signal circuit for open and short

1. Check the continuity between ECM harness connector and combination switch.

| Combination<br>switch | ECM       |          | Continuity |
|-----------------------|-----------|----------|------------|
| Terminal              | Connector | Terminal | *          |
| 13                    | E10       | 85       | 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 M1, E30

• Combination switch (spiral cable)

• Harness for open and short between ECM and combination switch

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

## 7. CHECK ASCD STEERING SWITCH

Refer to EC-344, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace ASCD steering switch.

**8.**CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

#### Component Inspection

INFOID:000000005441922

## **1.**CHECK ASCD STEERING SWITCH

- 1. Disconnect combination switch (spiral cable) harness connector M88
- 2. Check the continuity between combination switch harness connector terminals under following conditions.

| Combination meter |           | Condition                            | Desistance           |  |
|-------------------|-----------|--------------------------------------|----------------------|--|
| Connector         | Terminals | Condition                            | Resistance           |  |
|                   |           | MAIN switch: Pressed                 | Approx. 0 Ω          |  |
| M88               | 13 and 16 | CANCEL switch: Pressed               | Approx. 250 $\Omega$ |  |
|                   |           | SET/COAST switch: Pressed            | Approx. 660 Ω        |  |
|                   |           | RESUME/ACCELERATE switch:<br>Pressed | Approx. 1,480 Ω      |  |
|                   |           | All ASCD steering switches: Released | Approx. 4,000 Ω      |  |

| 88.      |             |
|----------|-------------|
| <b>1</b> |             |
|          |             |
| Ω        | JMBIA1625ZZ |
|          |             |

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch

## < COMPONENT DIAGNOSIS >

## 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 and hybrid vehicle control ECU detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to <u>EC-45</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-318, "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 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<br/>(The stop lamp switch circuit is shorted.)</li> <li>Harness or connectors<br/>(The ASCD brake switch circuit is shorted.)</li> </ul>  | G |
| P1572   | ASCD brake switch      | B) | ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.  | <ul> <li>Harness or connectors</li> <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> | Γ |

## 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.

#### TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If this test is conducted with the drive wheels lifted, activate "INPSECTION MODE 1" (<u>HBC-104</u>). If a road test is expected to be easier, it is unnecessary to lift up the vehicle. NOTE:

Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

#### >> GO TO 2.

## **2.** PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Turn ignition switch ON (READY).
- 2. Press MAIN switch and make sure that CRUISE indicator is displayed in combination meter.
- 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.

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Shift lever

More than 30 km/h (19 mph) Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-346, "Diagnosis Procedure".

NO >> GO TO 3.

**3.** PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Turn ignition ON (READY) and drive the vehicle for at least 5 consecutive seconds under the following conditions.

#### CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

| VHCL SPEED SE    | More than 30 km/h (19 mph)   |
|------------------|--|
| Selector lever   | Suitable position  |
| Driving location | Depress the brake pedal for more than<br>five seconds so as not to come off from<br>the above-mentioned vehicle speed. |

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

Is 1st trip DTC detected?

YES >> Go to EC-346, "Diagnosis Procedure".

NO >> INSPECTION END

## Diagnosis Procedure

## **1.**CHECK OVERALL FUNCTION-I

## (B) With CONSULT-III

Turn ignition switch ON.

- 2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "BRAKE SW1" indication under the following conditions.

| Monitor item          | Condition   |                    | Indication |
|-----------------------|-------------|--------------------|------------|
| BRAKE SW1 Brake pedal | Brake pedal | Slightly depressed | OFF        |
|                       | Diake pedal | Fully released     | ON         |

#### **Without CONSULT-III**

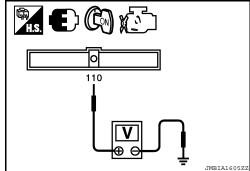
1. Turn ignition switch ON.

Check the voltage between ECM harness connector and ground.

| ECM       |                                   | Ground        | Condition          |                 | Voltage |
|-----------|-----------------------------------|---------------|--------------------|-----------------|---------|
| Connector | Terminal                          | around        | Cono               |                 | voltage |
| E10       | 110<br>(ASCD brake                |               | Slightly depressed | Approx. 0V      |         |
| E10       | (ASCD brake Ground switch signal) | Brake pedal - | Fully<br>released  | Battery voltage |         |

#### Is the inspection result normal?

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



#### < COMPONENT DIAGNOSIS >

## 2. CHECK OVERALL FUNCTION-II

#### (P) With CONSULT-III

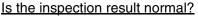
Select "BRAKE SW2" and check indication in "DATA MONITOR" mode.

| Monitor item          | Con         | Indication         |     |
|-----------------------|-------------|--------------------|-----|
| BRAKE SW2 Brake pedal | Brako podal | Slightly depressed | ON  |
|                       | Diake pedal | Fully released     | OFF |

#### Without CONSULT-III

Check the voltage between ECM harness connector and ground.

| ECM       |                   | Ground             | Conc               | lition            | Voltage    |
|-----------|-------------------|--------------------|--------------------|-------------------|------------|
| Connector | Terminal          | Ground Condi       |                    |                   | voltage    |
| E10       | 106<br>(Stop lamp | Ground Brake pedal | Slightly depressed | Battery voltage   |            |
| EIU       | switch signal)    |                    | und Brake pedar    | Fully<br>released | Approx. 0V |



YES >> GO TO 13.

NO >> GO TO 8.

## **3.**CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ASCD brake switch harness connector and ground.

| ASCD bra  | ASCD brake switch |        | Voltage         |  |
|-----------|-------------------|--------|-----------------|--|
| Connector | Terminal          | Ground | voltage         |  |
| E37       | 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 E6
- Junction block connector E46, E48
- 10A fuse (No.3)
- Harness for open or short between ASCD brake switch and fuse

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

## 5. Check ascd brake switch input signal circuit for open and short

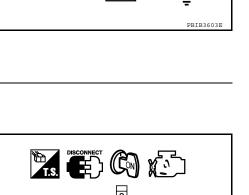
1. Turn ignition switch OFF.

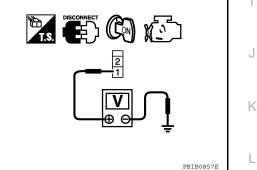
2. Disconnect ECM ASCD harness connector.

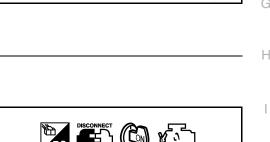
Check the continuity between ASCD brake switch harness connector and ECM harness connector. 3.

| ASCD brake switch |          | ECM                |     | Continuity |
|-------------------|----------|--------------------|-----|------------|
| Connector         | Terminal | Connector Terminal |     | Continuity |
| E37               | 2        | E10                | 110 | Existed    |

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







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< COMPONENT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

Junction block connector E45, E46

Harness for open or short between ASCD brake switch and ECM

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

7.CHECK ASCD BRAKE SWITCH

Refer to EC-349, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace ASCD brake switch.

**8.**CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- Check the voltage between stop lamp switch harness connector and ground.

| Stop lan  | np switch | Ground | Voltage         |
|-----------|-----------|--------|-----------------|
| Connector | Terminal  | Ground | vollage         |
| E38       | 1         | Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 9.

 $\sim >> GO TO 9.$ 

## 9. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E6
- 10A fuse (No.7)
- · Harness for open or short between stop lamp switch and battery

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

## 10. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.

2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

| ECM       |          | Stop lamp switch   |   | Continuity |
|-----------|----------|--------------------|---|------------|
| Connector | Terminal | Connector Terminal |   | Continuity |
| E10       | 106      | E38                | 2 | Existed    |

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

#### Is the inspection result normal?

YES >> GO TO 12.

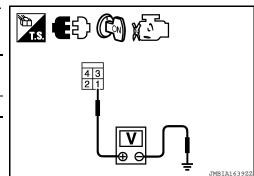
NO >> GO TO 11.

**11.** DETECT MALFUNCTIONING PART

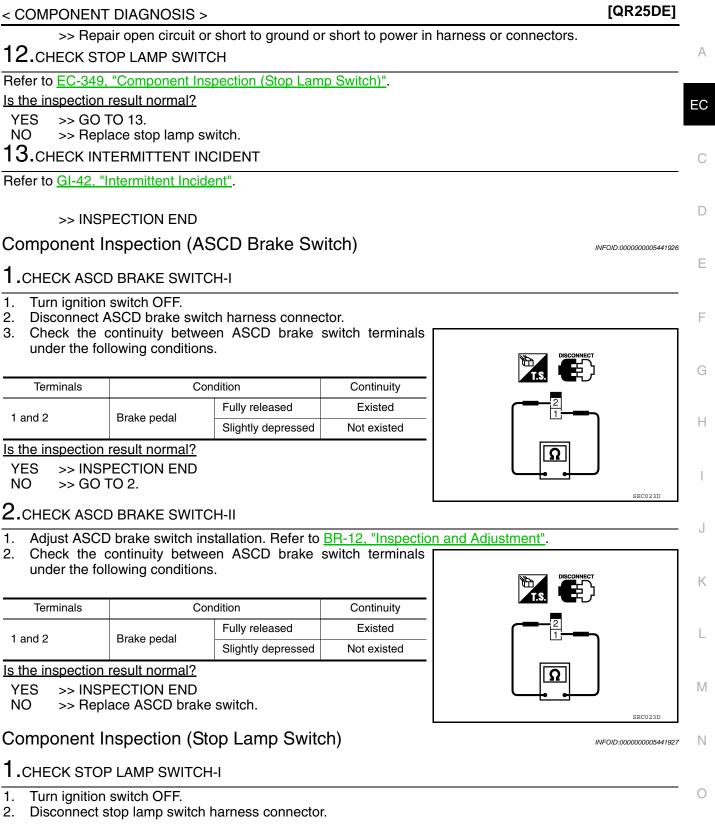
#### Check the following.

• Fuse block (J/B) connector E6

• Harness for open or short between ECM and stop lamp switch



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#### < COMPONENT DIAGNOSIS >

3. Check the continuity between stop lamp switch terminals under the following conditions.

| Terminals | Condition   |                    | Continuity  |
|-----------|-------------|--------------------|-------------|
| 1 and 2   | Brake pedal | Fully released     | Not existed |
| i and z   |             | Slightly depressed | Existed     |

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

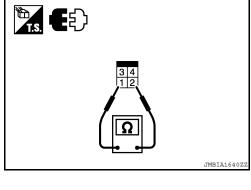
## 2.CHECK STOP LAMP SWITCH-II

- 1. Adjust stop lamp switch installation. Refer to <u>BR-12, "Inspection and Adjustment"</u>.
- 2. Check the continuity between stop lamp switch terminals under the following conditions.

| Terminals     | Condition   |                    | Continuity  |
|---------------|-------------|--------------------|-------------|
| 1 and 2 Brake | Brake pedal | Fully released     | Not existed |
|               | Diake pedal | Slightly depressed | Existed     |

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace stop lamp switch.



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# Adjustment".

# np switch terminals under

## P1574 ASCD VEHICLE SPEED SENSOR

## < COMPONENT DIAGNOSIS >

## P1574 ASCD VEHICLE SPEED SENSOR

## Description

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from hybrid vehicle ECU, and the other is from brake ECU. The ECM uses these signals for ASCD control. Refer to <u>EC-45, "System Description"</u> for ASCD functions.

## DTC Logic

DTC DETECTION LOGIC

#### NOTE:

- If DTC P1574 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to <u>EC-310, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-318, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-318, "DTC Logic"</u>.

| DTC No. | Trouble diagnosis<br>name | DTC detecting condition   | Possible cause  | G |
|---------|---------------------------|---|---|---|
| P1574   | ASCD vehicle speed sensor | ECM detects a difference between two vehicle speed signals is out of the specified range. | <ul> <li>Harness or connectors<br/>(The CAN communication line is open or<br/>shorted.)</li> <li>Hybrid vehicle control ECU</li> <li>Brake ECU</li> </ul> | Н |

## 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.

TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If this test is conducted with the drive wheels lifted, activate "INPSECTION MODE 1" (<u>HBC-104</u>). If a road test is expected to be easier, it is unnecessary to lift up the vehicle.

| >> GO TO 2.   |    |
|---|----|
| 2.PERFORM DTC CONFIRMATION PROCEDURE  | Μ  |
| <ol> <li>Turn ignition switch ON (READY).</li> <li>Drive the vehicle at more than 40 km/h (25 MPH).<br/>CAUTION:</li> </ol> | N  |
| Always drive vehicle at a safe speed.<br>3. Check DTC.  |    |
| Is DTC detected?  | 0  |
| YES >> Go to <u>EC-351, "Diagnosis Procedure"</u> .<br>NO >> INSPECTION END   | D  |
| Diagnosis Procedure   | 10 |
| 1. CHECK DTC WITH HYBRID VEHICLE CONTROL ECU  |    |
| Refer to HBC-597, "DTC Index".  | -  |

## Is the inspection result normal?

YES >> GO TO 2.

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NO >> Repair or replace. 2.CHECK BARAKE ECU

Refer to BRC-143, "DTC Index".

>> INSPECTION END

## P1805 BRAKE SWITCH

## Description

INFOID:000000005441931

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Brake switch signal is applied to the ECM and hybrid vehicle control ECU through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

## DTC Logic

INFOID:000000005441932

## DTC DETECTION LOGIC

| DTC No.  | Trouble diagnosis name   | DTC detecting  | condition                             | Possible cause  |
|--|--|--|---------------------------------------|---|
| P1805  | Brake switch   | A brake switch signal is no<br>tremely long time while the           |                                       | <ul> <li>Harness or connectors<br/>(Stop lamp switch circuit is open or short-<br/>ed.)</li> <li>Stop lamp switch</li> </ul>  |
| DTC CON  | IFIRMATION PROCI   | EDURE  |                                       |   |
| <b>1</b> .PERFO  | RM DTC CONFIRMAT   | ION PROCEDURE  |                                       |   |
| 2. Fully d<br>3. Erase<br>4. Check<br><u>Is 1st trip E</u><br>YES >:<br>NO >:                | gnition switch ON.<br>lepress the brake peda<br>the DTC with CONSU<br>. 1st trip DTC.<br><u>DTC detected?</u><br>> Go to <u>EC-353, "Diag</u><br>> INSPECTION END<br>is Procedure  | _T-III.  | ls.                                   |   |
| _  |  |  |                                       | INFOID:0000000544193  |
| I.CHECK  | STOP LAMP SWITCH   | H CIRCUIT  |                                       |   |
|  | nition switch OFF.<br>the stop lamp when d   | epressing and releasir   | ng the brake peda                     | al.   |
|  |  |  |                                       |   |
|  | Brake pedal  | Stop lam   | р                                     |   |
|  | Brake pedal<br>Fully released  | Stop lam<br>Not illumina   |                                       |   |
|  | Fully released   |  | ated                                  |   |
| Is 1st trip [<br>YES >><br>NO >><br>2.CHECK<br>1. Turn ig                                    | Fully released<br>Slightly depressed<br><u>OTC detected?</u><br>> GO TO 4.<br>> GO TO 2.<br>C STOP LAMP SWITCI<br>gnition switch OFF.  | Not illumina<br>Illuminate   | ated<br>ed                            |   |
| Is 1st trip [<br>YES >:<br>NO >:<br>2.CHECK<br>1. Turn iç<br>2. Discor                       | Fully released<br>Slightly depressed<br><u>DTC detected?</u><br>> GO TO 4.<br>> GO TO 2.<br>C STOP LAMP SWITCH<br>gnition switch OFF.<br>Innect stop lamp switch<br>the voltage between s  | Not illumina<br>Illuminate<br>I POWER SUPPLY C<br>harness connector. | IRCUIT                                | <b>X. E</b> D (N) XIII  |
| Is 1st trip E<br>YES >:<br>NO >:<br>2.CHECK<br>1. Turn ig<br>2. Discor<br>3. Check<br>and gr | Fully released<br>Slightly depressed<br><u>OTC detected?</u><br>> GO TO 4.<br>> GO TO 2.<br>STOP LAMP SWITCH<br>gnition switch OFF.<br>nnect stop lamp switch<br>the voltage between so<br>ound.<br>Stop lamp switch   | Not illumina<br>Illuminate<br>I POWER SUPPLY C<br>harness connector. | IRCUIT                                |   |
| Is 1st trip [<br>YES >:<br>NO >:<br>2.CHECK<br>1. Turn iç<br>2. Discor<br>3. Check<br>and gr | Fully released         Slightly depressed         DTC detected?         > GO TO 4.         > GO TO 2.         C STOP LAMP SWITCH         gnition switch OFF.         nnect stop lamp switch         the voltage between sound.         Stop lamp switch         stop lamp switch         ctor       Terminal | Not illumina<br>Illuminate   | ated<br>ed<br>IRCUIT<br>ess connector | ★ Con x |

## P1805 BRAKE SWITCH

< COMPONENT DIAGNOSIS >

## 3. DETECT MALFUNCTIONING PART

Check the following.

Fuse block (J/B) connector E6

10A fuse (No. 7)

· Harness for open or short between stop lamp switch and battery

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

## 4. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.

2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

| EC        | ECM      |           | Stop lamp switch |            |
|-----------|----------|-----------|------------------|------------|
| Connector | Terminal | Connector | Terminal         | Continuity |
| E10       | 106      | E38       | 2                | 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.

• Fuse block (J/B) connector E6

Harness for open or short between ECM and stop lamp switch

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

**6.**CHECK STOP LAMP SWITCH

Refer to EC-354, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace stop lamp switch.

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Stop Lamp Switch)

**1.**CHECK STOP LAMP SWITCH-I

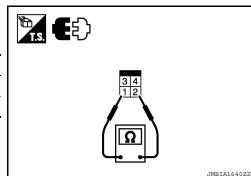
- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- Check the continuity between stop lamp switch terminals under the following conditions.

| Terminals | Con         | Continuity         |             |
|-----------|-------------|--------------------|-------------|
| 1 and 2   | Brake pedal | Fully released     | Not existed |
|           | Diake pedal | Slightly depressed | Existed     |

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.



## P1805 BRAKE SWITCH

## < COMPONENT DIAGNOSIS >

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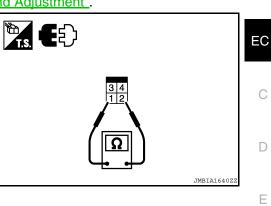


- 1. Adjust stop lamp switch installation. Refer to BR-12, "Inspection and Adjustment".
- Check the continuity between stop lamp switch terminals under the following conditions.

| Terminals   | Con         | Continuity         |             |
|-------------|-------------|--------------------|-------------|
| 1 and 2 Bra | Brake pedal | Fully released     | Not existed |
| T and 2     | Diake pedal | Slightly depressed | Existed     |

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace stop lamp switch.



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## P2100, P2103 THROTTLE CONTROL MOTOR RELAY

#### < COMPONENT DIAGNOSIS >

## P2100, P2103 THROTTLE CONTROL MOTOR RELAY

## Description

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[QR25DE]

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

## DTC Logic

INFOID:000000005441936

## DTC DETECTION LOGIC

| DTC No. | Trouble diagnosis name                     | DTC detecting condition  | Possible cause  |
|---------|--|--|---|
| P2100   | Throttle control motor relay circuit open  | ECM detects a voltage of power source for throttle control motor is excessively low. | <ul> <li>Harness or connectors<br/>(Throttle control motor relay circuit is<br/>open)</li> <li>Throttle control motor relay</li> </ul>    |
| P2103   | Throttle control motor relay circuit short | ECM detect the throttle control motor relay is stuck ON.                             | <ul> <li>Harness or connectors<br/>(Throttle control motor relay circuit is<br/>shorted)</li> <li>Throttle control motor relay</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.

#### **TESTING CONDITION:**

#### Before performing the following procedure, confirm that battery voltage is more than 8V.

Witch DTC is detected?

P2100 >> GO TO 2.

P2103 >> GO TO 3.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100

1. Turn ignition switch ON and wait at least 2 seconds.

- 2. Turn ignition switch ON (READY).
- 3. Depress the accelerator pedal to start engine, then keep engine running for at least 5 seconds.
- 4. Check DTC.

#### Is DTC detected?

- YES >> Go to EC-356, "Diagnosis Procedure".
- NO >> INSPECTION END

## **3.**PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

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

#### Is DTC detected?

- YES >> Go to EC-356, "Diagnosis Procedure".
- NO >> INSPECTION END

## **Diagnosis** Procedure

## **1.**CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

## P2100, P2103 THROTTLE CONTROL MOTOR RELAY

#### < COMPONENT DIAGNOSIS >

- 2. Disconnect ECM harness connector.
- 3. Disconnect IPDM E/R harness connector F10.
- 4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

| ECM       |          | IPDM E/R  |          | Continuity |
|-----------|----------|-----------|----------|------------|
| Connector | Terminal | Connector | Terminal | Continuity |
| F14       | 15       | F10       | 70       | Existed    |

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

Is the inspection result normal?

YES >> GO TO 2.

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

## 2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

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

| ECM       |          | IPDM E/R  |          | Continuity |
|-----------|----------|-----------|----------|------------|
| Connector | Terminal | Connector | Terminal | Continuity |
| F14       | 2        | F10       | 54       | Existed    |

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

Is the inspection result normal?

YES >> GO TO 3.

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

## **3.**CHECK FUSE

1. Disconnect 15A fuse (No. 43) from IPDM E/R.

2. Check 15A fuse for blown.

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace 15A fuse.

**4.**CHECK INTERMITTENT INCIDENT

#### Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace harness or connectors.

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## **P2101 ELECTRIC THROTTLE CONTROL FUNCTION**

#### < COMPONENT DIAGNOSIS >

## P2101 ELECTRIC THROTTLE CONTROL FUNCTION

## Description

INFOID:000000005441938

[QR25DE]

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

## DTC Logic

INFOID:000000005441939

## DTC DETECTION LOGIC

#### NOTE:

# If DTC P2101 is displayed with DTC P2100 or P2119, first perform the trouble diagnosis for DTC P2100 or P2119. Refer to <u>EC-356, "DTC Logic"</u> or <u>EC-365, "DTC Logic"</u>.

| DTC No. | Trouble diagnosis name                | DTC detecting condition  | Possible cause  |
|---------|---------------------------------------|--|---|
| P2101   | Electric throttle control performance | Electric throttle control function does not oper-<br>ate properly. | <ul> <li>Harness or connectors<br/>(Throttle control motor circuit is open or<br/>shorted)</li> <li>Electric throttle control actuator</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.

#### TESTING CONDITION:

# Before performing the following procedure, confirm that battery voltage is more than 11V when engine is running.

>> GO TO 2.

## 2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 2 seconds.
- 2. Turn ignition switch ON (READY).
- 3. Depress the accelerator pedal to start engine, then keep engine running for at least 5 seconds.
- 4. Check DTC.

## Is DTC detected?

- YES >> Go to EC-358. "Diagnosis Procedure".
- NO >> INSPECTION END

## Diagnosis Procedure

INFOID:000000005441940

## **1.**CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".
- Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

## **P2101 ELECTRIC THROTTLE CONTROL FUNCTION**

Voltage

Approx. 0V

Battery voltage

#### < COMPONENT DIAGNOSIS >

ECM

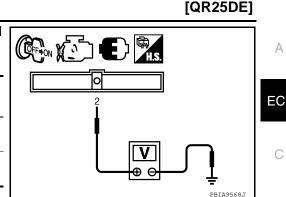
Connector

F14

Check the voltage between ECM harness connector and 1. ground.

Ground

Ground



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Is the inspection result normal?

YES >> GO TO 7.

 ${f 3.}$  CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Disconnect ECM harness connector.

Terminal

2

2. Disconnect IPDM E/R harness connector F10.

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

Condition

Ignition switch

Ignition switch

OFF

ON

| - | IPDM E/R  |          | ECM       |          | Continuity |
|---|-----------|----------|-----------|----------|------------|
| - | Connector | Terminal | Connector | Terminal | Continuity |
|   | F10       | 70       | F14       | 15       | Existed    |

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

Is the inspection result normal?

YES >> GO TO 4.

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

4.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

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

| IPDM E/R  |          | E         | Continuity |            |
|-----------|----------|-----------|------------|------------|
| Connector | Terminal | Connector | Terminal   | Continuity |
| F10       | 54       | F14       | 2          | Existed    |

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

Is the inspection result normal?

YES >> GO TO 5.

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

5.CHECK FUSE

Disconnect 15A fuse (No. 43) from IPDM E/R. 1

2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace 15A fuse.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace IPDM E/R.
- NO >> Repair or replace harness or connectors.

## I.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.

Disconnect electric throttle control actuator harness connector. 2.

3. Disconnect ECM harness connector.

## P2101 ELECTRIC THROTTLE CONTROL FUNCTION

## < COMPONENT DIAGNOSIS >

 Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

| Electric throttle | control actuator | ECM       |          | Continuity  |
|-------------------|------------------|-----------|----------|-------------|
| Connector         | Terminal         | Connector | Terminal | Continuity  |
| F57               | 5                | F14       | 5        | Not existed |
|                   |                  |           | 6        | Existed     |
|                   |                  |           | 5        | Existed     |
|                   |                  |           | 6        | Not existed |

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

Is the inspection result normal?

YES >> GO TO 8.

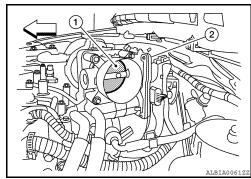
NO >> Repair or replace.

## **8.**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.
  - 2. Electric throttle control actuator
  - <□ : Vehicle front

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside.



## **9.**CHECK THROTTLE CONTROL MOTOR

Refer to EC-360, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 11.

10. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair or replace harness or connectors.

**11.**REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.

2. Go to EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

Component Inspection

**1**.CHECK THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.

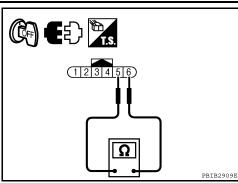
INFOID:000000005441941

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# **P2101 ELECTRIC THROTTLE CONTROL FUNCTION**

#### < COMPONENT DIAGNOSIS >

2. Check resistance between electric throttle control actuator terminals as follows.



| Terminals                       | Resistance                         |
|---------------------------------|------------------------------------|
| 5 and 6                         | Approx. 1 - 15 Ω [at 25 °C (77°F)] |
| the increation we cult required |                                    |

# Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2. \_\_\_\_ \_

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# $2. {\tt REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR}$

| 1. Replace electric throttle control actuator.  |   |
|---|---|
| 2. Go to EC-15. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement". | E |
| >> INSPECTION END   |   |
| Special Repair Requirement  | F |
| 1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING                                       |   |
| Refer to EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"  | G |
| >> GO TO 2.   | Н |
| 2. PERFORM IDLE AIR VOLUME LEARNING   |   |
| Refer to EC-16, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"                 | I |
| >> END  | I |
| >> LIND   |   |
|   | J |
|   |   |

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# 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:000000005441944

# DTC DETECTION LOGIC

| DTC No. | Trouble diagnosis name                  | DTC detecting condition  | Possible cause  |
|---------|---|--|---|
| P2118   | Throttle control motor<br>circuit short | ECM detects short in both circuits between ECM and throttle control motor. | <ul> <li>Harness or connectors<br/>(Throttle control motor circuit is shorted.)</li> <li>Electric throttle control actuator<br/>(Throttle control motor)</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 2 seconds.
- 2. Turn ignition switch ON (READY).
- 3. Depress the accelerator pedal to start engine, then keep engine running for at least 5 seconds.
- 4. Check DTC.

#### Is DTC detected?

YES >> Go to EC-362, "Diagnosis Procedure".

NO >> INSPECTION END

### Diagnosis Procedure

INFOID:000000005441945

### **1.**CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E9. Refer to Ground Inspection in GI-42, "Intermittent Incident".

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect electric throttle control actuator harness connector.
- 2. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

INFOID:000000005441943

# P2118 THROTTLE CONTROL MOTOR

#### < COMPONENT DIAGNOSIS >

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| Electric throttle c                                     | control actuator   | EC                       | M                          |   |                                     | А        |
|---|--------------------|--------------------------|----------------------------|---|-------------------------------------|----------|
| Connector   | Terminal           | Connector                | Terminal                   | Continuity                                    |                                     |          |
| -   | 5                  |                          | 5                          | Not existed                                   |                                     | EC       |
| F57   | 5                  | F14                      | 6                          | Existed                                       |                                     |          |
| 157   | 6                  | 114                      | 5                          | Existed                                       |                                     |          |
|   | 0                  |                          | 6                          | Not existed                                   |                                     | С        |
| 4. Also check   | < harness for      | r short to g             | round an                   | d short to power.                             |                                     |          |
| Is the inspection                                       |                    | mal?                     |                            |   |                                     | D        |
|   | O TO 3.            |                          |                            |   |                                     | D        |
| 3.CHECK TH  | epair or repla     |                          |                            |   |                                     |          |
|   |                    |                          |                            |   |                                     | E        |
| Refer to EC-36  |                    |                          | <u>tion"</u> .             |   |                                     |          |
| <u>Is the inspection</u><br>YES >> G0                   | OTO 4.             | <u>nal :</u>             |                            |   |                                     | F        |
|   | D TO 4.<br>D TO 5. |                          |                            |   |                                     | I        |
| 4.CHECK INT   | FERMITTEN          |                          | IT                         |   |                                     |          |
| Refer to GI-42  | , "Intermitten     | t Incident".             |                            |   |                                     | — G      |
| Is the inspection                                       | on result norr     | mal?                     |                            |   |                                     |          |
|   | O TO 5.            |                          |                            |   |                                     | Н        |
| _   | epair or repla     |                          |                            |   |                                     |          |
| <b>J.</b> REPLACE                                       | ELECTRIC 1         | THROTTLE                 | CONTR                      | OL ACTUATOR                                   |                                     | <u> </u> |
| <ol> <li>Replace e</li> <li>Go to <u>EC-</u></li> </ol> | lectric throttle   | e control a<br>TLE VALVE | ctuator.<br><u>E CLOSE</u> | D POSITION LEAR                               | VING : Special Repair Requirement". | I        |
| >> IN   | SPECTION           | END                      |                            |   |                                     | J        |
| Component   | Inspectio          | n                        |                            |   | INFOID:00000000                     | 05441946 |
| <b>1.</b> снеск тн                                      | -                  |                          | OTOR                       |   |                                     | K        |
|   |                    |                          |                            | r harnaaa aannaatar                           |                                     |          |
|   |                    |                          |                            | r harness connector.<br>control actuator term | i- I                                |          |
| nals as fol   | lows.              |                          |                            |   |                                     |          |
| Ţ   | erminals           |                          |                            | Resistance                                    | (123456)                            | M        |
|   | 5 and 6            |                          | Approx. 1                  | - 15 Ω [at 25 °C (77°F)]                      |                                     |          |
| Is the inspection                                       | on result norr     | mal?                     |                            |   | -  <u>}t</u>                        |          |
|   | SPECTION           | END                      |                            |   |                                     | N        |
| NO >> G0  | O TO 2.            |                          |                            |   | Ω                                   |          |
|   |                    |                          |                            |   |                                     | 2909E O  |
| 2.REPLACE   | ELECTRIC 1         | THROTTLE                 |                            | OL ACTUATOR                                   |                                     |          |
|   | lectric throttle   |                          |                            |   |                                     |          |
|   |                    |                          |                            | D POSITION LEAR                               | VING : Special Repair Requirement". | P        |
| >> IN   | SPECTION           | END                      |                            |   |                                     |          |
| Special Rep   | bair Requi         | rement                   |                            |   | INFOID:00000000                     | 05441947 |
| <b>1</b> .PERFORM                                       | THROTTLE           | VALVE CL                 | .OSED P                    | OSITION LEARNING                              | 3                                   |          |
|   |                    |                          |                            |   |                                     |          |

# P2118 THROTTLE CONTROL MOTOR

< COMPONENT DIAGNOSIS >

[QR25DE]

Refer to EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-16, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

# P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

#### < COMPONENT DIAGNOSIS >

# P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

# Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

# DTC Logic

INFOID:000000005441949

### DTC DETECTION LOGIC

| DTC No.                                   | Trouble diagnosis name                            |         | DTC detecting condition   | Possible cause                     |
|---|---|---------|---|------------------------------------|
| <b>D0110</b>                              | Electric throttle control                         |         | Electric throttle control actuator does not func-<br>tion properly due to the return spring malfunc-<br>tion. |                                    |
| P2119                                     | actuator  | B)      | Throttle valve opening angle in fail-safe mode is not in specified range.                                     | Electric throttle control actuator |
|   |   | C)      | ECM detect the throttle valve is stuck open.  |                                    |
| DTC CON                                   | FIRMATION PROC                                    | EDU     | RE  |                                    |
| <b>1</b> .PRECO                           | NDITIONING  |         |   |                                    |
|   |   | nas be  | een previously conducted, always perform  | m the following before conduct-    |
| ing the nex                               | t test.<br>Inition switch OFF and                 | l wait  | at least 10 seconds   |                                    |
| 2. Turn ig                                | nition switch ON.                                 |         |   |                                    |
| 3. Turn ig                                | nition switch OFF and                             | l wait  | at least 10 seconds.  |                                    |
|   | > GO TO 2.  |         |   |                                    |
| -   |   |         | PROCEDURE FOR MALFUNCTION A   |                                    |
|   |   |         |   |                                    |
|   | nition switch ON and<br>ift lever to D position a |         |   |                                    |
|   | ift lever to P or N position                      |         | at least 10 seconds   |                                    |
|   | nition switch OFF and<br>nition switch ON and     |         |   |                                    |
| 6. Set shi                                | ift lever to D position a                         | and w   | ait at least 3 seconds.   |                                    |
|   | ift lever to P or N position switch OFF wa        |         | east 10 seconds, and then turn ON.  |                                    |
| 9. Check                                  |   | n ai n  |   |                                    |
| Is DTC det                                | ected?  |         |   |                                    |
|   | > Go to <u>EC-366, "Diag</u><br>> GO TO 3.        | nosis   | Procedure".   |                                    |
|   |   |         |   |                                    |
|   |   |         | PROCEDURE FOR MALFUNCTION C   |                                    |
|   | nition switch ON and<br>ift lever to D position a |         |   |                                    |
| 3. Set shi                                | ift lever to P position.                          |         |   |                                    |
|   | nition switch ON (RE                              |         | start engine, then keep engine running fo   | r at least 3 seconds               |
| <ol> <li>Depres</li> <li>Check</li> </ol> |   | ai 10 3 |   | n at least 3 seconds.              |
| Is DTC det                                | ected?  |         |   |                                    |
|   |   |         |   |                                    |

- YES >> Go to EC-366. "Diagnosis Procedure".
- NO >> INSPECTION END

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# P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

# < COMPONENT DIAGNOSIS >

### Diagnosis Procedure

# Revision: September 2009

# 1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Turn ignition switch OFF.
- 2. Remove the intake air duct.
- 3. Check if foreign matter is caught between the throttle valve (1) and the housing.
  - 2. Electric throttle control actuator
  - <□ : Vehicle front

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace electric throttle control actuator.
- 2. Go to EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

# >> INSPECTION END

# Special Repair Requirement

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

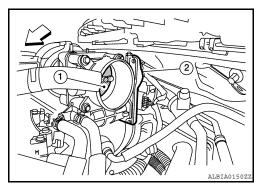
Refer to EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-16, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END



INFOID:000000005441950

INFOID:000000005441951

# 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 potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



#### DTC DETECTION LOGIC

#### NOTE:

If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-321, "DTC Logic".

| DTC No. | Trouble diagnosis name                                     | DTC detecting condition   | Possible cause   |
|---------|--|---|--|
| P2135   | Throttle position sensor<br>circuit range/perfor-<br>mance | Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2. | <ul> <li>Harness or connector<br/>(TP sensor 1 and 2 circuit is open or<br/>shorted.)</li> <li>Electric throttle control actuator<br/>(TP sensor 1 and 2)</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.
- 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 8V at idle.

| >> GO TO 2.  |                        | Μ |
|--|------------------------|---|
| 2. PERFORM DTC CONFIRMATION PROCEDURE  |                        |   |
| <ol> <li>Turn ignition switch ON (READY).</li> <li>Depress the accelerator pedal to start engine, then keep engine running for at least 1 sec</li> <li>Check DTC.</li> </ol>                     | cond.                  | Ν |
| Is DTC detected?   |                        | 0 |
| YES >> Go to <u>EC-367, "Diagnosis Procedure"</u> .<br>NO >> INSPECTION END  |                        | 0 |
| Diagnosis Procedure  | INFOID:000000005441954 | Ρ |
| 1.CHECK GROUND CONNECTION  |                        |   |
| <ol> <li>Turn ignition switch OFF.</li> <li>Check ground connection E9. Refer to Ground Inspection in <u>GI-45, "Circuit Inspection"</u>.<br/><u>Is the inspection result normal?</u></li> </ol> |                        |   |

[QR25DE]

Throttle position sensor

Sensor 1

Seńsor 2

90

45

Throttle valve opening angle (deg)

6.0

4.0

0<sup>L</sup>

sensor

Throttle position s output voltage 0.6

135

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# P2135 TP SENSOR

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#### NO >> Repair or replace ground connection.

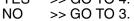
# 2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

- 1. Disconnect electric throttle control actuator harness connector.
- Turn ignition switch ON. 2.
- Check the voltage between electric throttle control actuator har-3. ness connector and ground.

| Electric throttle | control actuator | Ground | Voltage    |  |
|-------------------|------------------|--------|------------|--|
| Connector         | Terminal         | Cround | Voltage    |  |
| F57               | 1                | Ground | Approx. 5V |  |

Is the inspection result normal?

YES >> GO TO 4.



# 3. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.

- Disconnect ECM harness connector. 2.
- Check the continuity between electric throttle control actuator harness connector and ground. 3.

| Electric throttle | control actuator | E         | СМ         | Continuity |
|-------------------|------------------|-----------|------------|------------|
| Connector         | Terminal         | Connector | Continuity |            |
| F57               | 1                | F13       | 47         | Existed    |

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

### ${f 4.}$ 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 ground.

| Electric throttle | control actuator | E         | Continuity |         |
|-------------------|------------------|-----------|------------|---------|
| Connector         | Terminal         | Connector | Continuity |         |
| F57               | 4                | F13       | 36         | Existed |

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

Is the inspection result normal?

YES >> GO TO 5.

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

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

Check the continuity between electric throttle control actuator harness connector and ground. 1.

| Electric throttle | control actuator | EC                | Continuity |            |
|-------------------|------------------|-------------------|------------|------------|
| Connector         | Terminal         | Connector Termina |            | Continuity |
| F57               | 2                | F13               | 37         | Existed    |
| 1.57              | 3                | 115               | 38         | LAISIEU    |

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

Is the inspection result normal?

YES >> GO TO 6.

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

# P2135 TP SENSOR

|                            |   |               |                      | F2133 I            | P SENSUR         |                                       |
|----------------------------|---|---------------|----------------------|--------------------|------------------|---------------------------------------|
| < COMPC                    | DNENT DIA   | GNOSI         | S >                  |                    |                  | [QR25DE]                              |
| <b>6.</b> CHECH            | K THROTTL   | E POSI        | TION SENS            | OR                 |                  | A                                     |
|                            | <u>C-369, "Cor</u>                                | -             |                      | -                  |                  |                                       |
| -                          | ection resul                                      |               | <u>?</u>             |                    |                  | EC                                    |
|                            | > GO TO 8.<br>> GO TO 7.                          |               |                      |                    |                  | EC                                    |
| 7.repla                    | CE ELECTI   | RIC THF       | OTTLE CC             | NTROL A            | CTUATOR          |                                       |
|                            | ce electric tl                                    |               |                      |                    |                  | C                                     |
| 2. Go to                   | <u>EC-15, "TH</u>                                 | ROTTLE        | <u>: VALVE CL</u>    | <u>OSED PO</u>     | SITION LEARNI    | NG : Special Repair Requirement".     |
| >                          | > INSPECT   | ION EN        | C                    |                    |                  | D                                     |
| 8.CHECH                    | (INTERMIT   |               | ICIDENT              |                    |                  |                                       |
| Refer to G                 | il-42, "Intern                                    | nittent In    | <u>cident"</u> .     |                    |                  | E                                     |
|                            | > INSPECT   |               | <b>٦</b>             |                    |                  |                                       |
| -                          |   |               |                      |                    |                  | F                                     |
|                            | nent Inspe  |               |                      |                    |                  | INFOID:000000005441955                |
|                            | ( THROTTL   |               | TION SENS            | OR                 |                  | G                                     |
|                            | gnition switc                                     |               | nnectors dis         | connected          | _                |                                       |
| 3. Perfor                  | rm <u>EC-15, "</u>                                | <u>THROTT</u> |                      |                    |                  | NING : Special Repair Requirement". H |
|                            | gnition switc<br>nift lever to E                  |               | า.                   |                    |                  |                                       |
| 6. Check                   | the volta   |               |                      | harness            | connector and    |                                       |
| groun                      | u.  |               |                      |                    |                  |                                       |
| E                          | ECM   | Ground        | Con                  | dition             | Voltage          |                                       |
| Connector                  | Terminal  | Ground        | Con                  |                    | Voltage          |                                       |
|                            | 37  |               |                      | Fully<br>released  | More than 0.36 V |                                       |
|                            | (TP sensor<br>1 signal)                           |               |                      | Fully              | Less than 4.75 V |                                       |
| F13                        |   | Ground        | Accelerator<br>pedal | depressed          |                  |                                       |
|                            | 38<br>(TP sensor                                  |               | pouu                 | Fully<br>released  | Less than 4.75 V | JWB18163422                           |
|                            | 2 signal)   |               |                      | Fully<br>depressed | More than 0.36 V | Μ                                     |
|                            | ection resul                                      |               |                      |                    |                  | 141                                   |
|                            | > INSPECT<br>> GO TO 2.                           |               | C                    |                    |                  |                                       |
| 2.REPLA                    | CE ELECTI   | RIC THF       | OTTLE CC             | NTROL A            | CTUATOR          | Ν                                     |
|                            | ce electric tl                                    |               |                      |                    |                  |                                       |
| 2. Go to                   | <u>EC-369, "S</u>                                 | pecial Re     | <u>epair Requi</u>   | <u>rement"</u> .   |                  | 0                                     |
| >                          | > INSPECT   | ION EN        | C                    |                    |                  |                                       |
| Special Repair Requirement |   |               |                      |                    |                  |                                       |
| <b>1</b> .PERFC            | 1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING |               |                      |                    |                  |                                       |
|                            |   |               |                      |                    |                  | G : Special Repair Requirement"       |
|                            |   |               |                      |                    |                  |                                       |

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-16, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

#### < COMPONENT DIAGNOSIS >

# P2423 HC ADSORPTION CATALYST FUNCTION

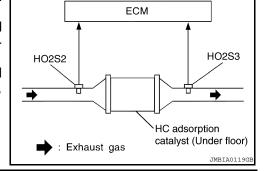
### **DTC** Logic

### DTC DETECTION LOGIC

The ECM monitors the phase gap between heated oxygen sensor 2 signal and heated oxygen sensor 3 signal.

The phase gap between heated oxygen sensor 2 signal and heated oxygen sensor 3 signal becomes small as the HC adsorption catalyst (under floor) is deteriorated.

When the phase gap between heated oxygen sensor 2 signal and heated oxygen sensor 3 signal approaches a specified limit value, the HC adsorption catalyst (under floor) malfunction is diagnosed.



| P2423       HC adsorption catalyst efficiency below threshold       • HC adsorption catalyst (under floor) does not operate properly.       • HC adsorption catalyst (under floor) does not have enough oxygen storage capacity.       • HC adsorption catalyst (under floor) does not have enough oxygen storage capacity.       • HC adsorption catalyst (under floor) does not have enough oxygen storage capacity.       • HC adsorption catalyst (under floor) does not have enough oxygen storage capacity.       • HC adsorption catalyst (under floor) does not have enough oxygen storage capacity.       • HC adsorption catalyst (under floor) does not have enough oxygen storage capacity.       • HC adsorption catalyst (under floor) does not have enough oxygen storage capacity.       • HC adsorption catalyst (under floor) does not have enough oxygen storage capacity.       • HC adsorption catalyst (under floor) does not have enough oxygen storage capacity.       • HC adsorption catalyst (under floor) does not have enough oxygen storage capacity.       • HC adsorption catalyst (under floor) does not have enough oxygen storage capacity.       • HC adsorption catalyst (under floor) does not have enough oxygen storage capacity.       • HC adsorption catalyst (under floor) does not have enough oxygen storage capacity.       • HC adsorption catalyst (under floor) does not have enough oxygen storage capacity.       • HC adsorption catalyst (under floor) does not have enough oxygen storage capacity.       • HC adsorption catalyst (under floor) does not have enough oxygen storage capacity.       • HC adsorption catalyst (under floor) does not have enough oxygen storage capacity.       • HC adsorption catalyst (under floor) does not have enough oxygen storage capacity. | DTC No. | Trouble diagnosis name   | DTC detecting condition  | Possible cause   | _ |
|---|---------|--------------------------|--|--|---|
|   | P2423   | efficiency below thresh- | operate properly.<br>• HC adsorption catalyst (under floor) does not | <ul> <li>Exhaust tube</li> <li>Intake air leaks</li> <li>Fuel injector</li> <li>Fuel injector leaks</li> <li>Spark plug</li> </ul> | G |

#### DTC CONFIRMATION PROCEDURE

### **1**.PRECONDITIONING

| If DTC Confirmation Procedure has been previously conducted, always perform the following before conduct- |  |
|---|--|
| ing 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

#### CAUTION:

#### Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws. (P)With CONSULT-III

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine 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 (READY).
- 6. Repeat following procedure 2 times.
- Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes.
   NOTE:

Keep the vehicle speed as steady as possible during the cruising.

# Stop vehicle.

NOTE:

#### Never turn ignition switch OFF.

7. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-III.

- 8. Drive vehicle at a speed of 80 km/h (50 MPH) or more until "INCMP" of "CATALYST" changes to "CMPLT". NOTE:
  - Keep the vehicle speed as steady as possible during the cruising.
  - It will take at most 3 minutes until "INCMP" of "CATALYST" changes to "CMPLT".
- 9. Check 1st trip DTC.

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### With GST

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine 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 (READY).
- 6. Repeat following procedure 3 times.
- Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. **NOTE:**

#### Keep the vehicle speed as steady as possible during the cruising.

- Stop vehicle.
- NOTE:

#### Never turn ignition switch OFF.

7. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to <u>EC-372, "Diagnosis Procedure"</u>. NO >> INSPECTION END

### Diagnosis Procedure

# **1.**CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dent.

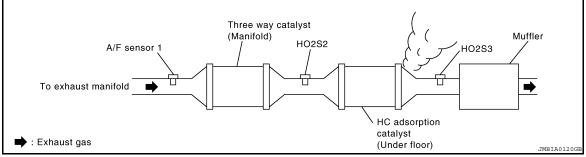
Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

2.CHECK EXHAUST GAS LEAK

- 1. Activate "INSPECTION MODE 1" (HBC-104) to start engine.
- 2. Listen for an exhaust gas leak before the HC adsorption catalyst (under floor).



Is exhaust gas leak detected?

OK >> Repair or replace. NG >> 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-11. "BASIC INSPECTION : Special Repair Requirement"</u>. For specification, refer to <u>EC-470, "Idle Speed"</u> and <u>EC-470, "Ignition Timing"</u>.

Is the inspection result normal?

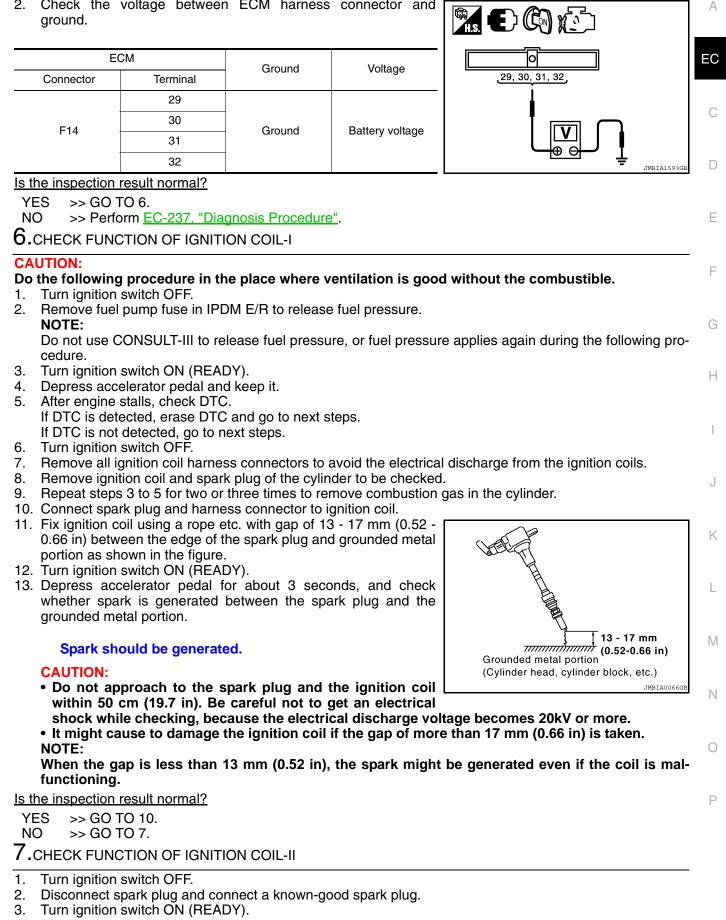
YES >> GO TO 5. NO >> Follow the <u>EC-11. "BASIC INSPECTION : Special Repair Requirement"</u>. **5.**CHECK FUEL INJECTOR

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





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4. Depress the accelerator pedal to 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.

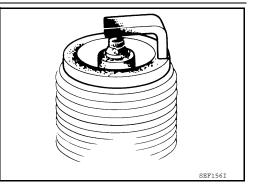
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-390, "Diagnosis Procedure".

#### 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>MA-20, "SPARK PLUG :</u> <u>Removal and Installation"</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. Turn ignition switch ON (READY).
- 3. Depress the accelerator pedal to 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 >> INSPECTION END
- NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>MA-20, "SPARK</u> <u>PLUG : Removal and Installation"</u>.

### **10.**CHECK FUEL INJECTOR

- 1. Turn ignition switch OFF.
- Remove fuel injector assembly. Refer to <u>EM-35</u>, "<u>Removal and Installation</u>". Keep fuel hose and all fuel injectors connected to fuel tube.

Disconnect all ignition coil harness connectors.

- 4. Reconnect all fuel injector harness connectors disconnected.
- Turn ignition switch ON. Make sure fuel does not drip from fuel injector.

#### Is the inspection result normal?

- YES >> GO TO 11.
- NO >> Replace the fuel injector(s) from which fuel is dripping.

# 11. CHECK INTERMITTENT INCIDENT

#### Refer to GI-42, "Intermittent Incident".

#### Is the trouble fixed?

- YES >> INSPECTION END
- NO >> Replace HC adsorption catalyst (under floor).

# P2A00 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).

# Zirconia element 4500 4000 3500

23000 voltage ( 2500 2000

> 0 12 14

Protector

Holder

18 20 22 Air fuel ratio

24 26 28

16

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# 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 to be shifted to LEAN side or RICH side.

| P2A00       Air fuel ratio (A/F) sensor 1<br>circuit range/performance          • The output voltage computed by ECM from the<br>A/F sensor 1 signal is shifted to the lean side for<br>a specified period.           • A/F sensor 1<br>· Intake air leaks | DTC No. | Trouble diagnosis name | DTC detecting condition   | Possible Cause   | ĸ |
|--|---------|------------------------|---|--|---|
| specified period.  | P2A00   |                        | <ul><li>A/F sensor 1 signal is shifted to the lean side for<br/>a specified period.</li><li>The A/F signal computed by ECM from the A/F</li></ul> | <ul><li> A/F sensor 1 heater</li><li> Fuel pressure</li><li> Fuel injector</li></ul> | L |

### DTC CONFIRMATION PROCEDURE

# **1**.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conduct-Ν ing the next test.

- Turn ignition switch OFF and wait at least 10 seconds. 1.
- 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 11V at idle.

#### >> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Clear the mixture ratio self-learning value. Refer to EC-18, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
- 2. Turn ignition switch OFF and wait at least 10 seconds.

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# P2A00 A/F SENSOR 1

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- 3. Activate "INSPECTION MODE 1" (HBC-104) to start engine, and warm up engine to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds. 4.
- Turn ignition switch ON.
   Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON (READY). 7.
- Drive vehicle at a speed of 80 km/h (50 MPH) or more for at least 3 consecutive minutes. CAUTION:

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

#### Keep the vehicle speed as steady as possible during the cruising.

- 9. Stop the vehicle and shift the selector lever to P position.
- 10. Repeat following procedure 4 times.
- Fully depress the accelerator pedal and keep the engine speed 2,500 rpm for 5 minutes.
- Fully release the accelerator pedal.

#### 11. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-376, "Diagnosis Procedure".

NO >> INSPECTION END

### **Diagnosis** Procedure

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# **1.**CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection". 2.
- Is the inspection result normal?
- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

### 2.RETIGHTEN A/F SENSOR 1

1. Loosen and retighten the A/F sensor 1.

### Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

 ${f 3.}$ CHECK FOR INTAKE AIR LEAK

- 1. Activate "INSPECTION MODE 1" (HBC-104) to start engine.
- Listen for an intake air leak after the mass air flow sensor. 2

Is intake air leak detected?

- YES >> GO TO 4.
- NO >> Repair or replace.

**4.**CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to EC-18, "MIXTURE RATIO SELF-LEARNING VALUE 1. CLEAR : Special Repair Requirement".
- Activate "INSPECTION MODE 1" (HBC-104) to start engine, and let engine idle for at least 10 minutes. 2
- Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?
- YES >> Perform trouble diagnosis for DTC P0171or P0172. Refer to EC-224, "DTC Logic" or EC-228, "DTC Logic".

NO >> GO TO 5.

5. 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.

# P2A00 A/F SENSOR 1

|  |              |                | PZA          | 00 A/F 3               | DENSUR 1        | i i i i i i i i i i i i i i i i i i i       |    |
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| Is the inspec                                    | tion result  | normal?        |              |                        |                 |   | •  |
| YES >>   | GO TO 6.     |                |              |                        |                 |   | А  |
| •  | -            | eplace harn    |              |                        |                 |   |    |
| 6.CHECK A  | VF SENSC     | DR 1 POWE      | R SUPPLY     | CIRCUIT                |                 |   | EC |
|  | ition switch |                | -            |                        | unnector and    | ·   |    |
| <ol><li>Check tl<br/>ground.</li></ol>           | ne voltage   | Detween A/r    | - sensor i   | namess co              | onnector and    |   |    |
| ground   |              |                |              |                        |                 |   | С  |
|  | A/F sensor 1 |                |              |                        |                 |   |    |
| Connecto   | or -         | Terminal       | Groun        | d                      | Voltage         | $\begin{pmatrix} 2 \\ 4 \\ 3 \end{pmatrix}$ |    |
|  |              | 4              | Groun        | d Ba                   | attery voltage  |   | D  |
| Is the inspec                                    | tion result  |                |              |                        |                 |   |    |
|  | GO TO 8.     | <u>normar:</u> |              |                        |                 |   | Е  |
|  | GO TO 7.     |                |              |                        |                 | ÷   |    |
| 7  |              |                |              |                        |                 | PBIB3308E                                   | l  |
| 7.DETECT   | MALFUNG      | CTIONING F     | PART         |                        |                 |   | F  |
| Check the fo                                     |              |                | -            |                        |                 |   |    |
| <ul> <li>IPDM E/R</li> <li>15A fuse (</li> </ul> |              | onnector F1    | 0            |                        |                 |   | 0  |
| <ul> <li>Harness for</li> </ul>                  |              | short betwee   | en A/F sen   | sor 1 and f            | use             |   | G  |
|  | I            |                |              |                        |                 |   |    |
| >>   | Repair or r  | eplace harn    | ess or con   | nectors.               |                 |   | Н  |
| 8.CHECK  | VF SENSC     | DR 1 INPUT     | SIGNAL C     |                        | OR OPEN AN      | ND SHORT                                    |    |
|  | ition switch |                |              |                        |                 |   | -  |
|  |              | arness conr    | nector.      |                        |                 |   |    |
| 3. Check tl                                      | he continui  | ty between A   | A/F sensor   | <sup>-</sup> 1 harness | connector a     | nd ECM harness connector.                   |    |
|  |              |                |              |                        |                 |   | .1 |
| A/F  | sensor 1     |                | ECM          |                        | Continuity      |   | 0  |
| Connector  | Termin       | al Conn        | ector        | Terminal               |                 |   |    |
| F44  | 1            | F1             | 13           | 45                     | Existed         |   | Κ  |
|  | 2            |                |              | 49                     | 2/10/00         |   |    |
| 4. Check tl                                      | he continui  | ty between     | ECM harne    | ess connec             | tor or A/F se   | nsor 1 harness connector and ground.        |    |
|  |              |                |              | 1                      |                 |   | L  |
| A/F ser  | nsor 1       | EC             | M            | Ground                 | Continuity      |   |    |
| Connector  | Terminal     | Connector      | Terminal     |                        |                 |   | Μ  |
| F44  | 1            | F13            | 45           | Ground                 | Not existed     |   |    |
| 1 44   | 2            | 115            | 49           | around                 | NUL EXISIEU     |   |    |
| 5. Also che                                      | eck harnes   | s for short to | o power.     |                        |                 |   | Ν  |
| Is the inspec                                    | tion result  | normal?        |              |                        |                 |   |    |
|  | GO TO 9.     |                |              |                        |                 |   |    |
| •  | • •          |                | -            | ound or sho            | ort to power in | n harness or connectors.                    | 0  |
| 9.CHECK A  | VF SENSO     | OR 1 HEATE     | R            |                        |                 |   |    |
| Refer to EC-                                     | 132, "Com    | ponent Insp    | ection".     |                        |                 |   | P  |
| Is the inspec                                    |              |                | _            |                        |                 |   |    |
|  | GO TO 10     |                |              |                        |                 |   |    |
| NO >> GO TO 11.                                  |              |                |              |                        |                 |   |    |
| 10.CHECH   | K INTERMI    | ITTENT INC     | IDENT        |                        |                 |   |    |
| Perform GI-4                                     | 42, "Interm  | ittent Incide  | <u>nt"</u> . |                        |                 |   | •  |
| Is the inspec                                    | tion result  | normal?        |              |                        |                 |   |    |
|  |              |                |              |                        |                 |   |    |

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YES >> GO TO 11.

NO >> Repair or replace.

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

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

CAUTION:

- Discard any 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 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 12.

NO >> GO TO 13.

12.CONFIRM A/F ADJUSTMENT DATA

#### With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "A/F ADJ-B1" 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 13.

**13.**CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to <u>EC-18</u>, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".

Do you have CONSULT-III?

YES >> GO TO 14.

NO >> INSPECTION END

**14.**CONFIRM A/F ADJUSTMENT DATA

#### With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "A/F ADJ-B1" in "DATA MONITOR" mode with CONSULT-III.
- 3. Make sure that "0.000" is displayed on CONSULT-III screen.

>> INSPECTION END

# ASCD BRAKE SWITCH

# Description

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM and hybrid vehicle control ECU detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to <u>EC-45</u>, "System Description" for the ASCD function.

# **Component Function Check**

### 1. CHECK FOR ASCD BRAKE SWITCH FUNCTION

### With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "BRAKE SW1" indication under the following conditions.

| Monitor item | Con         | dition             | Indication |
|--------------|-------------|--------------------|------------|
| BRAKE SW1    | Brake pedal | Slightly depressed | OFF        |
| DHARE OWN    | Diake pedal | Fully released     | ON         |

#### **Without CONSULT-III**

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

| ECM     Ground     Condition     Voltage       Connector     Terminal                             |           |             |        |             |        |                 |
|---|-----------|-------------|--------|-------------|--------|-----------------|
| Connector     Terminal       110     Slightly       (ASCD)     Ground       Brake pedal     Fully | E         | СМ          | Ground | Conc        | lition | Voltago         |
| E10 brake Ground Brake pedal  | Connector | Terminal    | Ground | Conc        |        | voltage         |
| Fully   |           | (ASCD       |        |             |        | Approx. 0V      |
| nal) released   | E10       | switch sig- | Ground | Brake pedal | ,      | Battery voltage |

#### Is the inspection result normal?

YES >> INSPECTION END.

NO >> Refer to EC-379, "Diagnosis Procedure".

### **Diagnosis** Procedure

# 1. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch harness connector.
- 3. Turn ignition switch ON.
- Check the voltage between ASCD brake switch harness connector and ground.

| ASCD bra           | ake switch | Ground  | Voltage         |
|--------------------|------------|---------|-----------------|
| Connector Terminal |            | Citound | vonage          |
| E37                | 1          | Ground  | Battery voltage |

#### Is the inspection result normal?

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

2. DETECT MALFUNCTIONING PART

#### Check the following.

• Fuse block (J/B) connector E6

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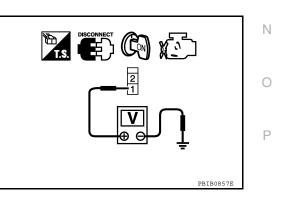
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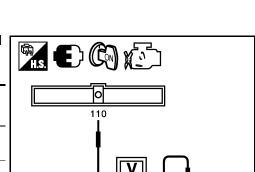
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# ASCD BRAKE SWITCH

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- Junction block connector E46, E48
- 10A fuse (No. 3)
- Harness for open or short between ASCD brake switch and fuse

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

 ${f 3.}$  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 brake switch |          | ECM       |          | Continuity |
|-------------------|----------|-----------|----------|------------|
| Connector         | Terminal | Connector | Terminal | Continuity |
| E37               | 2        | E10       | 110      | 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.

Junction block connector E45, E46

Harness for open or short between ASCD brake switch and fuse

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

#### **5.**CHECK ASCD BRAKE SWITCH

Refer to EC-380, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace ASCD brake switch.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

#### >> INSPECTION END

### Component Inspection (ASCD Brake Switch)

### 1.CHECK ASCD BRAKE SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch harness connector.
- 3. Check the continuity between ASCD brake switch terminals under the following conditions.

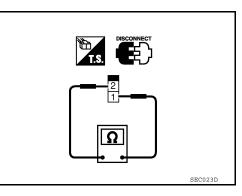
| Terminals | Con         | Continuity         |             |
|-----------|-------------|--------------------|-------------|
| 1 and 2   | Brake pedal | Fully released     | Existed     |
|           | Diake pedai | Slightly depressed | Not existed |

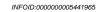
Is the inspection result normal?

YES >> INSPECTION END NO >> GO TO 2.

# 2. CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to <u>BR-12, "Inspection and Adjustment"</u>.





# **ASCD BRAKE SWITCH**

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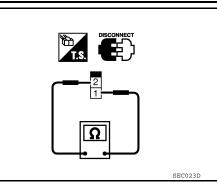
2. Check the continuity between ASCD brake switch terminals under the following conditions.

| Terminals | Condition   |                    | Continuity  |
|-----------|-------------|--------------------|-------------|
| 1 and 2   | Brake pedal | Fully released     | Existed     |
|           | Diake pedal | Slightly depressed | Not existed |

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD brake switch.



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# COOLING FAN

# Description

### COOLING FAN CONTROL MODULE

Cooling fan control module receives ON/OFF pulse duty signal from IPDM E/R. Corresponding to this ON/OFF pulse duty signal, cooling fan control module sends cooling fan motor operating voltage to cooling fan motor. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage.

#### COOLING FAN MOTOR

Cooling fan motor receives cooling fan motor operating voltage from cooling fan control module. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage.

### Component Function Check

INFOID:000000005441967

### **1.**CHECK COOLING FAN FUNCTION

### With CONSULT-III

#### 1. Turn ignition switch ON.

- 2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that cooling fan speed varies according to the percent.

### **Without CONSULT-III**

- 1. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to <u>PCS-13. "Diagnosis</u> <u>Description"</u>.
- 2. Make sure that cooling fan operates.

#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-382, "Diagnosis Procedure".

# Diagnosis Procedure

INFOID:000000005441968

# 1. CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-I

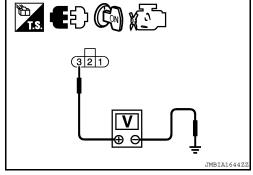
- 1. Turn ignition switch OFF.
- 2. Disconnect cooling fan control module harness connector E231.
- 3. Turn ignition switch ON.
- 4. Check the voltage between cooling fan control module harness connector and ground.

| Cooling fan c | ontrol module | Ground | Voltage         |
|---------------|---------------|--------|-----------------|
| Connector     | Terminal      | Ciouna | Voltage         |
| E231          | 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.
- 2. Check the continuity between cooling fan control module harness connector and ground.

| _ | Cooling fan c | ontrol module | Ground | Continuity |  |
|---|---------------|---------------|--------|------------|--|
| _ | Connector     | Terminal      | Cround | Continuity |  |
|   | E231          | 1             | Ground | Existed    |  |

3. Also check harness for short to power.

#### Is the inspection result normal?

YES >> GO TO 3.

INFOID:000000005441966

# **COOLING FAN**

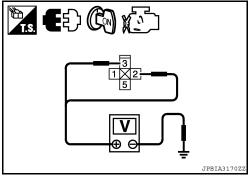
|                       |                                 |                              | COOLI          |                 | [QR25DE]                                |
|-----------------------|---------------------------------|------------------------------|----------------|-----------------|---|
|                       | NT DIAGNO                       |                              | - nowor in he  |                 |   |
|                       | • •                             | UND CIRCUI                   | -              | irness or conne | actors.                                 |
|                       |                                 |                              |                | 10              |   |
|                       |                                 | narness conne<br>etween IPDM | ,              | connector and   | ground.                                 |
|                       | PDM E/R                         |                              |                |                 |   |
| Connector             | Termi                           |                              | àround         | Continuity      |   |
| E18                   | 12                              |                              | a second       | Eviated         |   |
| E17                   | 41                              |                              | àround         | Existed         |   |
| Also chec             | k harness for                   | short to powe                | er.            |                 |   |
|                       | on result norr                  | nal?                         |                |                 |   |
|                       | O TO 4.<br>epair open ciu       | cuit or short to             | o nower in ha  | rness or conne  | actors                                  |
|                       | • •                             | CONTROL S                    | •              |                 |   |
|                       |                                 | narness conne                |                |                 |   |
| Check the             |                                 |                              |                | connector and   | cooling fan control module harness con- |
| nector.               | -                               |                              |                |                 |   |
|                       | I E/R                           | Cooling for a                | control module |                 |   |
| Connector             | Terminal                        | Connector                    | Terminal       | Continuity      |   |
| E201                  | 97                              | E231                         | 2              | Existed         |   |
| -                     | -                               | short to grou                |                |                 |   |
|                       |                                 | CONTROL M                    |                | PUT SIGNAL      | CIRCUIT                                 |
| Disconne              | ct cooling fan                  | control modu                 |                | onnectors E232  | , E233.                                 |
|                       | ion switch ON<br>e voltage betv |                              | fan control m  | odule harness   |   |
|                       | r and ground.                   | 0                            |                |                 |   |
| 0                     |                                 |                              |                |                 | A B                                     |
|                       | an control modul                | (                            | around         | Voltage         | . (A) (B)<br>(45) (617)                 |
| Connector<br>E232 (A) | Termi                           | ial                          |                |                 |   |
| E232 (A)              | 6                               |                              | around         | Battery voltage |   |
|                       | on result norr                  | nal?                         |                |                 |   |
|                       | O TO 6.                         |                              |                |                 |   |
|                       | -                               | g fan control r              |                |                 | 226891A1emu                             |
| CHECK CO              | DOLING FAN                      | MOTORS -1                    | AND -2         |                 |   |
|                       |                                 | ent Inspection               | (Cooling Far   | n Motor)".      |   |
| •                     | on result norr                  | nal?                         |                |                 |   |
|                       | O TO 11.<br>eplace coolin       | n fan motor                  |                |                 |   |
|                       | •                               | -                            |                | VER SUPPLY      | CIBCUIT-II                              |
|                       |                                 |                              |                |                 |   |
|                       | ion switch OF<br>ct cooling fan | r.<br>relay harness          | connector E    | 82.             |   |
|                       | ion switch ON                   |                              |                |                 |   |
|                       |                                 |                              |                |                 |   |

# **COOLING FAN**

#### < COMPONENT DIAGNOSIS >

4. Check the voltage between cooling fan relay harness connector and ground.

| Cooling f                        | an relay-1 | Ground | Voltage         |  |  |
|----------------------------------|------------|--------|-----------------|--|--|
| Connector Terminal               |            | Ground | voltage         |  |  |
| E82                              | 2          | Ground | Pattony voltago |  |  |
| E02                              | 3          | Ground | Battery voltage |  |  |
| Is the inspection result normal? |            |        |                 |  |  |



[QR25DE]

YES >> GO TO 9.

NO >> GO TO 8.

#### 8. DETECT MALFUNCTIONING PART

#### Check the following.

- IPDM E/R harness connector E18
- 50A fusible link (letter O)
- · Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and IPDM E/R

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

# 9. CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-III

#### Turn ignition switch OFF. 1.

- Disconnect IPDM E/R harness connector E17. 2.
- 3. Check the continuity between cooling fan relay-1 harness connector and IPDM E/R harness connector.

| Cooling f | an relay-1 | IPDN      | Continuity |            |
|-----------|------------|-----------|------------|------------|
| Connector | Terminal   | Connector | Terminal   | Continuity |
| E82       | 1          | E17       | 42         | Existed    |

Check the continuity between cooling fan relay harness connector and cooling fan control module harness 4. connector.

| Cooling f | an relay-1 | Cooling fan c | Continuity |            |
|-----------|------------|---------------|------------|------------|
| Connector | Terminal   | Connector     | Terminal   | Continuity |
| E82       | 5          | E231          | 3          | Existed    |

5. 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 connector E81, E207

Harness for open or short between cooling fan relay-1 and cooling fan control module

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

# **11.**CHECK COOLING FAN RELAY-1

Refer to EC-385, "Component Inspection (Cooling Fan Relay)".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace cooling fan relay-1.

12. CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

|                 |                                  |           |          | COOLIN   | IG FAN       |     |                        |       |
|-----------------|----------------------------------|-----------|----------|--|--------------|-----|------------------------|-------|
| < COMPO         | NENT DI                          | AGNO      | SIS >    |  |              |     | [QR25DE]               |       |
| Is the insp     | ection resu                      | ult norn  | nal?     |  |              |     |                        |       |
|                 | > Replace                        |           |          | ness connectors.                               |              |     |                        | А     |
| _               | •                                | •         |          |  |              |     |                        |       |
| Compon          | ient insp                        | eclio     |          | oling Fan Motor)                               |              |     | INFOID:000000005441969 | EC    |
| <b>1</b> .CHECK |                                  | G FAN     | мотс     | R  |              |     |                        |       |
| 2. Discor       |                                  | ing fan   | contro   | l module harness con<br>dule terminals with ba |              |     |                        | С     |
|                 |                                  |           |          |  | ,            |     |                        | D     |
| Cooli           | ing fan contro                   |           |          |  |              |     |                        |       |
| Motor           | Connector                        |           | ninal    | Operation                                      |              |     |                        | _     |
| 1               | E232                             | (+)       | (-)      |  |              |     |                        | E     |
| 2               | E232                             | 4         | 5<br>7   | Cooling fan operates.                          |              |     |                        |       |
| Is the insp     |                                  | -         | -        |  |              |     |                        | F     |
| •               | > INSPEC                         |           |          |  |              |     |                        |       |
| NO >:           | > Replace                        | cooling   | g fan m  | notor.   |              |     |                        | G     |
| Compon          | ent Insp                         | oectio    | n (Co    | oling Fan Relay)                               |              |     | INFOID:000000005441970 | 0     |
| 1.CHECK         |                                  |           |          |  |              |     |                        |       |
|                 |                                  |           |          | r-1  |              |     |                        | Н     |
|                 | gnition swi<br>ve cooling        |           |          |  |              |     |                        |       |
| 3. Check        | the cont                         | tinuity   | betwee   | en cooling fan relay                           | -1 terminals |     |                        | 1     |
| under           | the followi                      | ng con    | ditions  |  |              | 2   |                        |       |
| Terminals       |                                  |           | Condit   | ions   | Continuity   | (A) |                        | .1    |
|                 | 12V direct                       | current s |          | etween terminals 1 and 2                       | Existed      | 5   |                        | 0     |
| 3 and 5         | No current                       |           |          |  | Not existed  | 3   | 5                      |       |
| Is the insp     | Is the inspection result normal? |           |          |  |              |     |                        | K     |
|                 | > INSPEC                         |           |          |  |              | 1   |                        |       |
| NO >:           | > Replace                        | coolin    | g fan re | elay.  |              |     | SEF090M                | L     |
|                 |                                  |           |          |  |              |     |                        |       |
|                 |                                  |           |          |  |              |     |                        | Μ     |
|                 |                                  |           |          |  |              |     |                        | 1 V I |
|                 |                                  |           |          |  |              |     |                        |       |
|                 |                                  |           |          |  |              |     |                        | Ν     |
|                 |                                  |           |          |  |              |     |                        |       |

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# FUEL PUMP

Description

| Sensor   | Input signal to ECM | ECM Function      | Actuator             |  |
|--|---------------------|-------------------|----------------------|--|
| Crankshaft position sensor (POS)<br>Camshaft position sensor (PHASE) | Engine speed*       | Fuel pump control | Fuel pump relay<br>↓ |  |
| Battery  | Battery voltage*    |                   | Fuel pump            |  |

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

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine start ability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

| Condition                        | Fuel pump operation    |  |
|----------------------------------|------------------------|--|
| Ignition switch is turned to ON. | Operates for 1 second. |  |
| Engine running and cranking      | Operates.              |  |
| When engine is stopped           | Stops in 1.5 seconds.  |  |
| Except as shown above            | Stops.                 |  |

# **Component Function Check**

# **1.**CHECK FUEL PUMP FUNCTION

- Turn ignition switch ON. 1.
- 2. Pinch fuel feed hose (1) with two fingers.

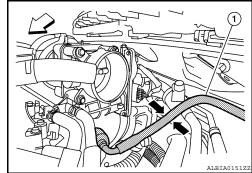
: Vehicle front

#### 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?

>> INSPECTION END YES

NO >> EC-386, "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.

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# FUEL PUMP

# < COMPONENT DIAGNOSIS >

Check the voltage between ECM harness connector and ground.

| EC        | М               | Ground | Voltage         |  |
|-----------|-----------------|--------|-----------------|--|
| Connector | nector Terminal |        | Voltage         |  |
| F14       | 14              | Ground | Battery voltage |  |

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 2.

# **2.**CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

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

| IPDM      | E/R      | Ground | Voltage         |
|-----------|----------|--------|-----------------|
| Connector | Terminal | Ground | voltage         |
| F10       | 77       | Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 10.

**3.**DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R connector F10
- Harness for open or short between IPDM E/R and ECM

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

# 4.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 4. Turn ignition switch ON.
- 5. Check the voltage between "fuel level sensor unit and fuel pump" harness connector and ground.

|           | sensor unit<br>el pump | Ground | Voltage   |  |  |
|-----------|------------------------|--------|---|--|--|
| Connector | Terminal               |        |   |  |  |
| B42       | 1                      | Ground | Battery voltage should exist 1 second after ignition switch is turn ON. |  |  |
|           |                        |        |   |  |  |

Is the inspection result normal?

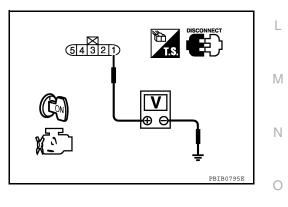
YES >> GO TO 8.

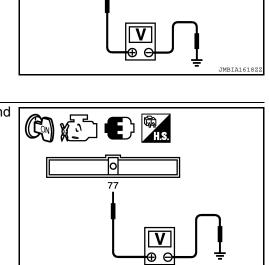
NO >> GO TO 5.

**5.**CHECK 15A FUSE

- 1. Turn ignition switch OFF.
- 2. Disconnect 15 A fuse (No. 32) from IPDM E/R.
- 3. Check 15 A fuse.
- Is the inspection result normal?
- YES >> GO TO 6.
- NO >> Replace15 A fuse.

**6.**CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV





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# **FUEL PUMP**

#### < COMPONENT DIAGNOSIS >

- 1. Disconnect IPDM E/R harness connector E18.
- Check the continuity between IPDM E/R harness connector and "fuel level sensor unit and fuel pump" harness connector.

| IPDM E/R  |          | Fuel level se<br>fuel | Continuity |         |
|-----------|----------|-----------------------|------------|---------|
| Connector | Terminal | Connector Terminal    |            |         |
| E18       | 13       | B42                   | 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.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E29, B10
- IPDM E/R connectors E18
- Harness for open or short between IPDM E/R and "fuel level sensor unit and fuel pump"

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

### **8.**CHECK FUEL PUMP GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Check the continuity between "fuel level sensor unit and fuel pump" and ground.

| Fuel level s<br>and fue |          | Ground | Continuity |  |
|-------------------------|----------|--------|------------|--|
| Connector               | Terminal |        |            |  |
| B42                     | 3        | Ground | Existed    |  |
|                         |          |        |            |  |

3. Also heck harness for short to power.

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 9.

**9.** DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors E29 (with rear view monitor), B10

IPDM E/R connector E18

• Harness for open or short between IPDM E/R and "fuel level sensor unit and fuel pump"

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

### **10.**CHECK FUEL PUMP

Refer to EC-389, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace "fuel level sensor unit and fuel pump".

**11.**CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

#### Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace harness or connectors.

# **FUEL PUMP**

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# < COMPONENT DIAGNOSIS >

# **Component Inspection**

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[QR25DE]

# 1.CHECK FUEL PUMP

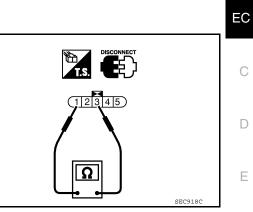
- 1. Turn ignition switch OFF.
- Disconnect "fuel level sensor unit and fuel pump" harness connector. 2.
- Check resistance between "fuel level sensor unit and fuel pump" 3. terminals as follows.

| Terminals | Resistance                  |
|-----------|-----------------------------|
| 1 and 3   | 0.2 - 5.0Ω [at 25°C (77°F)] |

#### Is the inspection result normal?

| YES | >> INSPECTION END |
|-----|-------------------|
|-----|-------------------|

NO >> Replace "fuel level sensor unit and fuel pump".





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# IGNITION SIGNAL

# Description

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.

### **Component Function Check**

### **1**.INSPECTION START

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON (READY).
- 3. Depress the accelerator pedal to start engine.

#### Does the engine start?

- YES-1 >> With CONSULT-III: GO TO 2.
- YES-2 >> Without CONSULT-III: GO TO 3.
- NO >> Go to EC-390, "Diagnosis Procedure".

2. IGNITION SIGNAL FUNCTION

#### With CONSULT-III

- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON (READY).
- 3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 4. Make sure that each circuit produces a momentary engine speed drop.

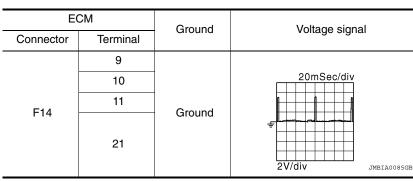
Is the inspection result normal?

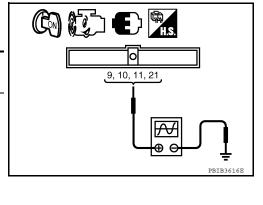
- YES >> INSPECTION END
- NO >> Go to EC-390, "Diagnosis Procedure".

# **3.** IGNITION SIGNAL FUNCTION

#### **Without CONSULT-III**

- 1. Activate "INSPECTION MODE 1" (HBC-104) to start engine, then let engine idle.
- 2. Read the voltage signal between ECM harness connector and ground.





### NOTE:

The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-390, "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 ON.

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INFOID:000000005441976

# **IGNITION SIGNAL**

#### < COMPONENT DIAGNOSIS >

Check the voltage between ECM harness connector and ground.

| ECM       |          | Ground | Voltage         |  |
|-----------|----------|--------|-----------------|--|
| Connector | Terminal | Cround | vollage         |  |
| E10       | 105      | Ground | Battery voltage |  |

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-114, "Diagnosis Procedure".

# **2.**CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect condenser-2 harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between condenser-2 harness connector and ground.

| Condenser-2 |          | Ground | Voltaga         |  |
|-------------|----------|--------|-----------------|--|
| Connector   | Terminal | Ground | Voltage         |  |
| F26         | 1        | Ground | Battery voltage |  |

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

# **3.**CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.

- 2. Disconnect IPDM E/R harness connector F10.
- 3. Check the continuity between IPDM E/R harness connector and condenser-2 harness connector.

| IPDM E/R  |          | Conde     | Condenser-2 |            |
|-----------|----------|-----------|-------------|------------|
| Connector | Terminal | Connector | Terminal    | Continuity |
| F10       | 53       | F26       | 1           | Existed    |

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

#### Is the inspection result normal?

YES >> Go to EC-114, "Diagnosis Procedure".

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

#### 4.CHECK CONDENSER-2 GROUND CIRCUIT FOR OPEN AND SHORT

#### 1. Turn ignition switch OFF.

2. Check the continuity between condenser-2 harness connector and ground.

| Condenser-2 |          | Ground | Continuity |  |
|-------------|----------|--------|------------|--|
| Connector   | Terminal | Ground | Continuity |  |
| F26         | 2        | Ground | Existed    |  |

#### 3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

## 5. CHECK CONDENSER

Refer to <u>EC-394</u>, "Component Inspection (Condenser-2)" Is the inspection result normal?





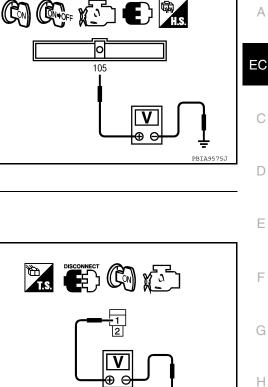
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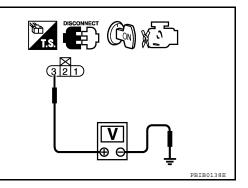
YES >> GO TO 6.

NO >> Replace condenser.

**6.**CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

- 1. Reconnect all harness connectors disconnected.
- 2. Disconnect ignition coil harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ignition coil harness connector and ground.

|          | Ignition coil |          | Ground   | Voltage         |
|----------|---------------|----------|----------|-----------------|
| Cylinder | Connector     | Terminal | Cround   | voltage         |
| 1        | F34           | 3        |          | Battery voltage |
| 2        | F35           | 3        | - Ground |                 |
| 3        | F36           | 3        |          |                 |
| 4        | F37           | 3        |          |                 |



Is the inspection result normal?

YES >> GO TO 7.

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

### 7.CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Check the continuity between ignition coil harness connector and ground.

| Ignition coil |           | Ground   | Continuity |            |  |
|---------------|-----------|----------|------------|------------|--|
| Cylinder      | Connector | Terminal | Cround     | Continuity |  |
| 1             | F34       | 2        |            |            |  |
| 2             | F35       | 2        | Ground     | Existed    |  |
| 3             | F36       | 2        |            |            |  |
| 4             | F37       | 2        |            |            |  |

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.

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

 ${f 8.}$  CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.

2. Check the continuity between ECM harness connector and ignition coil harness connector.

|          | Ignition coil |          | ECM       |          | Continuity |
|----------|---------------|----------|-----------|----------|------------|
| Cylinder | Connector     | Terminal | Connector | Terminal | Continuity |
| 1        | F34           | 1        | F14       | 11       |            |
| 2        | F35           | 1        |           | 10       | Existed    |
| 3        | F36           | 1        |           | 9        | Existed    |
| 4        | F37           | 1        |           | 21       |            |

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

Is the inspection result normal?

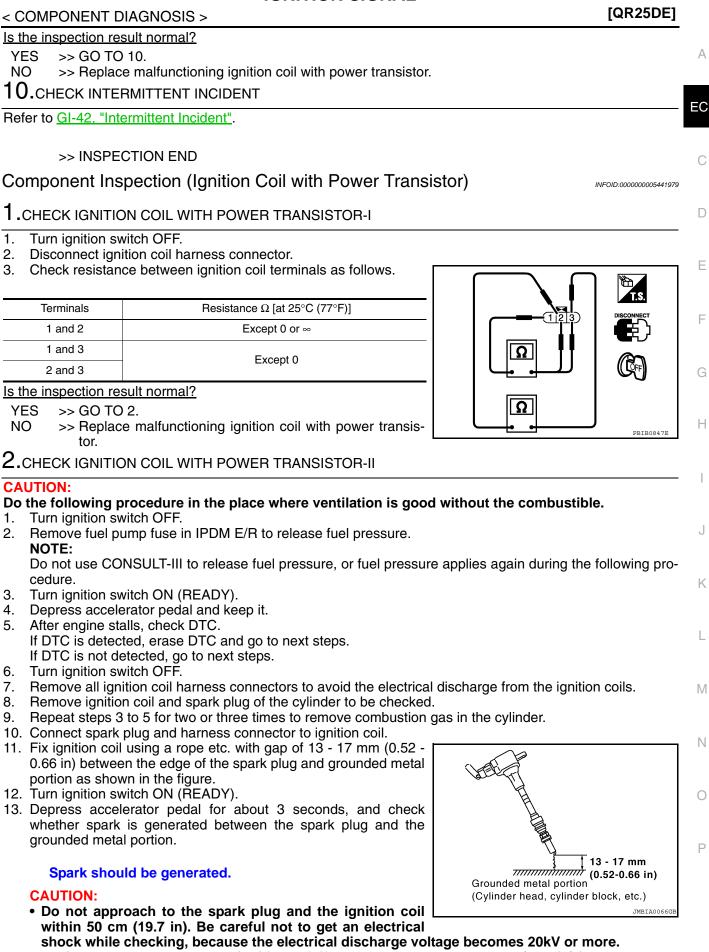
YES >> GO TO 9.

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

9.CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-393, "Component Inspection (Ignition Coil with Power Transistor)".

# **IGNITION SIGNAL**



• It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.

# **IGNITION SIGNAL**

< COMPONENT DIAGNOSIS >

# NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is mal-functioning.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning ignition coil with power transistor.

Component Inspection (Condenser-2)

INFOID:000000005441980

# 1.CHECK CONDENSER-2

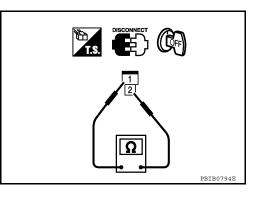
- 1. Turn ignition switch OFF.
- 2. Disconnect condenser-2 harness connector.
- 3. Check resistance between condenser-2 terminals as follows.

| Terminals | Resistance                  |
|-----------|-----------------------------|
| 1 and 2   | Above 1 MΩ [at 25°C (77°F)] |

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace condenser-2.



# MALFUNCTION INDICATOR LAMP

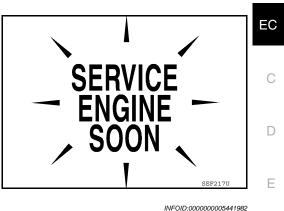
# Description

The Malfunction Indicator Lamp (MIL) is located on the combination meter.

The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.

When the engine is started, the MIL should go off. If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.

For details, refer to EC-395. "Diagnosis Procedure".



# **Component Function Check**

| 1. CHECK MIL FUNCTION   | F   |
|---|-----|
| <ol> <li>Turn ignition switch ON.</li> <li>Make sure that MIL lights up.</li> <li>Is the inspection result normal?</li> </ol>                                       | G   |
| YES >> INSPECTION END<br>NO >> Go to <u>EC-395. "Diagnosis Procedure"</u> .   | Н   |
| Diagnosis Procedure   |     |
| 1.снеск отс   |     |
| Check that DTC U1000 or U1001 is not displayed.   |     |
| <u>Is the inspection result normal?</u><br>YES >> GO TO 2.<br>NO >> Perform trouble diagnosis for DTC U1000, U1001. Refer to <u>EC-119, "Diagnosis Procedure"</u> . | J   |
| 2.CHECK DTC WITH COMBINATION METER  | LZ. |
| Refer to <u>MWI-53, "DTC Index"</u> .   | K   |
| Is the inspection result normal?  |     |
| YES >> GO TO 3.<br>NO >> Repair or replace.   | L   |
| 3. CHECK INTERMITTENT INCIDENT  |     |
| Refer to GI-42, "Intermittent Incident".  | M   |
| Is the inspection result normal?  |     |
| YES >> Replace combination meter.<br>NO >> Repair or replace.   | Ν   |
|   | 0   |
|   | 0   |

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[QR25DE]

INFOID:000000005441981

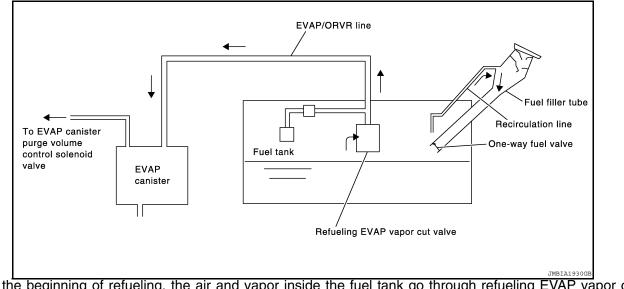
Α

# ON BOARD REFUELING VAPOR RECOVERY (ORVR)

#### < COMPONENT DIAGNOSIS >

# ON BOARD REFUELING VAPOR RECOVERY (ORVR)

# Description



From the beginning of refueling, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve and EVAP/ORVR line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

#### WARNING:

When conducting inspections below, be sure to observe the following:

- Put a "CAUTION: FLAMMABLE" sign in workshop.
- Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Be sure to furnish the workshop with a CO<sub>2</sub> fire extinguisher.

#### CAUTION:

- Before removing fuel line parts, carry out the following procedures:
- Put drained fuel in an explosion-proof container and put lid on securely.
- Release fuel pressure from fuel line. Refer to EC-465, "Inspection".
- Disconnect battery ground cable.
- Always replace O-ring when the fuel gauge retainer is removed.
- Do not kink or twist hose and tube when they are installed.
- Do not tighten hose and clamps excessively to avoid damaging hoses.
- After installation, run engine and check for fuel leaks at connection.
- Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

# **Component Function Check**

INFOID:000000005441985

[QR25DE]

INFOID:000000005441984

# **1**.CHECK ORVR FUNCTION

Check whether the following symptoms are present.

- Fuel odor from EVAP canister is strong.
- Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

#### Is any symptom present?

YES >> Go to <u>EC-396, "Diagnosis Procedure"</u>. NO >> INSPECTION END

### Diagnosis Procedure

**1**.INSPECTION START

Check whether the following symptoms are present. A: Fuel odor from EVAP canister is strong. INFOID:000000005441986

| ON BOARD REFUELING VAPOR RECOVERY (ORVR)<br>< COMPONENT DIAGNOSIS > [QR25DE]   |    |
|--|----|
| B: Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.<br>Which symptom is present?  | A  |
| A >> GO TO 2.<br>B >> GO TO 7.   |    |
| 2. CHECK EVAP CANISTER   | EC |
| 1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor  |    |
| <ul> <li>attached.</li> <li>Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.</li> </ul> | С  |
| The weight should be less than 2.8 kg (6.2 lb).<br>Is the inspection result normal?  | D  |
| YES $>>$ GO TO 3.  |    |
| NO >> GO TO 4.   | Е  |
| ${f 3.}$ CHECK IF EVAP CANISTER SATURATED WITH WATER   |    |
| Check if water will drain from EVAP canister.  |    |
| Does water drain from the EVAP canister?   | F  |
| YES >> GO TO 4.<br>NO >> GO TO 6.  | G  |
|  | Н  |
| 4.REPLACE EVAP CANISTER  | I  |
| Replace EVAP canister with a new one.  |    |
| >> GO TO 5.  | J  |
| 5. DETECT MALFUNCTIONING PART  |    |
| Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.   | Κ  |
|  |    |
| >> Repair or replace EVAP hose.  | L  |
| 6.CHECK REFUELING EVAP VAPOR CUT VALVE   |    |
| Refer to EC-399, "Component Inspection".   | ъл |
| Is the inspection result normal?   | Μ  |
| YES >> INSPECTION END<br>NO >> Replace refueling EVAP vapor cut valve with fuel tank.  |    |
| 7. CHECK EVAP CANISTER   | Ν  |
| 1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor  |    |
| <ul><li>attached.</li><li>Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.</li></ul>    | 0  |
| The weight should be less than 2.8 kg (6.2 lb).  | D  |
| Is the inspection result normal?   | Р  |
| YES >> GO TO 8.<br>NO >> GO TO 9.  |    |
| 8 CHECK IE EVAD CANIESTED SATI IDATED WITH WATED   |    |

 $\mathbf{8}$ .CHECK IF EVAP CANISTER SATURATED WITH WATER

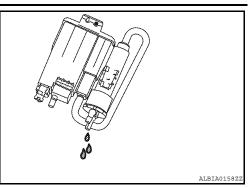
## **ON BOARD REFUELING VAPOR RECOVERY (ORVR)**

< COMPONENT DIAGNOSIS >

[QR25DE]

Check if water will drain from EVAP canister. <u>Does water drain from the EVAP canister?</u>

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



**9.**REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 10.

## **10.** DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

#### 11.CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace hoses and tubes.

12. CHECK RECIRCULATION LINE

Check recirculation line for clogging, dents and cracks.

Is the inspection result normal?

- YES >> GO TO 13.
- NO >> Replace fuel filler tube.

**13.**CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-399. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

**14.**CHECK FUEL FILLER TUBE

Check fuel filler tube and hose connected to the fuel tank for clogging, dents and cracks.

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace fuel filler tube.

15. CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

Is the inspection result normal?

YES >> GO TO 16.

NO >> Repair or replace one-way fuel valve with fuel tank.

**16.**CHECK ONE-WAY FUEL VALVE-II

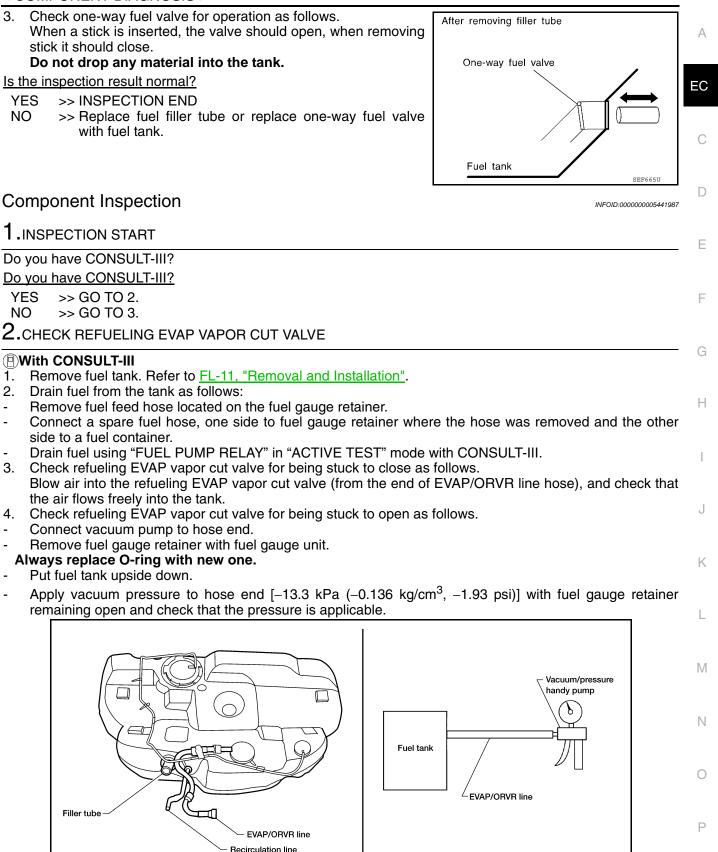
1. Make sure that fuel is drained from the tank.

2. Remove fuel filler tube and hose.

## ON BOARD REFUELING VAPOR RECOVERY (ORVR)

#### < COMPONENT DIAGNOSIS >

[QR25DE]



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

**3.**CHECK REFUELING EVAP VAPOR CUT VALVE

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## ON BOARD REFUELING VAPOR RECOVERY (ORVR)

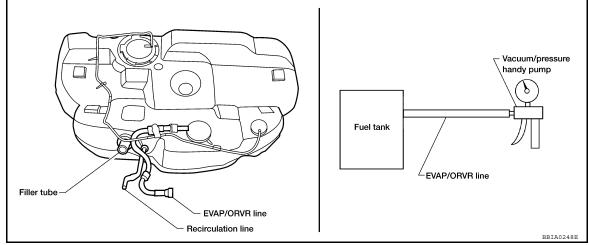
< COMPONENT DIAGNOSIS >

#### Without CONSULT-III

- 1. Remove fuel tank. Refer to <u>FL-11, "Removal and Installation"</u>.
- 2. Drain fuel from the tank as follows:
- Remove fuel gauge retainer.
- Drain fuel from the tank using a handy pump into a fuel container.
- 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.
- 4. 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.

- Put 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
- NO >> Replace refueling EVAP vapor cut valve with fuel tank.

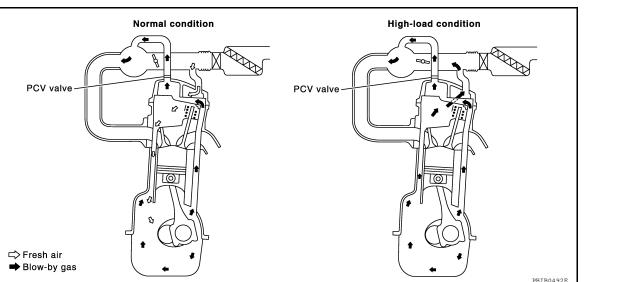
#### < COMPONENT DIAGNOSIS >

## POSITIVE CRANKCASE VENTILATION

## Description



[QR25DE]



This system returns blow-by gas to the intake manifold.

The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

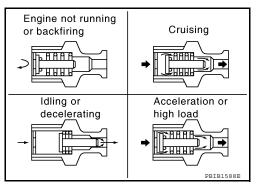
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

EC-401

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.



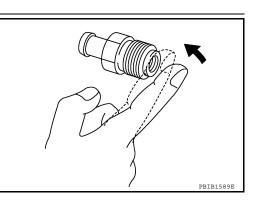
#### Component Inspection

#### **1.**CHECK PCV VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.

#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace PCV valve.



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#### < COMPONENT DIAGNOSIS >

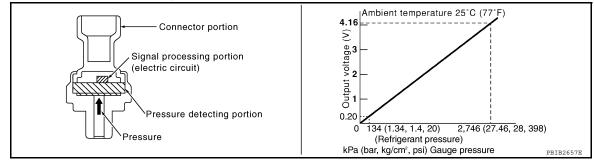
## REFRIGERANT PRESSURE SENSOR

## Description

INFOID:000000005441990

[QR25DE]

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:000000005441991

#### 1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

- 1. Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and warm up engine to normal operating temperature.
- 2. Turn A/C switch and blower fan switch ON.
- Check the voltage between ECM harness connector and ground.

|           | ECM   |        | Voltage    |  |
|-----------|---|--------|------------|--|
| Connector | Connector Terminal                            |        | voltage    |  |
| F13       | 39<br>(Refrigerant pressure sensor<br>signal) | Ground | 1.0 - 4.0V |  |

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-402, "Diagnosis Procedure".

#### **Diagnosis Procedure**

INFOID:000000005441992

#### **1.**CHECK GROUND CONNECTION

- 1. Turn A/C switch and blower fan switch OFF.
- 2. Turn ignition switch OFF.
- 3. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

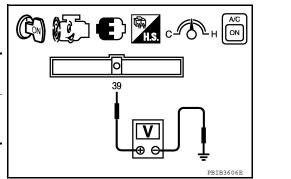
Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

#### 2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect refrigerant pressure sensor harness connector.
- 2. Turn ignition switch ON.



## **REFRIGERANT PRESSURE SENSOR**

Voltage

Approx. 5V

#### < COMPONENT DIAGNOSIS >

Refrigerant pressure sensor

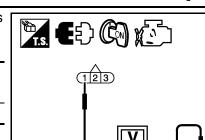
Terminal

1

Check the voltage between refrigerant pressure sensor harness connector and ground.

Ground

Ground



Is the inspection result normal?

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

Connector

E219

## **3.**DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F82, E78
- Harness for open or short between ECM and refrigerant pressure sensor

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

#### 4.CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

| Refrigerant p | ressure sensor | ECM                |    | Continuity |  |
|---------------|----------------|--------------------|----|------------|--|
| Connector     | Terminal       | Connector Terminal |    | Continuity |  |
| E219          | 3              | F13                | 40 | Existed    |  |

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

| Is the inspection result normal?      |  |
|---------------------------------------|--|
| · · · · · · · · · · · · · · · · · · · |  |

| YES | >> GO | то         | 6. |
|-----|-------|------------|----|
| 10  | ~~~   | <b>T</b> 0 | _  |

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors F82, E78

· Harness for open or short between ECM and refrigerant pressure sensor

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

#### 6.CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and refrigerant pressure sensor harness connector.

| Refrigerant p | ressure sensor | ECM                |    | Continuity |  |
|---------------|----------------|--------------------|----|------------|--|
| Connector     | Terminal       | Connector Terminal |    | Continuity |  |
| E219          | 2              | F13                | 39 | 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.

#### **I**.DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors F82, E78
- Harness for open or short between ECM and refrigerant pressure sensor

#### EC-403

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< COMPONENT DIAGNOSIS >

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

## $8. {\sf CHECK} {\sf INTERMITTENT} {\sf INCIDENT}$

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.

NO >> Repair or replace.

# < ECU DIAGNOSIS > ECU DIAGNOSIS >

## ECM

#### **Reference Value**

## VALUES ON THE DIAGNOSIS TOOL

#### NOTE:

Specification data are reference values.

• Specification data are output/input values which are detected or supplied by the ECM at the connector. \* Specification data may not be directly related to their components signals/values/operations.

i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. this IGN 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.

• If necessary, activate "INSPECTION MODE 1" (HBC-104).

| Monitor Item   |  | Values/Status                              |   |  |  |  |
|----------------|--|--|---|--|--|--|
| ENG SPEED      | SeeEC-11, "BASIC INSPECTION : Special Repair Requirement".   |  |   |  |  |  |
| MAS A/F SE-B1  | See EC-106, "Diagnosis Procedure".   |  |   |  |  |  |
| B/FUEL SCHDL   | See EC-106, "Diagnosis Proce   | dure".                                     |   |  |  |  |
| A/F ALPHA-B1   | See EC-106, "Diagnosis Proce   | dure".                                     |   |  |  |  |
| COOLAN TEMP/S  | Engine: After warming up   |  | More than 70°C (158°F)                          |  |  |  |
| A/F SEN1 (B1)  | Engine: After warming up   | Maintaining engine speed at 2,500 rpm      | Fluctuates around 2.2 V                         |  |  |  |
| HO2S2 (B1)     | tions are met.<br>- Engine: After warming up<br>- Driving for 3 minutes at a spe   |  |   |  |  |  |
| HO2S3(B1)      | <ul> <li>Engine running after the follo</li> <li>Engine: After warming up</li> <li>Driving for 3 minutes at a spectrum (Keep the vehicle speed as set as the vehicle speed as the v</li></ul>             | 0 - 1.0V                                   |   |  |  |  |
| HO2S2 MNTR(B1) | <ul> <li>Revving engine from idle up tions are met.</li> <li>Engine: After warming up</li> <li>Driving for 3 minutes at a spectific the vehicle speed as set to be the vehicle speed as se</li></ul> | $LEAN \leftarrow \rightarrow RICH$         |   |  |  |  |
| VHCL SPEED SE  | Turn drive wheels and comparindication.  | are CONSULT-III value with the speedometer | Almost the same speed as speedometer indication |  |  |  |
| BATTERY VOLT   | Ignition switch: ON (Engine s  | topped)                                    | 11 – 14V  |  |  |  |
|                | Ignition switch: ON  | Accelerator pedal: Fully released          | More than 0.36V                                 |  |  |  |
| TP SEN 1-B1    | Selector lever: D  | Accelerator pedal: Fully depressed         | Less than 4.75V                                 |  |  |  |
| TP SEN 2-B1*   | Ignition switch: ON  | Accelerator pedal: Fully released          | More than 0.36V                                 |  |  |  |
| IF JEN 2-DI    | Selector lever: D  | Accelerator pedal: Fully depressed         | Less than 4.75V                                 |  |  |  |
| FUEL T/TMP SE  | Ignition switch: ON  |  | Indicates fuel tank tempera-<br>ture            |  |  |  |
| INT/A TEMP SE  | Ignition switch: ON  | Ignition switch: ON                        |   |  |  |  |
| EVAP SYS PRES  | Ignition switch: ON  |  | Approx. 1.8 – 4.8V                              |  |  |  |
| FUEL LEVEL SE  | Ignition switch: ON  |  |   |  |  |  |
| START SIGNAL   | <ul> <li>INSPECTION MODE</li> <li>Ignition switch: ON → ON (R</li> </ul>   | EADY)                                      | $OFF\toON\toOFF$                                |  |  |  |

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#### < ECU DIAGNOSIS >

| Monitor Item   | C  | condition  | Values/Status       |
|----------------|--|--|---------------------|
|                |  | ENG POWER RQST: 0 kW   | ON                  |
| CLSD THL POS   | <ul> <li>Ignition switch: ON (READY)</li> </ul>  | ENG POWER RQST: Except 0 kW  | OFF                 |
|                |  | Air conditioner switch: OFF  | OFF                 |
| AIR COND SIG   | Ignition switch: ON (READY)  | Air conditioner switch: ON<br>(Compressor operates.)                   | ON                  |
| P/N POSI SW    | Ignition switch: ON  | Selector lever: P or N   | ON                  |
|                | Ignition Switch. Or  | Selector lever: Except above   | OFF                 |
| PW/ST SIGNAL   | Ignition switch: ON  |  | OFF                 |
| LOAD SIGNAL    | Ignition switch: ON  | Rear window defogger switch: ON and/or Lighting switch: 2nd position   | ON                  |
| LOAD SIGNAL    |  | Rear window defogger switch and light-<br>ing switch: OFF              | OFF                 |
| IGNITION SW    | • Ignition switch: $ON \rightarrow OFF \rightarrow OI$   | N  | $ON\toOFF\toON$     |
|                | Ignition owitch: ON (DEAD)()   | Heater fan switch: ON  | ON                  |
| HEATER FAN SW  | Ignition switch: ON (READY)  | Heater fan switch: OFF   | OFF                 |
| BRAKE SW       |  | Brake pedal: Fully released  | OFF                 |
| DRAKE SW       | Ignition switch: ON  | Brake pedal: Slightly depressed  | ON                  |
|                | Engine: After warming up   | Idle   | 2.0 – 3.0 msec      |
| INJ PULSE-B1   | <ul><li>Selector lever: P</li><li>No load</li></ul>  | 2,500 rpm  | 1.9 – 2.9 msec      |
| IGN TIMING     | <ul><li>Engine: After warming up</li><li>Selector lever: N</li></ul>   | Idle   | 11° – 21° BTDC      |
|                | Engine: After warming up   | Idle   | 10% – 35%           |
| CAL/LD VALUE   | <ul><li>Selector lever: P</li><li>No load</li></ul>  | 2,500 rpm  | 10% – 35%           |
|                | <ul> <li>Engine: After warming up</li> <li>Selector lever: P</li> <li>No load</li> </ul>   | Idle   | 1.0 – 5.0 g⋅m/s     |
| MASS AIRFLOW   |  | 2,500 rpm  | 4.0 – 12.0 g⋅m/s    |
|                | Engine: After warming up   | Vehicle speed: 0 km/h (0 MPH)  | 0%                  |
| PURG VOL C/V   | 150 seconds or more after turn-<br>ing ignition switch ON (READY)  | Vehicle speed: 70 km/h (43 MPH) or more (Accelerator pedal: Depressed) | 20% – 90%           |
| INT/V TIM(B1)  | <ul> <li>Engine: After warming up</li> <li>Selector lever: P</li> <li>No load</li> </ul>   | ldle   | Approx. 20° – 30°CA |
| INT/V SOL(B1)  | <ul> <li>Engine: After warming up</li> <li>Selector lever: P</li> <li>No load</li> </ul>   | ldle   | Approx. 50% – 60%   |
| FUEL PUMP RLY  | <ul> <li>For 1 seconds after turning ignition</li> <li>Engine running or cranking</li> </ul>   | on switch: ON  | ON                  |
|                | Except above   |  | OFF                 |
| VENT CONT/V    | Ignition switch: ON  |  | OFF                 |
| THRTL RELAY    | Ignition switch: ON  |  | ON                  |
| HO2S2 HTR (B1) | <ul> <li>Engine speed: Below 3,600 rpm</li> <li>Engine: Running after warming u</li> <li>Driving for 3 minutes at a speed<br/>(Keep the vehicle speed as stead)</li> </ul> | ON   |                     |
|                | Engine speed: Above 3,600 rpm  |  | OFF                 |

#### < ECU DIAGNOSIS >

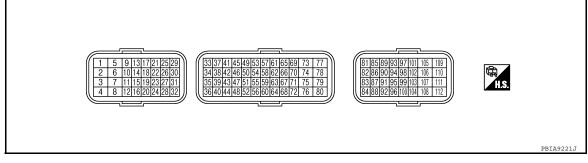
| Monitor Item        | (   | Condition  | Values/Status   | ٨   |
|---------------------|---|--|---|-----|
| HO2S3 HTR(B1)       | <ul> <li>Engine speed: Below 3,600 rpm</li> <li>Engine: Running after warming</li> <li>Driving for 3 minutes at a speed<br/>(Keep the vehicle speed as stead</li> </ul> | ON   | EC  |     |
|                     | Engine speed: Above 3,600 rpn   | n  | OFF   |     |
| VEHICLE SPEED       | Turn drive wheels and compare indication.   | CONSULT-III value with the speedometer                             | Almost the same speed as the speedometer indication     | С   |
| IDL A/V LEARN       | Engine: running   | Idle air volume learning has not been performed yet.               | YET   |     |
|                     |   | Idle air volume learning has already been performed successfully.  | CMPLT   | D   |
| TRVL AFTER MIL      | Ignition switch: ON   | Vehicle has traveled after MIL has turned ON.                      | 0 – 65,535 km<br>(0 – 40,723 miles)                     | Е   |
| A/F S1 HTR(B1)      | Engine: After warming up, idle t<br>(More than 140 seconds after seconds)   |  | 4 – 100%  |     |
| AC PRESS SEN        | <ul><li>Engine: Idle</li><li>Both A/C switch and blower fan</li></ul>   | switch: ON (Compressor operates)                                   | 1.0 – 4.0V  | F   |
| VHCL SPEED SE       | • Turn drive wheels and compare indication.   | CONSULT-III value with the speedometer                             | Almost the same speed as the speedometer indication     | G   |
| SET VHCL SPD        | Engine: Running   | ASCD: Operating  | The preset vehicle speed is displayed                   |     |
|                     | • Ignition quitch: ON   | MAIN switch: Pressed   | ON  | Н   |
| MAIN SW             | <ul> <li>Ignition switch: ON</li> </ul>   | MAIN switch: Released  | OFF   |     |
|                     | a Invition quitable ON  | CANCEL switch: Pressed   | ON  |     |
| CANCEL SW           | Ignition switch: ON   | CANCEL switch: Released  | OFF   |     |
| RESUME/ACC SW       | Ignition switch: ON   | RESUME/ACCELERATE switch:<br>Pressed                               | ON  |     |
| RESUME/ACC SW       |   | RESUME/ACCELERATE switch: Re-<br>leased                            | OFF   | J   |
| SET SW              | Ignition switch: ON   | SET/COAST switch: Pressed  | ON  | К   |
| 5ET 5W              |   | SET/COAST switch: Released   | OFF   | I.  |
| BRAKE SW1           | e Ignition quitabi ON   | Brake pedal: Fully released  | ON  |     |
| (ASCD brake switch) | Ignition switch: ON   | Brake pedal: Slightly depressed                                    | OFF   | L   |
| BRAKE SW2           | Ignition switch: ON   | Brake pedal: Fully released  | OFF   |     |
| (Stop lamp switch)  | - ignition switch. ON   | Brake pedal: Slightly depressed                                    | ON  | М   |
| VHCL SPD CUT        | <ul> <li>Ignition switch: ON</li> </ul>   |  | NON   | IVI |
| LO SPEED CUT        | Ignition switch: ON   |  | NON   |     |
| AT OD MONITOR       | Ignition switch: ON   |  | OFF   | Ν   |
| AT OD CANCEL        | Ignition switch: ON   |  | OFF   |     |
| CRUISE LAMP         | Ignition switch: ON   | MAIN switch: Pressed at the 1st time $\rightarrow$ at the 2nd time | $ON\toOFF$  | 0   |
| SET LAMP            | Ignition switch: ON   | ·  | OFF   |     |
| A/F ADJ B1          | Engine: running   |  | -0.330 - 0.330  |     |
| FAN DUTY            | Engine: Running   |  | 0 – 100%  | Ρ   |
| ACCEL PEDAL POSI    | Ignition switch: ON   |  | Depending on accelerator pedal position                 |     |
| ENG POWER RQST      | Ignition switch: ON (READY)   | Depending on signals from<br>Hybrid vehicle control ECU            |   |     |
| ENG SPEED RQST      | Ignition switch: ON (READY)   |  | Depending on signals from<br>Hybrid vehicle control ECU |     |

| [Q | DJ | 5 | n | E1 |
|----|----|---|---|----|
| IW | nz |   |   |    |

| Monitor Item        | Condition                                     | Values/Status   |
|---------------------|---|---|
| CATALYST TEMP-B1    | Engine: Running after warming up              | More than 360°C (680°F)   |
| ENG START RQST      | Ignition switch: ON (READY)                   | Depending on signals from<br>Hybrid vehicle control ECU           |
| ENG IDLE RQST       | Ignition switch: ON (READY)                   | Depending on signals from<br>Hybrid vehicle control ECU           |
| ENG F/C RQST        | Ignition switch: ON (READY)                   | Depending on signals from<br>Hybrid vehicle control ECU           |
| EVAP LEAK DIAG      | Ignition switch: ON                           | Depending on condition of EVAP leak diagnosis                     |
| EVAP DIAG READY     | Ignition switch: ON (READY)                   | Depending on ready condi-<br>tion of EVAP leak diagnosis          |
| ENG START DIAG      | Ignition switch: ON (READY)                   | Depending on condition of<br>engine does not start diagno-<br>sis |
| ENG ST DIAG RSLT    | Ignition switch: ON (READY)                   | Depending on result of en-<br>gine does not start diagnosis       |
| HO2 S2 DIAG2 (B1)   | NOTE:<br>The item is indicated, but not used. | _   |
| HO2 S2 DIAG2 (B2)   | NOTE:<br>The item is indicated, but not used. | _   |
| A/F SEN1 DIAG2 (B1) | NOTE:<br>The item is indicated, but not used. |   |
| A/F SEN1 DIAG2 (B2) | NOTE:<br>The item is indicated, but not used. | _   |

\*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

#### TERMINAL LAYOUT



#### PHYSICAL VALUES

#### NOTE:

- ECM is located in the engine room left side near inverter with converter assembly.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.
- If necessary, activate "INSPECTION MODE 1" (HBC-104).

#### CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

#### < ECU DIAGNOSIS >

| Termi    | inal No. |               | Description                                    |                  |   |   | А  |
|----------|----------|---------------|--|------------------|---|---|----|
| +        |          | Wire<br>color | Signal name                                    | Input/<br>Output | Condition   | Value<br>(Approx.)  |    |
| 2        | Ground   | L             | Throttle control motor relay power supply      | Input            | [Ignition switch: ON]   | BATTERY VOLTAGE<br>(11 - 14V)                                       | EC |
| 4        | Ground   | LG            | A/F sensor 1 heater                            | 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 - 8.8V★<br>50mSec/div<br>50mSec/div<br>50mSec/div<br>50mSec/div | C  |
|          |          |               |  |                  |   | 0 - 14V★  | E  |
| 5        | Ground   | GR            | Throttle control motor<br>(Open)               | Output           | <ul><li>[Ignition switch: ON]</li><li>Selector lever: D</li><li>Accelerator pedal: Fully depressed</li></ul>  | 1mSec/div   | F  |
|          |          |               |  |                  |   | 0 - 14V★  |    |
| 6        | Ground   | BR            | Throttle control motor<br>(Close)              | Output           | <ul><li>[Ignition switch: ON]</li><li>Selector lever: D</li><li>Accelerator pedal: Fully released</li></ul>   | 1 mSec/div  | Η  |
| 7        |          |               | Tumble control valve motor power supply        |                  |   | 5V/div jmbia0084gb  | J  |
|          |          |               |  |                  |   | 0 - 0.2V★   | К  |
| 9<br>10  | Ground   | O<br>LG       | Ignition signal No. 3<br>Ignition signal No. 2 | Output           | <ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed<br/>NOTE:<br/>The pulse cycle changes depending on rpm at idle</li> </ul> | 20mSec/div  | L  |
| 11<br>21 | Giounu   | Y<br>BR       | Ignition signal No. 1<br>Ignition signal No. 4 | Output           |   | 0 - 0.3V★   | Μ  |
|          |          | 2             |  |                  | <ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,500 rpm</li></ul>   | 20mSec/div  | N  |
| 12<br>16 | Ground   | GR<br>B       | ECM ground                                     |                  | [Engine is running]<br>• Idle speed   | Body ground   | Р  |

#### < ECU DIAGNOSIS >

#### Terminal No. Description Wire Value Condition Input/ color (Approx.) Signal name + Output [Engine is running] • Engine speed: Below 3,600 10V★ rpm after the following con-50mSec/div ditions are met - Engine: after warming up - Driving for 3 minutes at a speed of 80 km/h (50 MPH) or more Heated oxygen sensor 2 13 Ground Υ Output (Keep the vehicle speed as heater steady as possible during 5V/div JMBIA0037GB the cruising.) [Ignition switch: ON] Engine stopped BATTERY VOLTAGE [Engine is running] (11 - 14V) • Engine speed: Above 3,600 rpm [Ignition switch: ON] · For 1 second after turning 0 - 1.0V ignition switch ON [Engine is running] 14 Ground B/R Fuel pump relay Output [Ignition switch: ON] BATTERY VOLTAGE • More than 1 second after (11 - 14V) turning ignition switch ON 0 - 1.0V BATTERY VOLTAGE [Ignition switch: $ON \rightarrow OFF$ ] (11 - 14V) 15 R Output Ground Throttle control motor relay 0V [Ignition switch: ON] 0 - 1.0V [Engine is running] • Engine speed: Below 3,600 10V★ rpm after the following con-50mSec/div ditions are met - Engine: after warming up - Driving for 3 minutes at a speed of 80 km/h (50 MPH) Heated oxygen sensor 3 or more 17 Ground L Output heater (Keep the vehicle speed as steady as possible during 5V/div JMBIA0037GB the cruising.) [Engine is running] BATTERY VOLTAGE • Engine speed: Above 3,600 rpm (11 - 14V) [Ignition switch: ON] [Engine is running] [Ignition switch: OFF] 0 - 1.0V • A few seconds after turning ignition switch OFF ECM relay 24 Ground SB Output (Self shut-off) [Ignition switch: OFF] BATTERY VOLTAGE · More than a few seconds after turning ignition switch (11 - 14V) OFF

| Term     | inal No. | Miro          | Description                                |                  |  | Value  |              |
|----------|----------|---------------|--|------------------|--|--|--------------|
| +        |          | Wire<br>color | Signal name                                | Input/<br>Output | Condition  | Value<br>(Approx.)   | A            |
|          |          |               | EVAP canister purge volume                 |                  | [Engine is running]<br>• Idle speed  | BATTERY VOLTAGE<br>(11 - 14V)★<br>50mSec/div<br>€<br>20V/div JMBIA0087GB | EC<br>C<br>D |
| 25       | Ground   | Ρ             | control solenoid valve                     | Output           | <ul> <li>[Engine is running]</li> <li>150 seconds or more after turning ignition switch ON (READY)</li> <li>Vehicle speed: 70 km/h (43MPH) or more</li> <li>Accelerator pedal: De-</li> </ul>  | BATTERY VOLTAGE<br>(11 - 14V)★<br>50mSec/div                             | E            |
|          |          |               |  |                  | pressed  | 10V/div JMBIA0088GB<br>BATTERY VOLTAGE                                   | G            |
|          |          |               |  |                  | <ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li><li>NOTE:</li></ul>   | (11 - 14V)★<br>50mSec/div  | Н            |
| 29<br>30 | Ground   | LG<br>W       | Fuel injector No. 4<br>Fuel injector No. 3 | Output           | The pulse cycle changes depending on rpm at idle   | TOV/div JMBIA0089GB  | Ι            |
| 31<br>32 |          | O<br>V        | Fuel injector No. 2<br>Fuel injector No. 1 | Cuput            | [Engine is running]<br>• Warm-up condition<br>• Engine speed: 2,500 rpm  | BATTERY VOLTAGE<br>(11 - 14V)★<br>50mSec/div                             | J<br>K<br>L  |
|          |          |               |  |                  | <ul> <li>[Engine is running]</li> <li>Revving engine from idle to 2,500 rpm quickly after the following conditions are met</li> <li>Engine: after warming up</li> </ul>  | 10V/div JMBIA0090GB  | М            |
| 33       | Ground   | BR            | Heated oxygen sensor 2                     | Input            | <ul> <li>Driving for 3 minutes at a<br/>speed of 80 km/h (50 MPH)<br/>or more<br/>(Keep the vehicle speed as<br/>steady as possible during<br/>the cruising.)</li> </ul>   | 0 - 1.0V   | N            |
| 34       | Ground   | w             | Heated oxygen sensor 3                     | Input            | <ul> <li>[Engine is running]</li> <li>Engine running after the following conditions are met</li> <li>Engine: after warming up</li> <li>Driving for 3 minutes at a speed of 80 km/h (50 MPH) or more (Keep the vehicle speed as steady as possible during the cruising.)</li> </ul> | 0 - 1.0V   | Ρ            |

| Term | inal No. | 14/100        | Description   |                  |   | Value   |  |  |
|------|----------|---------------|---|------------------|---|---|--|--|
| +    |          | Wire<br>color | Signal name   | Input/<br>Output | Condition   | Value<br>(Approx.)  |  |  |
| 35   | Ground   | В             | Sensor ground<br>(Heated oxygen sensor 2,<br>Heated oxygen sensor 3)      | _                | <ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>  | οv  |  |  |
| 36   | Ground   | G             | Sensor ground<br>(Throttle position sensor)                               | —                | <ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>  | οv  |  |  |
| 37   | Ground   | В             | Throttle position sensor 1  | Input            | <ul><li>[Ignition switch: ON]</li><li>Selector lever: D</li><li>Accelerator pedal: Fully released</li></ul>   | More than 0.36V   |  |  |
| 07   | Ciouna   | D             |   |                  | <ul><li>[Ignition switch: ON]</li><li>Selector lever: D</li><li>Accelerator pedal: Fully depressed</li></ul>  | Less than 4.75V   |  |  |
| 38   | Ground   | R             | Throttle position sensor 2  | Input            | <ul><li>[Ignition switch: ON]</li><li>Selector lever: D</li><li>Accelerator pedal: Fully released</li></ul>   | Less than 4.75V   |  |  |
| 00   | Circuna  |               |   | mput             | <ul><li>[Ignition switch: ON]</li><li>Selector lever: D</li><li>Accelerator pedal: Fully depressed</li></ul>  | More than 0.36V   |  |  |
| 39   | Ground   | L             | Refrigerant pressure sensor   | Input            | <ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Both A/C switch and blower<br/>fan motor switch: ON (Com-<br/>pressor operates)</li> </ul> | 1.0 - 4.0V  |  |  |
| 40   | Ground   | GR            | Sensor ground<br>(Refrigerant pressure sen-<br>sor)                       | _                | <ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>  | ov  |  |  |
| 45   | Ground   | G             | A/F sensor 1 (bank 1)   | Input            | [Ignition switch: ON]   | 2.2V  |  |  |
| 46   | Ground   | Ρ             | Engine coolant temperature sensor   | Input            | [Engine is running]   | 0 - 4.8V<br>Output voltage varies with engine<br>coolant temperature. |  |  |
| 47   | Ground   | W             | Sensor power supply<br>(Throttle position sensor)                         | _                | [Ignition switch: ON]   | 5V  |  |  |
| 49   | Ground   | L             | A/F sensor 1  | Input            | <ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,500 rpm</li></ul>   | 1.8V<br>Output voltage varies with air fuel<br>ratio.                 |  |  |
| 50   | Ground   | 0             | Intake air temperature sen-<br>sor  | Input            | [Engine is running]   | 0 - 4.8V<br>Output voltage varies with intake<br>air temperature.     |  |  |
| 52   | Ground   | SB            | Sensor ground<br>(Engine coolant temperature<br>sensor)                   | _                | <ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>  | ov  |  |  |
| 56   | Ground   | R             | Sensor ground<br>(Mass air flow sensor, Intake<br>air temperature sensor) | _                | <ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>  | 0V  |  |  |



| Term | inal No. | Description   |  |                  |   | Value  |             |
|------|----------|---------------|--|------------------|---|--|-------------|
| +    |          | Wire<br>color | Signal name  | Input/<br>Output | Condition   | Value<br>(Approx.)   | A           |
| 58   | Ground   | GR            | Mass air flow sensor   | Input            | [Engine is running]<br>• Warm-up condition<br>• Selector lever: N<br>• Idle speed   | 0.9 - 1.2V   | EC          |
| 50   | Ciouna   | GIT           |  | mpar             | <ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Selector lever: P</li><li>Engine speed: 2,500 rpm</li></ul>                                       | 1.5 - 1.8V   | С           |
| 59   | Ground   | 0             | Sensor power supply<br>[Camshaft position sensor<br>(PHASE)] | _                | [Ignition switch: ON]   | 5V   | D           |
| 60   | Ground   | W             | Sensor ground<br>[Crankshaft position sensor<br>(POS)]       | _                | <ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>  | OV   | E           |
| 61   | Ground   | W             | Knock sensor   | Input            | [Engine is running]<br>• Idle speed   | 2.5V   | F           |
| 64   | Ground   | L             | Sensor ground<br>[Camshaft position sensor<br>(PHASE)]       |                  | <ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>  | OV   | G           |
| 65   | Ground   | R             | Crankshaft position sensor                                   | Input            | <ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed<br/>NOTE:<br/>The pulse cycle changes depending on rpm at idle</li> </ul>           | 1.0 - 6.0★<br>1mSec/div<br>↓<br>↓<br>↓<br>↓<br>↓<br>↓<br>↓<br>↓<br>↓<br>↓<br>↓<br>↓<br>↓ | H           |
| 03   | Ground   | n             | (POS)  | mput             | [Engine is running]<br>• Engine speed: 2,500 rpm  | 1.0 - 6.0★<br>1mSec/div<br>TmSec/div<br>2V/div JMEIA0092GB                               | J<br>K<br>L |
| 67   | Ground   |               | Sensor ground<br>(Knock sensor)                              |                  | [Engine is running]<br>• Warm-up condition<br>• Idle speed  | 0V   | M           |
| 69   | Ground   | Y             | Camshaft position 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> | 1.0 - 6.0★<br>10mSec/div<br>   | N           |
|      | Ground   | Ť             | (PHASE)  | input            | [Engine is running]<br>• Engine speed is 2,500 rpm  | 1.0 - 6.0★<br>10mSec/div<br>+<br>+<br>2V/div JMBIA0094GB                                 | Ρ           |

| Term | inal No. |               | Description   |                  |  |  |
|------|----------|---------------|---|------------------|--|--|
| +    |          | Wire<br>color | Signal name   | Input/<br>Output | Condition  | Value<br>(Approx.)   |
| 72   | Ground   | V             | Sensor power supply<br>(Refrigerant pressure sen-<br>sor)         | _                | [Ignition switch: ON]  | 5V   |
| 73   | Ground   | BR            | CAN communication line  | Input/<br>Output | _  | _  |
| 74   | Ground   | Y             | CAN communication line  | Input/<br>Output | _  | _  |
| 76   | Ground   | L             | Sensor power supply<br>[Crankshaft position sensor<br>(POS)]      |                  | [Ignition switch: ON]  | 5V   |
| 77   | Ground   | LG            | Power supply for ECM (Back-up)                                    | Input            | [Ignition switch: OFF]   | BATTERY VOLTAGE<br>(11 - 14V)  |
| 78   | Ground   | Ρ             | Intake valve timing control solenoid valve                        | Output           | <ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul> | 7 - 10V★<br>2mSec/div<br>↓<br>↓<br>↓<br>↓<br>↓<br>↓<br>↓<br>↓<br>↓<br>↓<br>↓ |
|      |          |               |   |                  | [Ignition switch: ON]<br>• ASCD steering switch: OFF                               | 4V   |
|      |          |               |   |                  | [Ignition switch: ON]<br>• MAIN switch: Pressed                                    | ov   |
| 85   | Ground   | G/Y           | ASCD steering switch  | Input            | [Ignition switch: ON]<br>• CANCEL switch: Pressed                                  | 1V   |
|      | aroana   |               |   | mpor             | [Ignition switch: ON]<br>• RESUME/ACCELERATE<br>switch: Pressed                    | 3V   |
|      |          |               |   |                  | [Ignition switch: ON]<br>• SET/COAST switch:<br>Pressed                            | 2V   |
| 86   | Ground   | G             | EVAP control system pres-<br>sure sensor                          | Input            | [Ignition switch: ON]  | 1.8 - 4.8V   |
| 88   | _        | 0             | Data link connector   | Input/<br>Output | _  | _  |
| 91   | Ground   | v             | Sensor power supply<br>(EVAP control system pres-<br>sure sensor) | _                | [Ignition switch: ON]  | 5V   |
| 92   | Ground   | R             | Sensor ground<br>(ASCD steering switch)                           | _                | <ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul> | 0V   |
| 00   |          |               | Investment of the la  |                  | [Ignition switch: OFF]   | 0V   |
| 93   | Ground   | Y             | Ignition switch   | Input            | [Ignition switch: ON]  | BATTERY VOLTAGE<br>(11 - 14V)  |
| 95   | Ground   | W             | Fuel tank temperature sen-<br>sor                                 | Input            | [Engine is running]  | 0 - 4.8V<br>Output voltage varies with fuel<br>tank temperature.             |
| 96   | Ground   | GR            | Sensor ground<br>(EVAP control system pres-<br>sure sensor)       | _                | <ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul> | ΟV   |
| 97   | _        | Ρ             | CAN communication line  | Input/<br>Output | _  | _  |

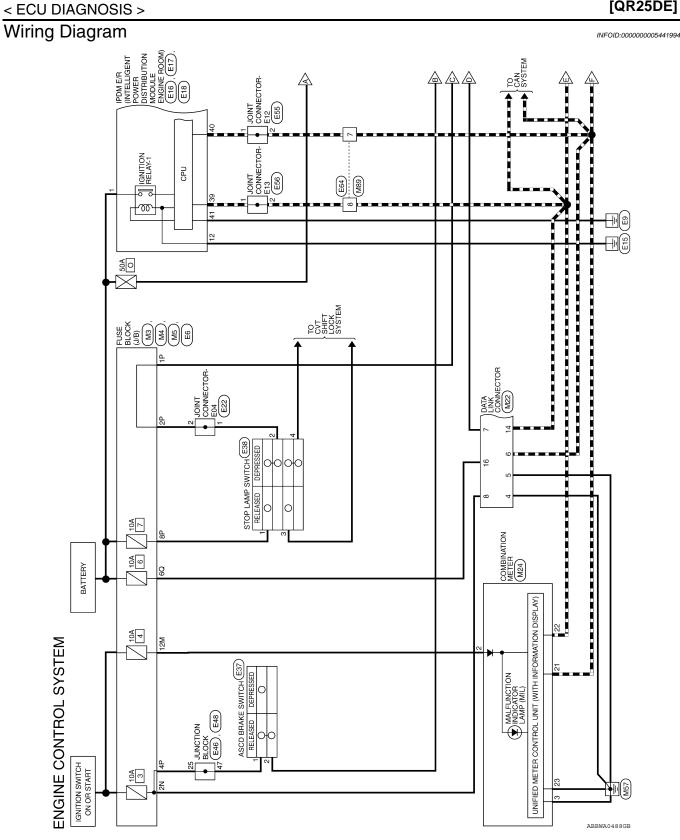
#### [QR25DE]

| Term       | inal No. | Wire  | Description  |                  |   | Value   |
|------------|----------|-------|--|------------------|---|---|
| +          |          | color | Signal name  | Input/<br>Output | Condition   | (Approx.)   |
| 98         | _        | L     | CAN communication line                               | Input/<br>Output | _   | _   |
| 99         | Ground   | L     | Engine speed signal output                           | Output           | <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 - 14V★<br>2mSec/div<br>€<br>5V/div JMCIA0009gB        |
| 103        | Ground   | Ρ     | Engine TDC signal output                             | Output           | <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 - 14V★<br>50mSec/div<br>€<br>50mSec/div<br>50mSec/div |
| 104        | Ground   | BR    | Sensor ground<br>(Fuel tank temperature sen-<br>sor) | _                | <ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>  | 0V  |
| 105        | Ground   | V     | Power supply for ECM                                 | Input            | [Ignition switch: ON]   | BATTERY VOLTAGE<br>(11 - 14V)                           |
|            |          |       |  |                  | [Ignition switch: OFF]<br>• Brake pedal: Fully released   | ov  |
| 106        | Ground   | SB    | Stop lamp switch                                     | Input            | [Ignition switch: OFF]<br>• Brake pedal: Slightly de-<br>pressed  | BATTERY VOLTAGE<br>(11 - 14V)                           |
| 107<br>108 | Ground   | В     | ECM ground   | _                | [Engine is running]<br>• Idle speed   | Body ground   |
| 109        | Ground   | W     | EVAP canister vent control valve                     | Output           | [Ignition switch: ON]   | BATTERY VOLTAGE<br>(11 - 14V)                           |
| 110        | Ground   | G/B   | ASCD brake switch                                    | Input            | <ul><li>[Ignition switch: ON]</li><li>Brake pedal: Slightly depressed</li></ul>   | OV  |
|            |          |       |  |                  | <ul><li>[Ignition switch: ON]</li><li>Brake pedal: Fully released</li></ul>   | BATTERY VOLTAGE<br>(11 - 14V)                           |
| 111<br>112 | Ground   | В     | ECM ground   | _                | [Engine is running]<br>• Idle speed   | Body ground   |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

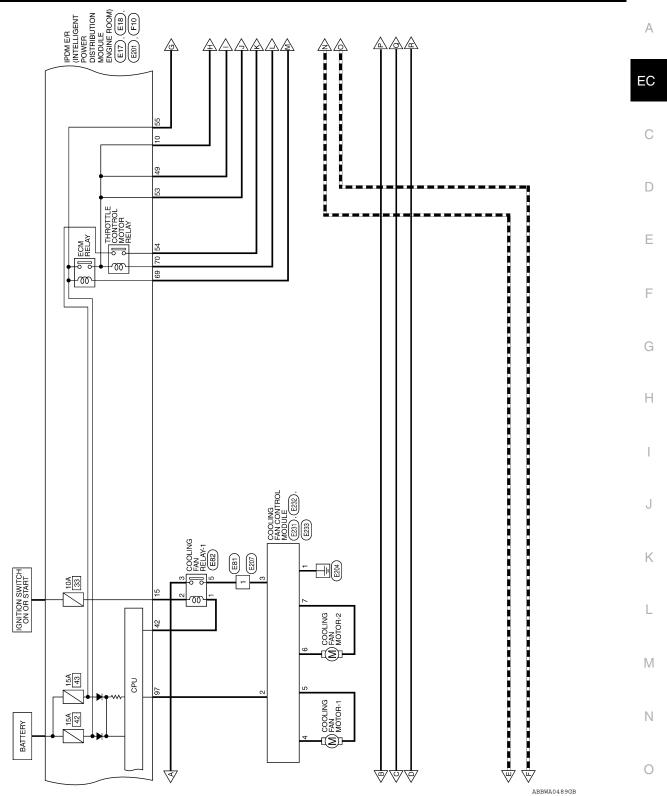
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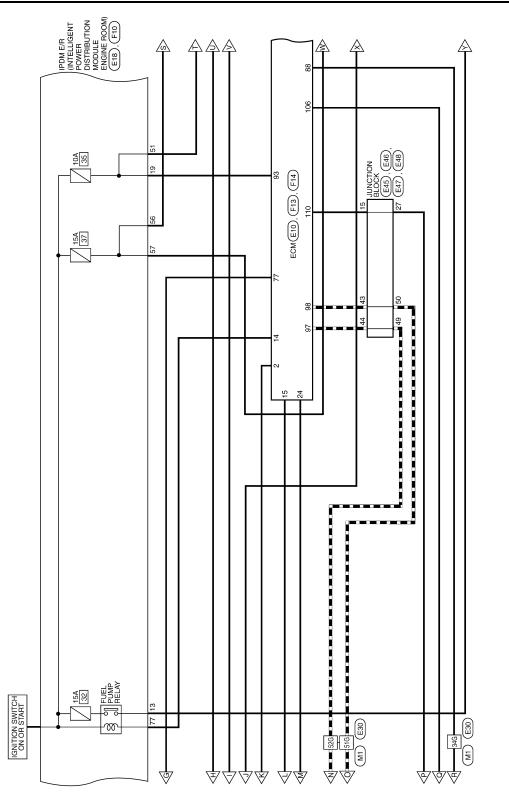


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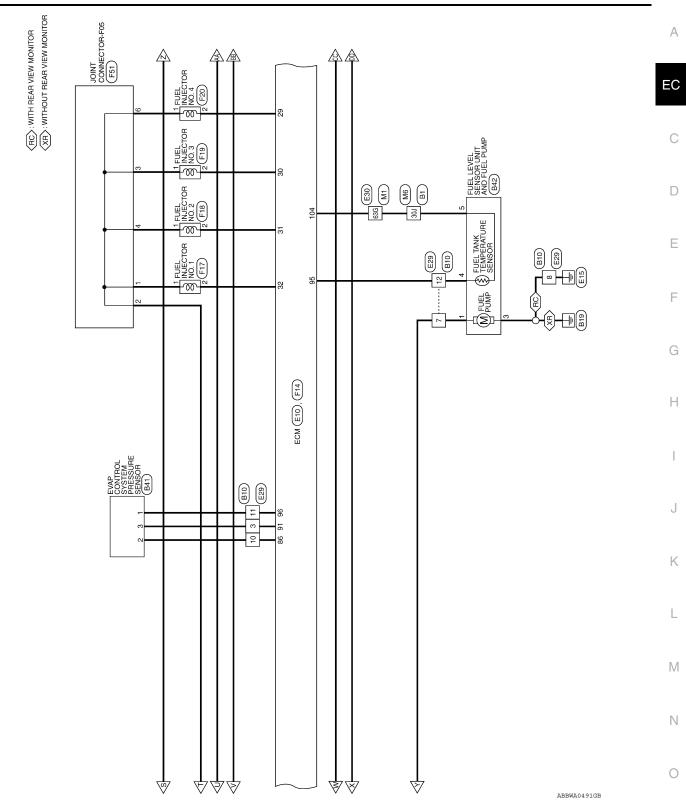




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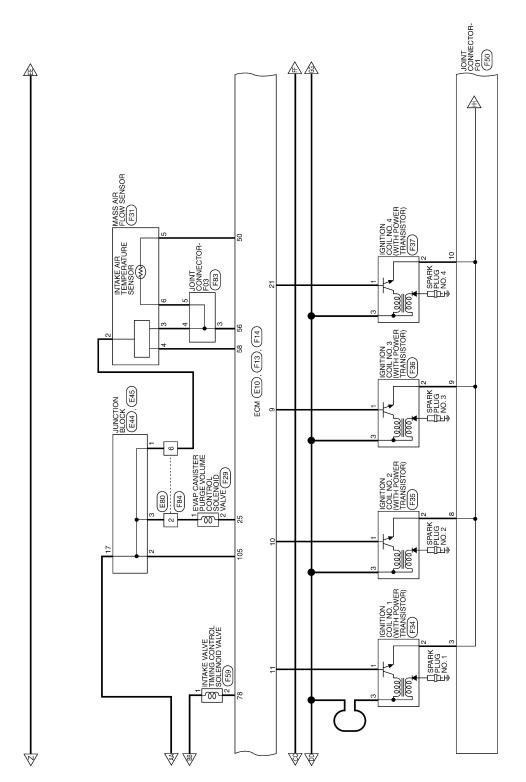


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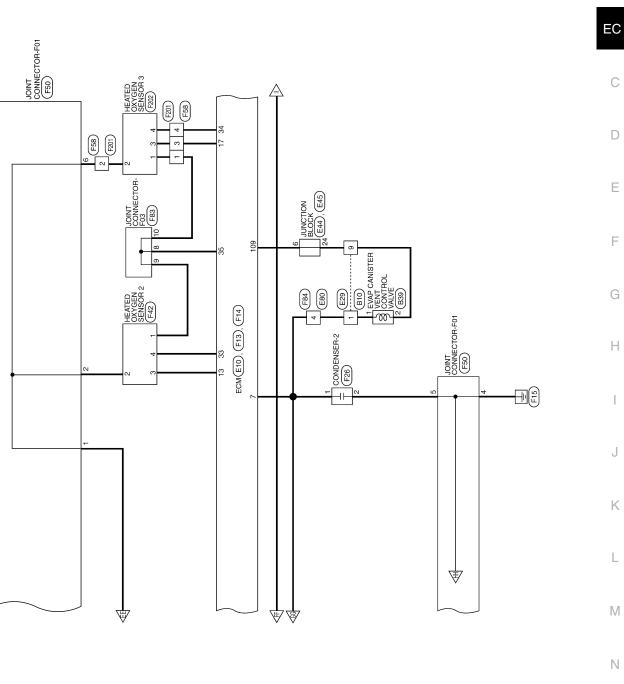
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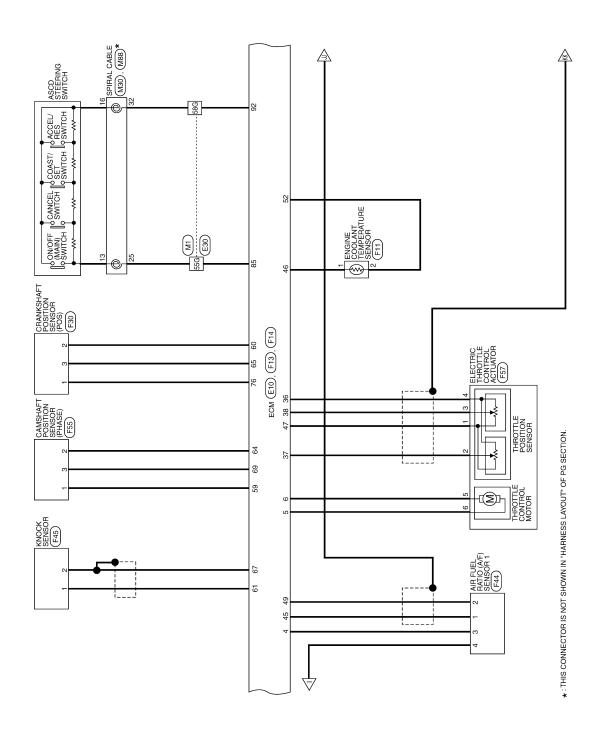


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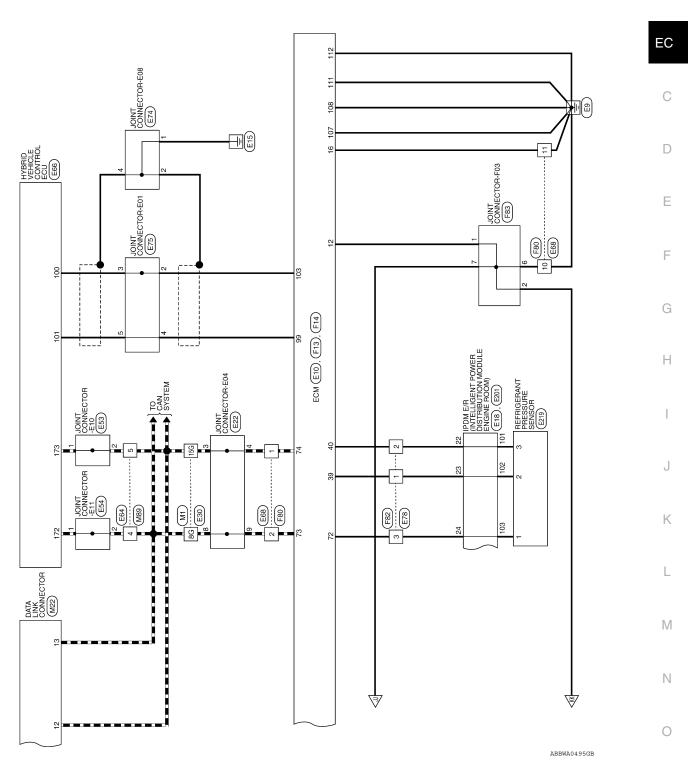
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| Connector No. M3                 | Connector Name FUSE BLOCK (J/B)<br>Connector Color WHITE | 研究<br>H.S.   | Terminal No. Kire Signal Name<br>2N G   |   |   |
|----------------------------------|--|--|---|---|---|
| Color of                         | I errinal No. Wire Signal Name<br>8G BR –<br>15G Y –     | 34G     O     -       51G     L     -       52G     P     -       55G     G/Y     -        | 58G R   | Connector No. M5<br>Connector Name<br>FUSE BLOCK (J/B)<br>Connector Color WHITE | Mathem     Mathem     Mathem       List     Existent and No.     Evolor of Vire     Signal Name       12M     O     - |
| ENGINE CONTROL SYSTEM CONNECTORS | Connector Name WIRE TO WIRE<br>Connector Color WHITE     | 96 86 76 66 56 46 36<br>170 186 156 146 136 146 136 146 106 26 10<br>100 100 100 100 26 10 | 44d         33d         32d         37d         34d         33d         32d         37d         34d         34d <td>Connector No. M4<br/>Connector Name FUSE BLOCK (J/B)<br/>Connector Color WHITE</td> <td>Terminal No.     Color of<br/>Wire     Signal Name</td> | Connector No. M4<br>Connector Name FUSE BLOCK (J/B)<br>Connector Color WHITE    | Terminal No.     Color of<br>Wire     Signal Name   |

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| Connector No. M22<br>Connector Name DATA LINK CONNECTOR<br>Connector Color WHITE                        | Signation Signat | M88       Image: Spiral CABLE       Image: Spiral Strate       Image: Signal Name       V     ASCD_SW       B     ASCD_GND  |  |
|---|--|---|--|
| M22<br>Ne DATA<br>N WHITE   | Color of Wire of Wire A A A A A A A A A A A A A A A A A A A  | B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B   |  |
| Connector No. M22<br>Connector Name DATA L<br>Connector Color WHITE                                     | Terminal No. C<br>4<br>5<br>6<br>8<br>8<br>12<br>12<br>13<br>13<br>14<br>16  | Connector No.<br>Connector Name<br>Connector Color<br>13<br>16<br>16<br>E   |  |
|   |  |   |  |
| Signal Name   |  | 0<br>AV<br>Signal Name<br>ASCD_GND  |  |
| Color of<br>Wire<br>B/W   |  | Relation of M30 M30 M30 All (All All All All All All All All Al   |  |
| Terminal No. Co<br>30J E  |  | Connector No.     M30       Connector Name     SPIRAL CABLE       Connector Name     SPIRAL CABLE       Connector Color     GRAY       Image: State of the state of |  |
|   |  |   |  |
|   |  |   |  |
| M6<br>ne WIRE TO WIRE<br>WHITE<br>90 & 12 & 14 & 14<br>172 160 151 44 & 14<br>172 160 151 144 130 22 14 | 25.1         24.1         23.1 <td< td=""><td>Connector No.         M24           Connector Name         COMBINATION METER           Connector Name         COMBINATION METER           Connector Color         WHITE           M3         9 10 11 12 13 14 15 16 17 18 19 20           1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20           2 2 0         0 10 10 12 13 14 15 16 17 18 19 20           2 2 0         0 10 11 12 13 14 15 16 17 18 19 20           2 3 8 5 27 28 28 27 28 28 28 33 34 35 28 37 38 38 34 35 28 37 38 38 34 35 28 27 28 28 28 27 28 28 28 27 28 28 28 28 28 28 28 28 28 28 28 28 28</td><td></td></td<>   | Connector No.         M24           Connector Name         COMBINATION METER           Connector Name         COMBINATION METER           Connector Color         WHITE           M3         9 10 11 12 13 14 15 16 17 18 19 20           1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20           2 2 0         0 10 10 12 13 14 15 16 17 18 19 20           2 2 0         0 10 11 12 13 14 15 16 17 18 19 20           2 3 8 5 27 28 28 27 28 28 28 33 34 35 28 37 38 38 34 35 28 37 38 38 34 35 28 27 28 28 28 27 28 28 28 27 28 28 28 28 28 28 28 28 28 28 28 28 28   |  |
| M6<br>e WIRE T<br>WHITE<br>14/15/15/15/15/15/15/15/15/15/15/15/15/15/                                   | 223, 224, 123, 122, 122, 123, 123, 124, 123, 123, 124, 124, 123, 123, 124, 124, 124, 124, 124, 124, 124, 124   | M24           0ior         WHITE           8         9         10           8         9         10           00         0         0           0         0         0           B         B         B   |  |
| ector No.   |  | Connector No.         M24           Connector Name         COMB           Connector Name         COMB           Connector Color         WHITE           1.3         4.5         6.7         8.9         10           2         2         2         0         2  |  |
| Conne<br>Conne<br>H.S.  |  |   |  |

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#### < ECU DIAGNOSIS >

Revision: September 2009



2010 Altima HEV

ABBIA0634GB

| E6                | Connector Name FUSE BLOCK (J/B) | WHITE                 | 7P 6P 5P 4P3P 2P 1P<br>6P15P14P 13P12P11P 10P 9P 8P |
|-------------------|---------------------------------|-----------------------|---|
| Connector No.     | Connector Name                  | Connector Color WHITE | (1991)<br>H.S.                                      |
|                   |                                 |                       |   |
| M89               | WIRE TO WIRE                    | WHITE                 | 5         4   |
| Connector No. M89 | Connector Name WIRE TO WIRE     | Connector Color WHITE | د<br>H.S.   |

| Signal Name       | I  | I | I | I |
|-------------------|----|---|---|---|
| Color of<br>Wire  | BR | ≻ | L | ٩ |
| Terminal No. Wire | 4  | £ | 2 | 8 |

Signal Name

Terminal No. Wire

тт

R G/R P SB

8P 4P 2P

|               | V              | CK              | 85 89 93 97 101 105 109<br>86 90 94 98 102 106 110 | 87 91 95 99 103 107 111<br>88 92 96 100104 108 112 |   | Signal Name      | I  | I  | I  | I  | ASCDSW |
|---------------|----------------|-----------------|--|--|---|------------------|----|----|----|----|--------|
| E10           | e ECM          | r BLACK         | 81 85 89<br>82 86 90                               | 83 87 91<br>84 88 92                               |   | Color of<br>Wire | T  | 1  | I  | I  | G∕Y    |
| Connector No. | Connector Name | Connector Color | v  |  | ) | Terminal No.     | 81 | 82 | 83 | 84 | 85     |

| 89         - | 95         W         T           96         GR         GNDA-F           97         P         CAI           98         L         CAI           99         L         CAI |  |
|--|--|--|
|--|--|--|

| Signal Name      | FTPRES | I  | KLINE | I  | 1  | AVCC2-FTPRES | GNDA-ASCDSW | IGNSW | I  | TF | GNDA-FTPRES | CAN-L | CAN-H | NEO |
|------------------|--------|----|-------|----|----|--------------|-------------|-------|----|----|-------------|-------|-------|-----|
| Color of<br>Wire | g      | I  | 0     | I  | I  | >            | æ           | ≻     | I  | Μ  | GR          | Ь     | _     | L   |
| Terminal No.     | 86     | 87 | 88    | 89 | 06 | 91           | 92          | 93    | 94 | 96 | 96          | 26    | 86    | 66  |

| Signal Nan       | I   | Ι   | Ι   | GO  | GNDA-TF | VBR | BRAKE | GND | GND | CDCV | BNCSW | GND | GND |  |
|------------------|-----|-----|-----|-----|---------|-----|-------|-----|-----|------|-------|-----|-----|--|
| Color of<br>Wire | I   | I   | I   | Р   | BR      | ٨   | SB    | В   | В   | Μ    | G/B   | в   | в   |  |
| Terminal No.     | 100 | 101 | 102 | 103 | 104     | 105 | 106   | 107 | 108 | 109  | 110   | 111 | 112 |  |

| al Name |  |
|---------|--|
|         |  |
|         |  |
| I       |  |
| GO      |  |
| DA-TF   |  |
| /BR     |  |

ECM

| Image: Second |               |                 |                      |             |              |          |                 |
|---|---------------|-----------------|----------------------|-------------|--------------|----------|-----------------|
| Image: Second |               | Connector Color |                      |             |              |          |                 |
| Terminal No.     Color of<br>Wire     Signal Name       39     P     CAN-L       40     L     CAN-L       41     B     GND (SIGNAL)       42     SB     MOTOR_FAN_RLY_MID       42     SB     MOTOR_FAN_RLY_MID       13     SB     FUEL PUWP       14     PD_SENS_GND-E/R  |               | E H.S.          | 42 41 40 39 45 44 43 |             |              |          |                 |
| 39     P     CAN-L       40     L     CAN-L       41     B     GND (SIGNAL)       42     SB     MOTOR_FAN_RLY_MID       42     SB     MOTOR_FAN_RLY_MID       12     B     GND (POWER)       13     SB     FUEL PUMP       13     SB     FUEL PUMP       13     SB     FUEL PUMP       13     SB     FUEL PUMP       23     B/R     PD_SENS_GID-E/R       23     B/R     PD_SENS_SIG-E/R       23     B/R     PD_SENS_SIG-E/R       23     B/R     PD_SENS_SIG-E/R  | Signal Name   |                 |                      | gnal Name   |              |          |                 |
| 40     L     CANH       41     B     GND (SIGNAL)       42     SB     MOTOR_FAN_RLY_MID       42     SB     MOTOR_FAN_RLY_MID       43     SB     Signal Name       10     BR     ECM VB       13     SB     FUEL PUMP       14     PD_SENS_SIG-E/R       22     W/R     PD_SENS_SIG-E/R       23     B/R     PD_SENS_SIG-E/R       23     B/R     PD_SENS_WRE/R  | Z             | 39              |                      | CAN-L       |              |          |                 |
| 41     B     GND (SIGNAL)       42     SB     MOTOR_FAN_RLY_MID       42     SB     MOTOR_FAN_RLY_MID       42     SB     MOTOR_FAN_RLY_MID       10     BR     ECM VB       13     SB     FUEL PUMP       22     W/R     PD_SENS_SIG-E/R       23     B/R     PD_SENS_SIG-E/R       23     B/R     PD_SENS_SIG-E/R       23     B/R     PD_SENS_SIG-E/R  |               | 40              |                      | CAN-H       |              |          |                 |
| 42     SB     MOTOR_FAN_RLY_MID       Terminal No.     Volor of Vire     Signal Name       10     BR     ECM VB       13     SB     FUEL PUMP       15     V     START IG E/R       19     Y     BCM_IGNSW       22     W/R     PD_SENS_SIG-E/R       23     B/R     PD_SENS_SIG-E/R       23     B/R     PD_SENS_SIG-E/R   |               | 41              |                      | D (SIGNAL)  |              |          |                 |
| Image: Signal Name     Terminal No.     Color of Nire     Signal Name       10     BR     ECM VB     ECM VB       12     B     GND (POWER)       13     SB     FUEL PUMP       19     Y     BCM_IGNSW       22     W/R     PD_SENS_GND-E/R       23     B/R     PD_SENS_SIG-E/R       23     B/R     PD_SENS_WRE/R  |               | 42              |                      | FAN_RLY_MID |              |          |                 |
| Terminal No.     Color of<br>Wire     Signal Name       10     BR     ECM VB       12     B     GND (POWER)       13     SB     FUEL PUMP       15     V     START IG E/R       22     W/R     PD_SENS_GND-E/R       23     B/R     PD_SENS_GND-E/R       23     B/R     PD_SENS_GND-E/R  |               |                 |                      |             |              |          |                 |
| 10     BR     ECM VB       12     B     GND (POWER)       13     SB     FUEL PUMP       15     V     START IG E/R       19     Y     BCM_IGNSW       22     W/R     PD_SENS_GND-E/R       33     36     B/R     PD_SENSPWRE/R   |               |                 |                      | gnal Name   | Connector N  | o. E22   |                 |
| 12     B     GND (POWEH)       13     SB     FUEL PUMP       13     SB     PD_SENS_GND-E/R       22     W/R     PD_SENS_GND-E/R       23     B/R     PD_SENS_SIG-E/R       23     B/R     PD_SENSPWRE/R       23     B/R     PD_SENSPWRE/R       23     B/R     PD_SENSPWRE/R       23     B/R     PD_SENSPWRE/R       24     BR/W     PD_SENSPWRE/R       3     Y     Y       3     Y       3     Y       9     BR   | GEN I<br>TION |                 |                      | FCM VB      | Connector N  |          | I CONNECTOR-E04 |
| 13       SB       FUEL PUMP         15       V       START IG E/R         15       V       BCM_IGNSW         22       W/R       PD_SENS_GND=E/R         23       B/R       PD_SENS_IGG-E/R         23       B/R       PD_SENSPWRE/R         202122/2324       35       36         35       36       P/V       PD_SENSPWRE/R         202122/2324       37       37         202122/2324       37       37         202122/2324       37       37         202122/2324       37       9         202122/2324       37       9   | ROOM)         |                 |                      | D (POWER)   | Connector C  |          | X               |
| 15       V       START IG E/R       1         19       Y       BCM_IGNSW       1         22       W/R       PD_SENS_GND-E/R       1         3031323334       37       38       37         303122334       37       38       24       BR/W       PD_SENS_SIG-E/R         20[2122[23]4]       35       36       P       Color of 1       P         20[2122[23]4]       35       36       P       1       P       P         20[2122[23]4]       35       36       P       D_SENSPWRE/R       Terminal No. Wire       1       P       P         20[2122[23]4]       35       36       P       P       2       P   |               |                 |                      | JEL PUMP    |              |          | R               |
| 19     Y     BCM_IGNSW       22     W/R     PD_SENS_GND-E/R       3031233334     37     38       37     38     B/R     PD_SENS_SIG-E/R       23     B/R     PD_SENSPWRE/R       23     B/R     PD_SENSPWRE/R       23     37     38       35     36       20[21]22[23]24     35       35     36       20[21]22[23]24     37       35     4       7     7       8     8       8     8       9     BR   |               | 15              |                      | ART IG E/R  |              |          | С               |
| 22         W/R         PD_SENS_GND-E/R           30(3)(22)(33)(33)(33)(33)(33)(33)(33)(33)(   |               | 19              |                      | CM_IGNSW    | <b>b</b>     | 10 9     | ~               |
| 23     B/R     PD_SENS_SIG-E/R     Terminal No.     Color of<br>Wire       30313233334     37     38     9     P       2021222324     35     36     7     P       2021222324     35     36     7     P       2021222324     35     36     9     BR  |               |                 |                      | ENS_GND-E/R |              |          |                 |
| 30313233334     37     38     1     24     BR.W     PD_SENSPWRE/R     1     P       20121222324     35     36     7     7     7     7       20121222324     35     36     7     7     7     7       20121222324     35     36     7     7     7     7       2012122323     35     36     7     7     7     7       201212233     35     36     7     7     7     7       201212233     4     7     7     7     7     7  | 11            |                 |                      | ENS_SIG-E/R |              | Color of | ä               |
| 20[21][22][33]       35       3         35       3       4       3       7       P         9       8       4       ×       ×       4       P  | 3031323334 37 |                 |                      | SENSPWRE/R  | I erminal No | . Wire   | Signal Name     |
| - ≻ × ₩ ₩   | 2021222324 35 |                 |                      |             |              | ۹ ۱      | I               |
| × × ⊀<br>88 ≺ ≺   |               |                 |                      |             | N            | <u>م</u> | I               |
| × BR<br>BR  |               |                 |                      |             | e            | ~        | I               |
| BR BR   |               |                 |                      |             | 4            | ~        | Ι               |
| BR  |               |                 |                      |             | ω            | BR       | I               |
|   |               |                 |                      |             | 6            | BR       | -               |
|   |               |                 |                      |             |              |          |                 |

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IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)

Connector No. Connector Name

> IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)

Connector No. Connector Name

E16

E17

А

EC

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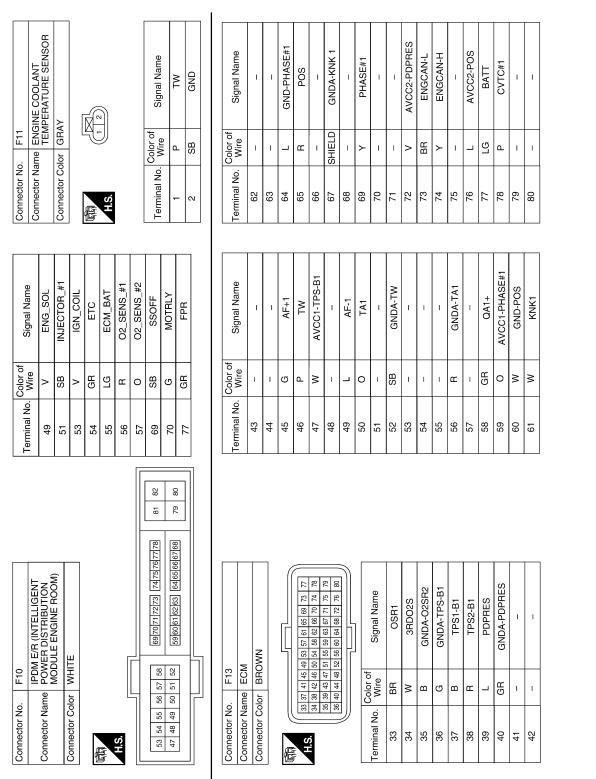
| Color of Signal Name Terminal No. Wire W - 2 2 3 | 2 |  | 51G     52G       55G     55G       55G     58G       58G     63G       63G     6       Connector Name     Connector Name       1     1 | 34G     O     -       51G     L     -       52G     P     -       55G     B     -       55G     SB     -       55G     SB     -       56G     SB     -       58G     SB     -       63G     BR     -       connector No.     E44       Connector Name     JUNCTION BLOCK       Connector Name     JUNCTION BLOCK       Terminal No.     Kire       7     0       2     V       3     V |
|--|---|--|---|--|
|--|---|--|---|--|

| E47           ne         JUNCTION BLOCK           or         WHITE           46         45           46         45 | Color of Signal Name L – – – – – – – – – – – – – – – – – – | Connector No. E54<br>Connector Name JOINT CONNECTOR-E11<br>Connector Color WHITE | Color of Signal Name Mire BR BR BR BR BR BR BR BR BR                        |  |
|--|--|--|---|--|
| Connector No.<br>Connector Name<br>Connector Color   | Terminal No. C<br>43<br>44                                 | Connector No.<br>Connector Name<br>Connector Color                               | Terminal No. C  |  |
| E46<br>JUNCTION BLOCK<br>r WHITE<br>3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3  | Signal Name  | E CONNECTOR-E10  | Signal Name   |  |
| Connector No. E46<br>Connector Name JUNCTI<br>Connector Color WHITE  | Terminal No. Color of Wire 25 Y W 27 W                     | Connector No. E53<br>Connector Name JOINT CONNECTOR-E10<br>Connector Color WHITE | Terminal No.     Color of       1     Y       2     Y                       |  |
|  |  |  |   |  |
| E45<br>b JUNCTION BLOCK<br>WHITE<br>2 22 21 20 19 18<br>2 22 22 20 19 18   | Signal Name  | E48<br>JUNCTION BLOCK<br>WHITE   | Signal Name   |  |
| Connector No. E45<br>Connector Name JUNCTION BLOCK<br>Connector Color WHITE  | Terminal No.Color of<br>Wire15G17BR24Y                     | Connector No. E48<br>Connector Name JUNCTION BLOCK<br>Connector Color WHITE      | Terminal No.     Color of Wire       47     L       49     P       50     L |  |
|  |  |  | ABBIA0637GB   |  |

| WHITE WHITE   |
|---|
| Connector Color     WHITE     Connector Color     WHI       Image: Signal No.     Image: Signal Name     Image: Signal Name     Image: Signal No.     Image: Signal No.       1     L     -     1     P       2     L     -     2     P |

| DIAGNOSIS >   |  |  |                                    | [QR25DE] |
|---|--|--|------------------------------------|----------|
|   |  |  |                                    |          |
| 278<br>WIRE TO WIRE   | Signal Name  | Connector No. E82<br>Connector Name COOLING FAN RELAY-1<br>Connector Color – | Signal Name                        | E        |
| 0. E78<br>lame WIRE T<br>cloor WHITE                                      | Golor of Wire GR GR SB GR  | o. E82<br>ame COC<br>olor -  | Color of Wire SB SB SB SB          |          |
| Connector No. E78<br>Connector Name WIRE TO WIRE<br>Connector Color WHITE | Terminal No.   | Connector No.<br>Connector Name<br>Connector Color                           | Terminal No.<br>1<br>2<br>3<br>5   |          |
|   |  |  |                                    |          |
| NNECTOR-E01   | Signal Name  | /IRE   | Signal Name                        |          |
| E75<br>JOINT CON<br>WHITE   |  | E81<br>WIRE TO W<br>BLACK  |                                    |          |
| ctor No.  | Terminal No.     Color of<br>Write       2     L       3     L       4     P       5     P | ctor No.<br>ctor Name<br>ctor Color  | Terminal No. Color of<br>Mire<br>B |          |
| Conne<br>Conne<br>Land  | Tern   | Conne<br>Conne<br>Conne<br>H.S.  | Terr                               |          |
| 8   |  |  |                                    |          |
| E74<br>JOINT CONNECTOR-E08<br>WHITE                                       | Signal Name  |  | Signal Name                        |          |
| E74<br>JOINT CONN<br>WHITE  |  | Connector No. E80<br>Connector Name WIRE TO WIRE<br>Connector Color BROWN    |                                    |          |
|   | Vo. Oolor of Wire B B SHIELD SHIELD  | r No.  | No. Color of Wire W Wire W W       |          |
| Connector No.<br>Connector Name<br>Connector Color<br>H.S.                | Terminal No.<br>1<br>4   | Connector No.<br>Connector Name<br>Connector Color                           | Terminal No.<br>2<br>6             |          |
|   |  |  |                                    | IA0639GB |
|   |  |  |                                    |          |
|   |  |  |                                    |          |

|   | < ECU DIAGNOSIS > |   | [QR:  |
|---|-------------------|---|---|
| Connector Name<br>Connector Name<br>Conne |                   |   | Color of Wire B B   |
| Connector No.     E201       Connector Name     PDM       Connector Name     PDM       Connector Name     PDM       MODU     Connector Name     Color of<br>RM       MODU     Connector Name     Color of<br>RM       MODU     Connector Name     Color of<br>RM       MODU     MODU       MODU     MODU       MODU     Connector Name       MODU     Connector Name       MODU     Connector Name       MODU     Connector Name       MODU     MODU       MODU       MODU       MODU       MODU       MODU       MODU       MODU       MODU       MODU   |                   |   | Color of Wire B B SB  |
|   |                   | nor of here and here | Terminal No.     Color of<br>Wire       1     B       2     V       3     R |





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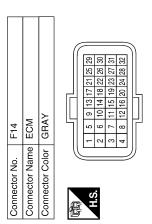
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| Signal Name      | 3RD02H | I  | 1  | 1  | IGN #4 | I  | 1  | SSOF | EVAP | 1  | I  | I  | INJ #4 | INJ #3 | INJ #2 | INJ #1 |
|------------------|--------|----|----|----|--------|----|----|------|------|----|----|----|--------|--------|--------|--------|
| Color of<br>Wire | _      | I  | I  | I  | ВВ     | I  | 1  | SB   | ٩.   | I  | I  | I  | ĽG     | ×      | 0      | >      |
| Terminal No.     | 17     | 18 | 19 | 20 | 21     | 22 | 23 | 24   | 25   | 26 | 27 | 28 | 29     | 30     | 31     | 32     |

| Signal Name      | 1 | VMOT-B1 | I | AFH1 | MOTOR1-B1 | MOTOR2-B1 | VSCV | I | IGN #3 | IGN #2 | IGN #1 | GND | 02HR1 | FPR | MOTRLY-B1 | GND |  |
|------------------|---|---------|---|------|-----------|-----------|------|---|--------|--------|--------|-----|-------|-----|-----------|-----|--|
| Color of<br>Wire | I | _       | I | ГG   | GR        | BR        | >    | I | 0      | ГG     | ≻      | GR  | ≻     | B/B | В         | ۵   |  |
| Terminal No.     | - | 2       | ю | 4    | 2         | 9         | 7    | 8 | 6      | 10     | 11     | 12  | 13    | 14  | 15        | 16  |  |



ECM

| Color of<br>Wire | SB | Μ |   |
|------------------|----|---|---|
| Terminal No.     | -  | 2 |   |
|                  |    |   | I |
|                  |    |   |   |

Color of Wire ≻ 0

> Terminal No. - $\sim$

Signal Name

C/U

| Connector No.        | F17                                |
|----------------------|------------------------------------|
| Connector Name       | Connector Name FUEL INJECTOR NO. 1 |
| Connector Color GRAY | GRAY                               |
| 际日<br>H.S.           |                                    |

Connector Name FUEL INJECTOR NO. 3 Connector Color GRAY

Connector No. F18 Connector Name FUEL INJECTOR NO. 2 Connector Color GRAY

Connector No. F19

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H.S.H E

| Signal Name      | IGN | C/U |  |
|------------------|-----|-----|--|
| Color of<br>Wire | SB  | >   |  |
| Terminal No.     | 1   | 2   |  |

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| ECU DIAGNOSIS >   |  | [QR25DE]  |
|---|--|---|
|   |  | A   |
| F29<br>EVAP CANISTER PURGE<br>VOLUME CONTROL<br>SOLENOID VALVE<br>BLUE<br>BLUE<br>Signal Name<br>VBR  |  | Signal Name<br>SIGNAL<br>GND<br>C   |
|   |  | Color of Wire of Vire of  |
| Connector No.<br>Connector Name<br>Connector Color<br>H.S.<br>Terminal No. Col  | Connector No.<br>Connector Name<br>Connector Color | Terminal No.  |
|   |  | F   |
| SER-2<br>Signal Name<br>VBR<br>GND  | F31<br>MASS AIR FLOW SENSOR<br>BLACK               | Signal Name<br>TA-<br>GND<br>VB   |
|   | E31<br>MASS AIR FLC<br>BLACK                       | н   |
|   |  | Ocolor of Mire       Wire       BB       R       BB       R |
| Connector No.<br>Connector Name<br>Connector Name<br>Connector Color<br>H.S.<br>Terminal No. Color<br>2 E   | Connector No.<br>Connector Name<br>Connector Color | Terminal No.  |
|   |  | K   |
| Connector No. F20<br>Connector Name FUEL INJECTOR NO. 4<br>Connector Color GRAY<br>Terminal No. Color of Signal Name<br>Terminal No. Wire Signal Name |  | Signal Name<br>AVCC2<br>FOS   |
|   | E30<br>EF30<br>BLACK<br>BLACK                      | M   |
| Connector No. F20<br>Connector Name FUE<br>Connector Color GR   | Connector No.<br>Connector Name<br>Connector Color | No. Color of Wire A   |
| Connector No.<br>Connector Nam<br>Connector Colo<br>H.S.<br>Terminal No.  | Connector No.<br>Connector Nar<br>Connector Colo   | O Terminal No.  |
|   | I  | abbia0643gb   |
|   |  | r   |
|   |  |   |

| F55<br>CAMSHAFT POSITION<br>SENSOR (PHASE)<br>BLACK                              |                         | Signal Name             | GND   | PHASE  |     |            |            |    |                   | INTAKE VALVE TIMING<br>CONTROL SOLENOID |                       |           | Signal Name          | VB    | C/U     |         |     |        |        |   |
|--|-------------------------|-------------------------|-------|--------|-----|------------|------------|----|-------------------|---|-----------------------|-----------|----------------------|-------|---------|---------|-----|--------|--------|---|
| Connector No. F55<br>Connector Name CAMSH<br>SENSOF<br>Connector Color BLACK     | _                       | al No. Color of<br>Wire | - c   | >      |     |            |            |    | Connector No. F59 | Connector Name CONTR                    | Connector Color GREEN |           | al No. Color of Wire | ~     | ٩.      |         |     |        |        |   |
| Conne<br>Conne<br>Conne  | 品<br>H.S.H              | Terminal No.            | -  ~  | e      |     |            |            |    | Conne             | Conne                                   | Conne                 | 同<br>H.S. | Terminal No.         | -     | N       |         |     |        |        |   |
| ONNECTOR-F05   |                         | Signal Name             | 1 1   | 1      | 1 1 |            |            |    |                   | ) WIRE                                  |                       |           | Signal Name          | I     | I       | I       | I   |        |        |   |
| Connector No. F51<br>Connector Name JOINT CONNECTOR-F05<br>Connector Color BLACK | 6543                    | 0                       | 8 8   | SB     | > > |            |            |    | or No. F58        | or Name WIRE TO WIRE<br>or Color BLACK  | -                     |           | No. Color of Wire    | В     | ш       |         | M   |        |        |   |
| Connector No.<br>Connector Name<br>Connector Color                               | 园<br>H.S.               | Terminal No.            | -   ~ | с<br>С | 4 0 |            |            |    | Connector No.     | Connector Name<br>Connector Color       |                       | 国<br>H.S. | Terminal No.         | -     | N       | n       | 4   |        |        |   |
| VECTOR-F01   |                         | Signal Name             | 1 1   | 1      | 1 1 | I          |            | I  |                   | THROTTLE<br>ACTUATOR                    |                       |           | Signal Name          | INPUT | OUTPUT1 | OUTPUT2 | GND | MOTOR1 |        |   |
| Connector No. F50<br>Connector Name JOINT CONNECTOR-F01<br>Connector Color BLACK | 5 4 3 2 1<br>10 9 8 7 6 | Color of<br>Wire        | r œ   | В      | а а | <u>م</u> ۳ | ы <u>с</u> | B  | lo. F57           | -                                       | olor BLACK            | 12345     | Color of<br>Wire     | M     |         |         |     |        |        |   |
| Connector No.<br>Connector Name<br>Connector Color                               | 同<br>H.S.               | Terminal No.            | -  ~  | e      | 4 D | ω α        | 0          | 10 | Connector No.     | Connector Name                          | Connector Color       | 同<br>H.S. | Terminal No.         | ۲     | N       | m       | 4   | 9 9    |        |   |
|  |                         |                         |       |        |     |            |            |    |                   |   |                       |           |                      |       |         |         | A   | BBIA0  | 1645GB | 8 |

| 8  | Signal Name   | 1   | I  | I   | I  | I   | I  | Ι   | I  | I   | I  |  |              | TED OXYGEN<br>SOR 3  | ~   |   | Signal Name   | SENSOR(-)   | HEATER(+)  |  |
|--|---|---|--|---|--|---|--|---|--|---|--|--|--------------|--|---|---|---|---|--|--|
| 4 6  | Color of<br>Wire  | GR  | GΥ   | ж   | н  | Y   | GR   | SHIELD  | В  | в   | в  |  |              |  | -   |   | Color of<br>Wire  | >   | RУ   |  |
| 国<br>H.S.  | Terminal No.  | -   | 2  | 3   | 4  | 5   | 6  | 7   | 8  | 6   | 10   |  | Connector No | Connector Na   | Connector Co  | 品<br>H.S.   | Terminal No.  |   | 2  |  |
|  | [   |   |  |   | ]  |   |  |   |  |   |  |  |              |  |   |   |   |   |  | Г  |
| 9 8 7 6  | Signal Name   | I   | I  | I   |  |   |  |   |  |   |  |  |              | E TO WIRE  | 5   |   | Signal Name   | 1   | 1  |  |
| 5         4         3           12         11         10 | Color of<br>Wire  | _   | GR   | >   |  |   |  |   |  |   |  |  |              |  | _   |   | Color of<br>Wire  | ш   | RV   |  |
| ात्रज्ञ<br>H.S.  | Terminal No.  | -   | 2  | e   |  |   |  |   |  |   |  |  | Connector No | Connector Na   |   | 国<br>H.S.   | Terminal No.  |   | 2  | ¢  |
|  |   |   |  |   |  |   |  |   |  |   |  |  |              |  |   |   |   |   |  | _  |
| 6 15 4 13 12 11 10                                       | Signal Name   | 1   | I  | I   | I  |   |  |   |  |   |  |  |              | E TO WIRE  | NN  | <b>□</b> 21<br>654  | Signal Name   | 1   | I  |  |
| 9 8 7 6<br>201918171                                     | Color of<br>Wire  | ≻   | BR   | в   | В  |   |  |   |  |   |  |  | . F84        |  | _   | 3   | Color of<br>Wire  | σ   | >  |  |
|  | Terminal No.  |   | 2  | 10  | 11   |   |  |   |  |   |  |  | tor Nc       | tor N  | iter<br>C   |   | Terminal No.  | 5   | 4  |  |
|  | 76 6 4 3 2 1<br>1817161514113121110<br>H.S. 121110<br>H.S. 10 9 8 7 1<br>10 9 8 7 | 9 8 7 6     5 4 3 2 1       201919181716151413121110     12 11 10 9 8 7 6       12 11 10 9 8 7 6     12 11 10 9 8 7 6       12 11 10 9 8 7 6     12 11 10 9 8 7 6       12 11 10 9 8 7 6     12 11 10 9 8 7 6       12 11 10 9 8 7 6     12 11 10 9 8 7 6       12 11 10 9 8 7 6     12 11 10 9 8 7 6       12 11 10 9 8 7 6     12 11 10 9 8 7 6       12 11 10 9 8 7 6     12 11 10 9 8 7 6       13 12 11 10     12 10 9 8 7 6       13 12 11 10     12 10 9 8 7 6       14 10 10 10 10 10     12 10 10 10 10       10 10 10 10     12 10 10 10       10 10 10 10     12 10 10 10       10 10 10 10     12 10 10 10       11 10 10 10 10     12 10 10       11 10 10 10 10     12 10 10       11 10 10 10 10     12 10 10       11 10 10 10 10     12 10 10       11 10 10 10 10     12 10 10       11 10 10 10 10       11 10 10 10 10       11 10 10 10 10       11 10 10 10 10       11 10 10 10 10       11 10 10 10 10       11 10 10 10 10       11 10 10 10 10       11 10 10 10 10       11 10 10 10 10       11 10 10 10 10       11 10 10 10 10       11 10 10 10 10       11 10 10 10 10       11 10 10 10 10 </td <td>9 8 7 6     5 4 3 2 1       2019191716[15]413121110]       Also       2010       2011       2010       201</td> <td>38 7 6 - 5 4 3 2 1<br/>2019191716[15]41312[11]10                  30191917716[15]413122[11]10                 20191010                 M.                 Color of<br/>V                 V                 Color of<br/>V                 PR                 Color of<br/>BR                   Color of<br/>Vire</td> <td>9876       54321         2019191776[15141312111]0         20191081776[1514131211110]         Muse         0010101         V         V         1         1         BR         2         3         V         3         V         3         3         3</td> <td>98 7 6       5 4 3 2 1         201919171661514131221110         201919177661514131221110         Muse         Color of Vire         V       -         V       -         B       -         B       -         B       -         3       V         3       V         4       B</td> <td>98 7 6       5 4 3 2 1         201919171661514131221110         201918171661514131221110         Color of         Signal Name         V       -         V       -         BR       -         3       V         B       -         3       V         5       V</td> <td>98 7 6       5 4 3 2 1         2019161716151413121110         2019161716151413121110         Color of         Signal Name         V       -         BR       -         B       -         3       V         3       V         5       V         6       GR</td> <td><sup>1</sup> <sup>1</sup> <sup>1</sup></td> <td><sup>1</sup> <sup>1</sup> <sup>1</sup></td> <td><sup>1</sup> <sup>1</sup> <sup>1</sup></td> <td><sup>1</sup> <sup>1</sup> <sup>1</sup></td> <td></td> <td>3010101171011313131311       5131313131313131         3010101171611313131311       51313131313131         Color of<br/>Wire       Signal Name         V       -         B       -         3       V         3       V         5       V         9       B         10       B         11       L         2       GR         3       V         3       V         5       V         7       SHIELD         9       B         9       B         9       B         10       B</td> <td>176       171       1</td> <td>Image: Description of the second s</td> <td>Tem       Tem       T</td> <td>Terminal No.       Signal Name       Terminal No.       Signal Name       Terminal No.       Signal Name         Profine       Signal Name       Terminal No.       Signal Name       Terminal No.       Signal Name       Terminal No.       Signal Name         Profine       Signal Name       Terminal No.       Signal Name       Terminal No.       Signal Name       Terminal No.       Signal Name         Profine       Terminal No.       Signal Name       Terminal No.       Signal Name       Terminal No.       Signal Name         Profine       T</td> <td>The field of the field of</td> <td>Teminal No.       Color of<br/>Name       Signal Name       Teminal No.       Color of<br/>Name       Teminal No.       Color of<br/>Nam       Teminal No.       Co</td> | 9 8 7 6     5 4 3 2 1       2019191716[15]413121110]       Also       2010       2011       2010       201 | 38 7 6 - 5 4 3 2 1<br>2019191716[15]41312[11]10                  30191917716[15]413122[11]10                 20191010                 M.                 Color of<br>V                 V                 Color of<br>V                 PR                 Color of<br>BR                   Color of<br>Vire | 9876       54321         2019191776[15141312111]0         20191081776[1514131211110]         Muse         0010101         V         V         1         1         BR         2         3         V         3         V         3         3         3 | 98 7 6       5 4 3 2 1         201919171661514131221110         201919177661514131221110         Muse         Color of Vire         V       -         V       -         B       -         B       -         B       -         3       V         3       V         4       B | 98 7 6       5 4 3 2 1         201919171661514131221110         201918171661514131221110         Color of         Signal Name         V       -         V       -         BR       -         3       V         B       -         3       V         5       V | 98 7 6       5 4 3 2 1         2019161716151413121110         2019161716151413121110         Color of         Signal Name         V       -         BR       -         B       -         3       V         3       V         5       V         6       GR | <sup>1</sup> | <sup>1</sup> | <sup>1</sup> | <sup>1</sup> |              | 3010101171011313131311       5131313131313131         3010101171611313131311       51313131313131         Color of<br>Wire       Signal Name         V       -         B       -         3       V         3       V         5       V         9       B         10       B         11       L         2       GR         3       V         3       V         5       V         7       SHIELD         9       B         9       B         9       B         10       B | 176       171       1 | Image: Description of the second s | Tem       T | Terminal No.       Signal Name       Terminal No.       Signal Name       Terminal No.       Signal Name         Profine       Signal Name       Terminal No.       Signal Name       Terminal No.       Signal Name       Terminal No.       Signal Name         Profine       Signal Name       Terminal No.       Signal Name       Terminal No.       Signal Name       Terminal No.       Signal Name         Profine       Terminal No.       Signal Name       Terminal No.       Signal Name       Terminal No.       Signal Name         Profine       T | The field of | Teminal No.       Color of<br>Name       Signal Name       Teminal No.       Color of<br>Name       Teminal No.       Color of<br>Nam       Teminal No.       Co |

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#### [QR25DE]

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| B10           MIRE TO WIRE           MHITE           I         2         3         4         6         7           8         9         10         11         12         13         14         15         16 | Signal Name  | B42<br>FUEL LEVEL SENSOR<br>UNIT AND FUEL PUMP<br>GRAY<br>12 3 4 15 | Signal Name<br>IGN<br>GND<br>SENSOR -                 |
|---|--|---|---|
| B10           ame         WIRE TO WIRE           olor         WHITE           10         WHITE  | Color of Wire Vire Color of Wire R R R X A Mire R X M Vire Vire Vire Vire Vire Vire Vire Vire  |   | Color of Wire SB B/Y B/Y B/W                          |
| Connector No.<br>Connector Name<br>Connector Color  | Terminal No.           1           3           3           7           7           9           11           12   | Connector No.<br>Connector Name<br>Connector Color                  | Terminal No.<br>1<br>3<br>5                           |
| Signal Name   |  | L SYSTEM<br>NSOR  | Signal Name<br>GND<br>SIGNAL<br>AVCC2                 |
| B/W Signal<br>B/W   |  | B41<br>EVAP CONTROL SYSTEM<br>PRESSURE SENSOR<br>GRAY               | Color of Signal<br>Wire Gi<br>GR GI<br>SB SIG<br>P AV |
| Terminal No. Co<br>30J E  |  | Connector No.<br>Connector Name<br>Connector Color                  | Terminal No. Vo. Vo. 33                               |
|   |  |   |   |
| B1<br>WIRE TO WIRE<br>WHITE<br>WHITE<br>10 20 100 110 20 130 140 150 160 170<br>220 230 240 250 1   | 13.1         13.0         2.0.         2.1.1         2.8.1         2.3.1         2.8.1         2.3.1           38.1         37.1         2.8.1         2.3.1         3.8.1         3.7.1           38.1         37.1         2.8.1         3.7.1         3.8.1         3.7.1           38.1         37.1         2.8.1         3.8.1         3.7.1         3.8.1         3.7.1           38.1         37.1         3.8.1         3.8.1         3.8.1         3.7.1         3.8.1         3.7.1           47.1         48.1         58.1         58.1         5.8.1 | B39<br>EVAP CANISTER VENT<br>CONTROL VALVE<br>BLACK                 | Signal Name<br>BATT<br>C/U                            |
|   | 181         19.0         20.0         21           381         383         40.14.3         33           471         481         560.1         57.1           71.1         72.2         73.3         74.1           80.1         81.1         82.1         74.1           93.1         94.1         85.1         74.1   |   | Color of Wire K                                       |
| Connector No. B1<br>Connector Name WIRE T<br>Connector Color WHITE<br>Lu 2 10041  |  | Connector No.<br>Connector Name<br>Connector Color                  | 2 1 1 No. Co  |

# Fail Safe

DTC RELATED ITEM

< ECU DIAGNOSIS >

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| DTC No.                                   | Detected items                                 | Engine operat  | ing condition in fail-safe mode   |  |  |  |  |  |
|---|--|--|---|--|--|--|--|--|
| U0293<br>U0400<br>U1020<br>U1021          | CAN communication                              | <ul><li>ECM stops the engine.</li><li>The vehicle drives using the moto</li></ul>  | r.  |  |  |  |  |  |
| P0011                                     | Intake valve timing control                    | <ul> <li>Engine idling stop is inhibited.</li> <li>The signal is not energized to the valve control does not function.</li> </ul>                | intake valve timing control solenoid valve and the  |  |  |  |  |  |
| P0075                                     | Intake valve timing control solenoid valve     | Engine idling stop is inhibited.   |   |  |  |  |  |  |
| P0101<br>P0102<br>P0103                   | Mass air flow sensor                           | <ul><li>Engine idling stop is inhibited.</li><li>Fuel is cut off when engine speed</li></ul>   | is more than 2,400 rpm.   |  |  |  |  |  |
| P0117<br>P0118                            | Engine coolant tempera-<br>ture sensor circuit |  | is running.<br>e determined by ECM based on the following condi<br>gine coolant temperature decided by ECM.                             |  |  |  |  |  |
|   |  | Condition  | Engine coolant temperature decided<br>(CONSULT-III display)   |  |  |  |  |  |
|   |  | Just as ignition switch is turned ON or START  | 40°C (104°F)  |  |  |  |  |  |
|   |  | Approx 4 minutes or more after en-<br>gine starting  | 80°C (176°F)  |  |  |  |  |  |
|   |  | Except as shown above  | 40 - 80°C (104 - 176°F)<br>(Depends on the time)  |  |  |  |  |  |
| P0122<br>P0123<br>P0222<br>P0223<br>P2135 | Throttle position sensor                       | in order for the idle position to be   | ttle control actuator in regulating the throttle openin<br>within +10 degrees.<br>beed of the throttle valve to be slower than the norm |  |  |  |  |  |
| P0125                                     | Engine coolant tempera-<br>ture sensor         | Engine idling stop is inhibited.   |   |  |  |  |  |  |
| P0171<br>P0172                            | Fuel injection system                          | Engine idling stop is inhibited.   |   |  |  |  |  |  |
| P0300<br>P0301<br>P0302<br>P0303<br>P0304 | Misfire  | Engine idling stop is inhibited.   |   |  |  |  |  |  |
| P0335                                     | Crankshaft position sensor<br>(POS)            | Engine idling stop is inhibited.   |   |  |  |  |  |  |
| P0340                                     | Camshaft position sensor<br>(PHASE)            | Engine idling stop is inhibited.   |   |  |  |  |  |  |
| P0500                                     | Vehicle speed sensor                           | When the fail-safe system for vehicle (Highest) while engine is running.   | e speed sensor is activated, the cooling fan operate  |  |  |  |  |  |
| P0605                                     | ECM  | <ul><li>Engine idling stop is inhibited.</li><li>The engine speed will not rise 2,5</li></ul>  | trol actuator control, throttle valve is maintained at<br>by the return spring.   |  |  |  |  |  |
| P0643                                     | Sensor power supply                            | <ul> <li>Engine idling stop is inhibited.</li> <li>ECM stops the electric throttle cor fixed opening (approx. 5 degrees)</li> </ul>              | trol actuator control, throttle valve is maintained at by the return spring.  |  |  |  |  |  |
| P1195                                     | Engine does not start                          | <ul> <li>ECM stops the engine according to the fuel cut request signal sent from HV ECU.</li> <li>The vehicle drives using the motor.</li> </ul> |   |  |  |  |  |  |

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| DTC No.        | Detected items   | Engine operating condition in fail-safe mode   |  |   |  |  |
|----------------|--|--|--|---|--|--|
| P1196          | Poor engine power  | <ul><li>ECM stops the engine according to the fuel cut request signal sent from HV ECU.</li><li>The vehicle drives using the motor.</li></ul>  |  |   |  |  |
| P1197          | Fuel run out   | <ul> <li>ECM stops the engine according to the fuel cut request signal sent from HV ECU.</li> <li>The vehicle drives using the motor.</li> </ul>   |  |   |  |  |
| P1805          | Brake switch   | ECM controls the electric throttle control actuator by regulating the throttle opening to a small range.<br>Therefore, acceleration will be poor.  |  |   |  |  |
|                |  | Vehicle condition  | Driving condition  | - |  |  |
|                |  | When engine is idling  | Normal   | - |  |  |
|                |  | When accelerating  | Poor acceleration  | - |  |  |
| P2100<br>P2103 | Throttle control motor relay   | <ul> <li>Engine idling stop is inhibited.</li> <li>ECM stops the electric throttle confixed opening (approx. 5 degrees)</li> </ul>   | ontrol actuator control, throttle valve is maintained at a<br>s) by the return spring. | - |  |  |
| P2101          | Electric throttle control function   | <ul> <li>Engine idling stop is inhibited.</li> <li>ECM stops the electric throttle confixed opening (approx. 5 degrees)</li> </ul>   | ontrol actuator control, throttle valve is maintained at a<br>s) by the return spring. | - |  |  |
| P2118          | Throttle control motor   | <ul> <li>Engine idling stop is inhibited.</li> <li>ECM stops the electric throttle confixed opening (approx. 5 degrees)</li> </ul>   | ontrol actuator control, throttle valve is maintained at a s) by the return spring.    | - |  |  |
| P2119          | Electric throttle control ac-<br>tuator  | (When electric throttle control actuator does not function properly due to the return spring malfunction:)<br>ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm. |  |   |  |  |
|                | <ul> <li>(When throttle valve opening angle in fail-safe mode is not in specified range:)</li> <li>ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.</li> <li>(When ECM detects the throttle valve is stuck open:)</li> <li>Engine idling stop is inhibited.</li> <li>The engine speed will not rise 1,150 rpm or more.</li> </ul> |  |  |   |  |  |
|                |  |  |  |   |  |  |

# 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 k chart.

| Priority | Detected items (DTC)  |
|----------|---|
| 1        | <ul> <li>U0129 U0293 U1020 1022 CAN communication line</li> <li>U0400 U0418 U1021 U1023 CAN communication</li> <li>U0164 U1001 CAN communication line</li> <li>P0101 P0102 P0103 Mass air flow sensor</li> <li>P0112 P0113 P0127 Intake air temperature sensor</li> <li>P0116 P0117 P0118 P0125 Engine coolant temperature sensor</li> <li>P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor</li> <li>P0128 Thermostat function</li> <li>P0181 P0182 P0183 Fuel tank temperature sensor</li> <li>P0201 - P0204 Fuel injector</li> <li>P0327 P0328 Knock sensor</li> <li>P0340 Camshaft position sensor (POS)</li> <li>P0460 P0461 P0462 P0463 Fuel level sensor</li> <li>P0500 Vehicle speed sensor</li> <li>P0605 P0607 ECM</li> <li>P0643 Sensor power supply</li> </ul>   |
| 2        | <ul> <li>P0031 P0032 Air fuel ratio (A/F) sensor 1 heater</li> <li>P0037 P0038 Heated oxygen sensor 2 heater</li> <li>P0043 P0044 Heated oxygen sensor 3 heater</li> <li>P0075 Intake valve timing control solenoid valve</li> <li>P0130 P0131 P0132 P0133 P2A00 Air fuel ratio (A/F) sensor 1</li> <li>P0137 P0138 P0139 Heated oxygen sensor 2</li> <li>P0143 P0144 P0145 P0146 Heated oxygen sensor 3</li> <li>P0441 EVAP control system purge flow monitoring</li> <li>P0443 P0444 P0445 EVAP canister purge volume control solenoid valve</li> <li>P0447 P0448 EVAP canister vent control valve</li> <li>P0447 P0448 EVAP canister vent control valve</li> <li>P0451 P0452 P0453 EVAP control system pressure sensor</li> <li>P0603 ECM power supply</li> <li>P1195 Engine does not start</li> <li>P1197 Fuel run out</li> <li>P1217 Engine over temperature (OVERHEAT)</li> <li>P1805 Brake switch</li> <li>P2100 P2103 Throttle control motor relay</li> <li>P2101 Electric throttle control function</li> <li>P2118 Throttle control motor</li> </ul> |
| 3        | <ul> <li>P0011 Intake valve timing control</li> <li>P0171 P0172 Fuel injection system function</li> <li>P0300 - P0304 Misfire</li> <li>P0420 Three way catalyst function</li> <li>P0456 EVAP control system</li> <li>P0506 P0507 Idle speed control system</li> <li>P0506 P0507 Idle speed control system</li> <li>P0AC4 HV ECU MIL ON request</li> <li>P1148 Closed loop control</li> <li>P1421 Cold start control</li> <li>P1564 ASCD steering switch</li> <li>P1572 ASCD brake switch</li> <li>P1574 ASCD vehicle speed sensor</li> <li>P2119 Electric throttle control actuator</li> <li>P2423 HC adsorption catalyst</li> </ul>  |

# DTC Index

INFOID:000000005441997

 $\times$ :Applicable —: Not applicable

| DTC* <sup>1</sup>                |                    | Items                      |          |      |     | Reference     |
|----------------------------------|--------------------|----------------------------|----------|------|-----|---------------|
| CONSULT-III<br>GST* <sup>2</sup> | ECM* <sup>3</sup>  | (CONSULT-III screen terms) | SRT code | Trip | MIL | page          |
| U0129                            | 0129               | LOST COMM (BRAKE)          | —        | 1    | ×   | <u>EC-118</u> |
| U0164                            | 0164* <sup>4</sup> | LOST COMM (HVAC)           | _        | 1    | ×   | <u>EC-119</u> |

#### < ECU DIAGNOSIS >

#### [QR25DE]

| DTO                              | C*1                | Items  |          |      |                        | Reference     | A         |
|----------------------------------|--------------------|--|----------|------|------------------------|---------------|-----------|
| CONSULT-III<br>GST* <sup>2</sup> | ECM* <sup>3</sup>  | (CONSULT-III screen terms)                                 | SRT code | Trip | MIL                    | page          | $\square$ |
| U0293                            | 0293               | LOST COMM (HV ECU)   | —        | 1    | ×                      | EC-120        | EC        |
| U0400                            | 0400               | INVALID (HV ECU)   | _        | 1    | ×                      | <u>EC-121</u> |           |
| U0418                            | 0418               | INVALID (BRAKE)  | _        | 1    | ×                      | EC-123        | _         |
| U1001                            | 1001* <sup>4</sup> | CAN COMM CIRCUIT   | —        | 2    | —                      | EC-125        | С         |
| U1020                            | 1020               | LOST COMM (HV ECU)   | _        | 2    | _                      | EC-120        | _         |
| U1021                            | 1021               | INVALID (HV ECU)   | —        | 2    | —                      | EC-121        | D         |
| U1022                            | 1022               | LOST COMM (BRAKE)  | —        | 2    | _                      | EC-118        | _         |
| U1023                            | 1023               | INVALID (BRAKE)  | _        | 2    | —                      | EC-123        | _         |
| P0000                            | 0000               | NO DTC IS DETECTED.<br>FURTHER TESTING<br>MAY BE REQUIRED. |          | _    | Flashing* <sup>5</sup> | _             | E         |
| P0011                            | 0011               | INT/V TIM CONT-B1  | ×        | 2    | ×                      | <u>EC-126</u> | F         |
| P0031                            | 0031               | A/F SEN1 HTR (B1)  | —        | 2    | ×                      | <u>EC-130</u> | _         |
| P0032                            | 0032               | A/F SEN1 HTR (B1)  | —        | 2    | ×                      | <u>EC-130</u> | - G       |
| P0037                            | 0037               | HO2S2 HTR (B1)   | —        | 2    | ×                      | <u>EC-133</u> | G         |
| P0038                            | 0038               | HO2S2 HTR (B1)   | —        | 2    | ×                      | <u>EC-133</u> | _         |
| P0043                            | 0043               | HO2S3 HTR (B1)   | —        | 2    | ×                      | <u>EC-137</u> | Н         |
| P0044                            | 0044               | HO2S3 HTR (B1)   | —        | 2    | ×                      | <u>EC-137</u> | _         |
| P0075                            | 0075               | INT/V TIM V/CIR-B1   | —        | 2    | ×                      | <u>EC-141</u> |           |
| P0101                            | 0101               | MAF SEN/CIRCUIT-B1   | —        | 2    | ×                      | <u>EC-144</u> | _         |
| P0102                            | 0102               | MAF SEN/CIRCUIT-B1   | —        | 1    | ×                      | <u>EC-153</u> | _         |
| P0103                            | 0103               | MAF SEN/CIRCUIT-B1   | —        | 1    | ×                      | <u>EC-153</u> | J         |
| P0112                            | 0112               | IAT SEN/CIRCUIT-B1   | —        | 2    | ×                      | <u>EC-161</u> | _         |
| P0113                            | 0113               | IAT SEN/CIRCUIT-B1   | —        | 2    | ×                      | <u>EC-161</u> | - 17      |
| P0116                            | 0116               | ECT SEN/CIRC   | —        | 2    | ×                      | <u>EC-164</u> | K         |
| P0117                            | 0117               | ECT SEN/CIRC   | —        | 1    | ×                      | <u>EC-166</u> | _         |
| P0118                            | 0118               | ECT SEN/CIRC   | —        | 1    | ×                      | <u>EC-166</u> | L         |
| P0122                            | 0122               | TP SEN 2/CIRC-B1   | —        | 1    | ×                      | <u>EC-169</u> | _         |
| P0123                            | 0123               | TP SEN 2/CIRC-B1   | —        | 1    | ×                      | <u>EC-169</u> | _         |
| P0125                            | 0125               | ECT SENSOR   | —        | 2    | ×                      | <u>EC-172</u> | Μ         |
| P0127                            | 0127               | IAT SENSOR-B1  | _        | 2    | ×                      | <u>EC-175</u> | _         |
| P0128                            | 0128               | THERMSTAT FNCTN  | —        | 2    | ×                      | <u>EC-177</u> | - N       |
| P0130                            | 0130               | A/F SENSOR1 (B1)   | —        | 2    | ×                      | <u>EC-179</u> | _         |
| P0131                            | 0131               | A/F SENSOR1 (B1)   | _        | 2    | ×                      | <u>EC-183</u> | _         |
| P0132                            | 0132               | A/F SENSOR1 (B1)   | —        | 2    | ×                      | <u>EC-186</u> | 0         |
| P0133                            | 0133               | A/F SENSOR1 (B1)   | ×        | 2    | ×                      | <u>EC-190</u> | _         |
| P0137                            | 0137               | HO2S2 (B1)   | ×        | 2    | ×                      | <u>EC-195</u> | - P       |
| P0138                            | 0138               | HO2S2 (B1)   | ×        | 2    | ×                      | <u>EC-200</u> | _         |
| P0139                            | 0139               | HO2S2 (B1)   | ×        | 2    | ×                      | <u>EC-207</u> | _         |
| P0143                            | 0143               | HO2S3 (B1)   | ×        | 2    | ×                      | <u>EC-212</u> | _         |
| P0144                            | 0144               | HO2S3 (B1)   | ×        | 2    | ×                      | <u>EC-215</u> | _         |
| P0145                            | 0145               | HO2S3 (B1)   | ×        | 2    | ×                      | <u>EC-218</u> | _         |
| P0146                            | 0146               | HO2S3 (B1)   | —        | 2    | ×                      | <u>EC-221</u> | -         |

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#### < ECU DIAGNOSIS >

| DTC* <sup>1</sup>                |                   | lite and                            |          |        |        | Deferreres        |
|----------------------------------|-------------------|-------------------------------------|----------|--------|--------|-------------------|
| CONSULT-III<br>GST* <sup>2</sup> | ECM* <sup>3</sup> | Items<br>(CONSULT-III screen terms) | SRT code | Trip   | MIL    | Reference<br>page |
| P0171                            | 0171              | FUEL SYS-LEAN-B1                    | _        | 2      | ×      | EC-224            |
| P0172                            | 0172              | FUEL SYS-RICH-B1                    | _        | 2      | ×      | <u>EC-228</u>     |
| P0181                            | 0181              | FTT SENSOR                          | _        | 2      | ×      | EC-231            |
| P0182                            | 0182              | FTT SEN/CIRCUIT                     | _        | 2      | ×      | EC-234            |
| P0183                            | 0183              | FTT SEN/CIRCUIT                     | _        | 2      | ×      | EC-234            |
| P0201                            | 0201              | INJECTOR CIRC-CYL1                  | _        | 1      |        | EC-237            |
| P0202                            | 0202              | INJECTOR CIRC-CYL2                  | _        | 1      | _      | EC-237            |
| P0203                            | 0203              | INJECTOR CIRC-CYL3                  | _        | 1      | _      | EC-237            |
| P0204                            | 0204              | INJECTOR CIRC-CYL4                  | _        | 1      |        | EC-237            |
| P0222                            | 0222              | TP SEN 1/CIRC-B1                    | _        | 1      | ×      | EC-240            |
| P0223                            | 0223              | TP SEN 1/CIRC-B1                    | _        | 1      | ×      | <u>EC-240</u>     |
| P0300                            | 0300              | MULTI CYL MISFIRE                   | _        | 2      | ×      | EC-243            |
| P0301                            | 0301              | CYL 1 MISFIRE                       |          | 2      | ×      | EC-243            |
| P0302                            | 0302              | CYL 2 MISFIRE                       |          | 2      | ×      | EC-243            |
| P0303                            | 0303              | CYL 3 MISFIRE                       |          | 2      | ×      | EC-243            |
| P0304                            | 0304              | CYL 4 MISFIRE                       | _        | 2      | ×      | EC-243            |
| P0327                            | 0327              | KNOCK SEN/CIRC-B1                   | _        | 2      |        | EC-249            |
| P0328                            | 0328              | KNOCK SEN/CIRC-B1                   | _        | 2      |        | EC-249            |
| P0335                            | 0335              | CKP SEN/CIRCUIT                     |          | 2      | ×      | EC-251            |
| P0340                            | 0340              | CMP SEN/CIRC-B1                     |          | 2      | ×      | EC-255            |
| P0420                            | 0420              | TW CATALYST SYS-B1                  | ×        | 2      | ×      | EC-259            |
| P0441                            | 0441              | EVAP PURG FLOW/MON                  | ×        | 2      | ×      | EC-263            |
| P0443                            | 0443              | PURG VOLUME CONT/V                  |          | 2      | ×      | EC-268            |
| P0444                            | 0444              | PURG VOLUME CONT/V                  |          | 2      | ×      | EC-273            |
| P0445                            | 0445              | PURG VOLUME CONT/V                  |          | 2      | ×      | EC-273            |
| P0447                            | 0447              | VENT CONTROL VALVE                  |          | 2      | ×      | EC-276            |
| P0448                            | 0448              | VENT CONTROL VALVE                  |          | 2      | ×      | EC-280            |
| P0451                            | 0451              | EVAP SYS PRES SEN                   |          | 2      | ×      | EC-284            |
| P0452                            | 0452              | EVAP SYS PRES SEN                   |          | 2      | ×      | EC-288            |
| P0453                            | 0453              | EVAP SYS PRES SEN                   |          | 2      | ×      | EC-293            |
| P0456                            | 0456              | EVAP VERY SML LEAK                  | ×        | 2      | ×      | EC-298            |
| P0460                            | 0460              | FUEL LEV SEN SLOSH                  |          | 2      | ×      | EC-304            |
| P0461                            | 0461              | FUEL LEVEL SENSOR                   | _        | 2      | ×      | EC-306            |
| P0462                            | 0462              | FUEL LEVL SEN/CIRC                  |          | 2      | ×      | EC-308            |
| P0463                            | 0463              | FUEL LEVL SEN/CIRC                  |          | 2      | ×      | EC-308            |
| P0500                            | 0500              | VEH SPEED SEN/CIRC                  |          | 2      | ×      | EC-310            |
| P0506                            | 0506              | ISC SYSTEM                          |          | 2      | ×      | EC-312            |
| P0507                            | 0507              | ISC SYSTEM                          |          | 2      | ×      | <u>EC-314</u>     |
| P0603                            | 0603              | ECM BACK UP/CIRCUIT                 |          | 2      | ×      | <u>EC-316</u>     |
| P0605                            | 0605              | ECM                                 | _        | 1 or 2 | × or — | EC-318            |
| P0607                            | 0607              | ECM                                 | _        | 1      | ×      | <u>EC-320</u>     |
| P0643                            | 0643              | SENSOR POWER/CIRC                   | _        | 1      | ×      | EC-321            |

#### [QR25DE]

| DTC* <sup>1</sup>                |                   |                                      |               |   |                  | 5 (           |     |                   |   |
|----------------------------------|-------------------|--------------------------------------|---------------|---|------------------|---------------|-----|-------------------|---|
| CONSULT-III<br>GST* <sup>2</sup> | ECM* <sup>3</sup> | Items     (CONSULT-III screen terms) | SBT code Trip |   | SBT code Trip MI |               | MIL | Reference<br>page | A |
| P0AC4                            | 0AC4              | HV ECU MIL REQUEST                   | _             | 1 | ×                | <u>EC-323</u> | EC  |                   |   |
| P1148                            | 1148              | CLOSED LOOP-B1                       | —             | 1 | ×                | <u>EC-324</u> | -   |                   |   |
| P1195                            | 1195              | ENGINE NOT START                     | —             | 1 | ×                | <u>EC-325</u> | -   |                   |   |
| P1196                            | 1196              | POOR ENGINE POWER                    | —             | 1 | ×                | <u>EC-328</u> | С   |                   |   |
| P1197                            | 1197              | FUEL RUN OUT                         | —             | 1 | —                | <u>EC-331</u> | -   |                   |   |
| P1217                            | 1217              | ENG OVER TEMP                        | —             | 1 | ×                | EC-332        | D   |                   |   |
| P1225                            | 1225              | CTP LEARNING-B1                      | —             | 2 | _                | <u>EC-336</u> |     |                   |   |
| P1226                            | 1226              | CTP LEARNING-B1                      | —             | 2 | _                | <u>EC-338</u> | -   |                   |   |
| P1421                            | 1421              | COLD START CONTROL                   | _             | 2 | ×                | <u>EC-340</u> | E   |                   |   |
| P1564                            | 1564              | ASCD SW                              | —             | 1 | _                | <u>EC-342</u> | -   |                   |   |
| P1572                            | 1572              | ASCD BRAKE SW                        | —             | 1 | _                | <u>EC-345</u> | - F |                   |   |
| P1574                            | 1574              | ASCD VHL SPD SEN                     | —             | 1 | —                | <u>EC-351</u> | - F |                   |   |
| P1805                            | 1805              | BRAKE SW/CIRCUIT                     | —             | 2 | _                | <u>EC-353</u> | -   |                   |   |
| P2100                            | 2100              | ETC MOT PWR-B1                       | —             | 1 | ×                | <u>EC-356</u> | G   |                   |   |
| P2101                            | 2101              | ETC FNCTN/CIRC-B1                    | —             | 1 | ×                | <u>EC-358</u> | -   |                   |   |
| P2103                            | 2103              | ETC MOT PWR                          | —             | 1 | ×                | <u>EC-356</u> |     |                   |   |
| P2118                            | 2118              | ETC MOT-B1                           | —             | 1 | ×                | <u>EC-362</u> | - H |                   |   |
| P2119                            | 2119              | ETC ACTR-B1                          | —             | 1 | ×                | <u>EC-365</u> | -   |                   |   |
| P2135                            | 2135              | TP SENSOR-B1                         |               | 1 | ×                | <u>EC-367</u> |     |                   |   |
| P2423                            | 2423              | HC ADS CATALYST-B1                   | ×             | 2 | ×                | <u>EC-371</u> | _   |                   |   |
| P2A00                            | 2A00              | A/F SENSOR1 (B1)                     | _             | 2 | ×                | <u>EC-375</u> | _   |                   |   |

\*1: 1st trip DTC No. is the same as DTC No.

\*2: This number is prescribed by SAE J2012.

\*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

\*4: The troubleshooting for this DTC needs CONSULT-III.

\*5: When the ECM is in the mode of displaying SRT status, MIL may flash. For the details, refer to "How to Display SRT Status".

# How to Set SRT Code

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

#### WITH CONSULT-III

Perform corresponding DTC CONFIRMATION PROCEDURE one by one.

#### **WITHOUT CONSULT-III**

The most efficient driving pattern in which SRT codes can be properly set is explained on the below. The driv-

0

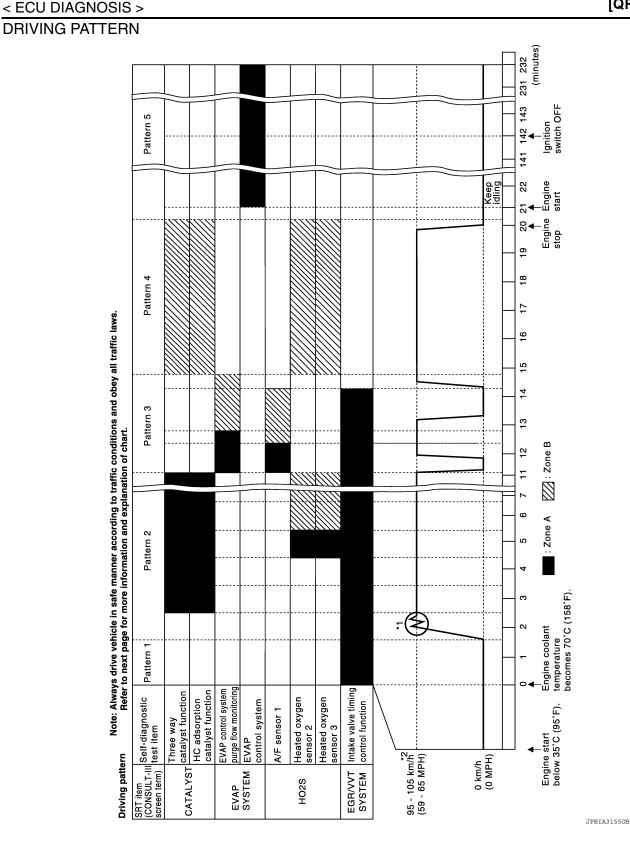
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• The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.

Zone A refers to the range where the time, required for the diagnosis under normal conditions\*, is the shortest.

Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A. \*: Normal conditions refer to the following:

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- Flat road
- Ambient air temperature: 20 30°C (68 86°F)
- Diagnosis is performed as quickly as possible under normal conditions. Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagno-EC sis may also be performed.

ECM

Pattern 1:

- The engine is started at the engine coolant temperature of –10 to 35°C (14 to 95°F)
- (where the voltage between the ECM terminal 46 and ground is 3.0 4.3V).
- The engine must be operated until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 46 and ground is lower than 1.4V).
- The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 95 and ground is less than 4.1V).
- Pattern 2:
- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during decelerating vehicle speed from 100 km/h (62 MPH) to 0 km/h (0 MPH).

Pattern 4:

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

Pattern 5:

- Activate "INSPECTION MODE 1" (<u>HBC-104</u>) to start engine, and wait at least 2 hours. Then turn ignition switch OFF and wait at least 90 minutes.
- \*1: Depress the accelerator pedal until vehicle speed is 100 km/h (62 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 100 km/h (62 MPH) again.

\*2: Checking the vehicle speed with GST is advised.

Suggested Transmission Gear Position Set the selector lever in the D position.

# Test Value and Test Limit

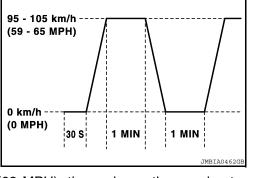
The following is the information specified in Service \$06 of SAE J1979/ISO 15031-5.

L 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 Μ 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. (eq., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

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EC-447

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#### < ECU DIAGNOSIS >

|       | OBD- |   |       | li  | e and Test<br>mit<br>display) |  |       |   |
|-------|------|---|-------|-----|-------------------------------|--|-------|---|
| Item  | MID  |   | DTC   | TID | Unitand<br>Scaling<br>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                        |       |   |
|       |      | Air fuel ratio (A/F) sensor 1<br>(Bank 1) | P0130 | 8BH | 0BH                           | Difference in sensor output voltage                          |       |   |
|       | 01H  |   | P0133 | 8CH | 83H                           | Response gain at the limited frequency                       |       |   |
|       |      |   | P014C | 8DH | 04H                           | O2 Sensor Slow Response - Rich to<br>Lean Bank 1 Sensor 1    |       |   |
|       |      |   |       |     | P014C                         | 8EH  | 04H   | O2 Sensor Slow Response - Rich to<br>Lean Bank 1 Sensor 1 |
| 11000 |      |   |       |     |                               |  | P014D | 8FH   |
| HO2S  |      |   | P014D | 90H | 84H                           | O2 Sensor Slow Response - Lean to<br>Rich Bank 1 Sensor 1    |       |   |
|       |      |   | P015A | 91H | 01H                           | O2 Sensor Delayed Response - Rich to<br>Lean Bank 1 Sensor 1 |       |   |
|       |      |   | P015A | 92H | 01H                           | O2 Sensor Delayed Response - Rich to<br>Lean Bank 1 Sensor 1 |       |   |
|       |      |   | P015B | 93H | 01H                           | O2 Sensor Delayed Response - Lean to<br>Rich Bank 1 Sensor 1 |       |   |
|       |      |   | P015B | 94H | 01H                           | O2 Sensor Delayed Response - Lean to<br>Rich Bank 1 Sensor 1 |       |   |
|       |      |   | P0138 | 07H | 0CH                           | Minimum sensor output voltage for test cycle                 |       |   |
|       | 02H  | Heated oxygen sensor 2<br>(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<br>(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 >

|      | OBD- |   |       | li    | e and Test<br>mit<br>display) |  | A   |   |
|------|------|---|-------|-------|-------------------------------|--|---|---|
| Item | MID  | Self-diagnostic test item                 | DTC   | TID   | Unitand<br>Scaling<br>ID      | Description  | EC  |   |
|      |      |   | P0151 | 83H   | 0BH                           | Minimum sensor output voltage for test cycle                 | С   |   |
|      |      |   | P0151 | 84H   | 0BH                           | Maximum sensor output voltage for test cycle                 | . 0   |   |
|      |      |   | P0150 | 85H   | 0BH                           | Minimum sensor output voltage for test cycle                 | D   |   |
|      |      |   | 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                        | G   |   |
|      |      |   | P0150 | 8BH   | 0BH                           | Difference in sensor output voltage                          | _   |   |
|      | 05H  | Air fuel ratio (A/F) sensor 1<br>(Bank 2) | P0153 | 8CH   | 83H                           | Response gain at the limited frequency                       |   |   |
|      |      |   |       | P014E | 8DH                           | 04H  | O2 Sensor Slow Response - Rich to<br>Lean Bank 2 Sensor 1 | H |
|      |      |   |       | P014E | 8EH                           | 04H  | O2 Sensor Slow Response - Rich to<br>Lean Bank 2 Sensor 1 |   |
| HO2S |      |   |       | P014F | 8FH                           | 84H  | O2 Sensor Slow Response - Lean to<br>Rich Bank 2 Sensor 1 | - |
| ПО23 |      |   | P014F | 90H   | 84H                           | O2 Sensor Slow Response - Lean to<br>Rich Bank 2 Sensor 1    | J   |   |
|      |      |   | P015C | 91H   | 01H                           | O2 Sensor Delayed Response - Rich to Lean Bank 2 Sensor 1    | K   |   |
|      |      |   |       | P015C | 92H                           | 01H  | O2 Sensor Delayed Response - Rich to Lean Bank 2 Sensor 1 | _ |
|      |      |   | P015D | 93H   | 01H                           | O2 Sensor Delayed Response - Lean to<br>Rich Bank 2 Sensor 1 | L   |   |
|      |      |   | P015D | 94H   | 01H                           | O2 Sensor Delayed Response - Lean to<br>Rich Bank 2 Sensor 1 | M   |   |
|      |      |   | P0158 | 07H   | 0CH                           | Minimum sensor output voltage for test cycle                 | _   |   |
|      | 06H  | Heated oxygen sensor 2<br>(Bank 2)        | P0157 | 08H   | 0CH                           | Maximum sensor output voltage for test cycle                 | N   |   |
|      |      |   | P0158 | 80H   | 0CH                           | Sensor output voltage  | -   |   |
|      |      |   | P0159 | 81H   | 0CH                           | Difference in sensor output voltage                          | 0   |   |
|      |      |   | P0163 | 07H   | 0CH                           | Minimum sensor output voltage for test cycle                 | -   |   |
|      | 07H  | Heated oxygen sensor 3<br>(Bank2)         | P0164 | 08H   | 0CH                           | Maximum sensor output voltage for test cycle                 | P   |   |
|      |      |   | P0166 | 80H   | 0CH                           | Sensor output voltage  | -   |   |
|      |      |   | P0165 | 81H   | 0CH                           | Difference in sensor output voltage                          | -   |   |

#### < ECU DIAGNOSIS >

|               |      |                             |       |     | e and Test<br>mit        |  |
|---------------|------|-----------------------------|-------|-----|--------------------------|--|
| Item          | OBD- |                             | DTC   |     | display)                 | Description  |
| item          | MID  | Sell-diagnosile test item   | DIO   | TID | Unitand<br>Scaling<br>ID | Description  |
|               |      |                             | P0420 | 80H | 01H                      | O2 storage index   |
|               | 21H  | Three way catalyst function | P0420 | 82H | 01H                      | Switching time lag engine exhaust index value  |
|               | 210  | (Bank1)                     | P2423 | 83H | 0CH                      | Difference in 3rd O2 sensor output volt-<br>age  |
| CATA-         |      |                             | P2423 | 84H | 84H                      | O2 storage index in HC trap catalyst   |
| LYST          |      |                             | P0430 | 80H | 01H                      | O2 storage index   |
|               | 22H  | Three way catalyst function | P0430 | 82H | 01H                      | Switching time lag engine exhaust index value  |
|               | 2211 | (Bank2)                     | P2424 | 83H | 0CH                      | Difference in 3rd O2 sensor output volt-<br>age  |
|               |      |                             | P2424 | 84H | 84H                      | O2 storage index in HC trap catalyst   |
|               |      | EGR function                | P0400 | 80H | 96H                      | Low Flow Faults: EGR temp change rate (short term)   |
|               |      |                             | P0400 | 81H | 96H                      | Low Flow Faults: EGR temp change rate (long term)  |
| EGR<br>SYSTEM | 31H  |                             | P0400 | 82H | 96H                      | Low Flow Faults: Difference between<br>max EGR temp and EGR temp under<br>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  | W/T Monitor (Ponko)         | P0024 | 81H | 9DH                      | VTC exhaust function diagnosis (VTC alignment check diagnosis)                             |
|               | 301  | VVT Monitor (Bank2)         | P0021 | 82H | 9DH                      | VTC intake function diagnosis (VTC drive failure diagnosis)                                |
|               |      |                             | P0024 | 83H | 9DH                      | VTC exhaust function diagnosis (VTC drive failure diagnosis)                               |

#### < ECU DIAGNOSIS >

| Item OBD-          |     |   | DTO                                 | li  | e and Test<br>mit<br>display) | Description  | Д        |
|--------------------|-----|---|-------------------------------------|-----|-------------------------------|--|----------|
| nem                | MID | Self-diagnostic test item                     | DTC                                 | TID | Unitand<br>Scaling<br>ID      | Description  | EC       |
|                    | 39H | EVAP control system leak<br>(Cap Off)         | P0455                               | 80H | 0CH                           | Difference in pressure sensor output voltage before and after pull down                      | C        |
|                    | 3BH | EVAP control system leak<br>(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)  | D        |
| SYSTEM             | 3CH | EVAP control system leak<br>(Very small leak) | P0456                               | 81H | FDH                           | Maximum internal pressure of EVAP system during monitoring                                   | E        |
|                    |     |   | 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<br>voltage before and after vent control<br>valve close | F        |
|                    | 41H | A/F sensor 1 heater<br>(Bank 1)               | Low Input:P0031<br>High Input:P0032 | 81H | 0BH                           | Converted value of Heater electric cur-<br>rent to voltage                                   | G        |
|                    | 42H | Heated oxygen sensor 2 heat-<br>er (Bank 1)   | Low Input:P0037<br>High Input:P0038 | 80H | 0CH                           | Converted value of Heater electric cur-<br>rent to voltage                                   | -        |
| O2 SEN-<br>SOR     | 43H | Heated oxygen sensor 3 heat-<br>er (Bank 1)   | P0043                               | 80H | 0CH                           | Converted value of Heater electric cur-<br>rent to voltage                                   | -        |
| HEATER             | 45H | A/F sensor 1 heater<br>(Bank 2)               | Low Input:P0051<br>High Input:P0052 | 81H | 0BH                           | Converted value of Heater electric cur-<br>rent to voltage                                   |          |
|                    | 46H | Heated oxygen sensor 2 heat-<br>er (Bank 2)   | Low Input:P0057<br>High Input:P0058 | 80H | 0CH                           | Converted value of Heater electric cur-<br>rent to voltage                                   | -        |
|                    | 47H | Heated oxygen sensor 3 heat-<br>er (Bank 2)   | P0063                               | 80H | 0CH                           | Converted value of Heater electric cur-<br>rent to voltage                                   | J        |
|                    |     |   | P0411                               | 80H | 01H                           | Secondary Air Injection System Incor-<br>rect Flow Detected                                  | k        |
|                    |     |   | Bank1: P0491<br>Bank2: P0492        | 81H | 01H                           | Secondary Air Injection System Insufficient Flow   | _        |
|                    |     |   | P2445                               | 82H | 01H                           | Secondary Air Injection System Pump<br>Stuck Off   |          |
| Second-<br>ary Air | 71H | Secondary Air system                          | P2448                               | 83H | 01H                           | Secondary Air Injection System High<br>Airflow   | N        |
|                    |     |   | Bank1: P2440<br>Bank2: P2442        | 84H | 01H                           | Secondary Air Injection System Switch-<br>ing Valve Stuck Open                               |          |
|                    |     |   | P2440                               | 85H | 01H                           | Secondary Air Injection System Switch-<br>ing Valve Stuck Open                               | Ν        |
|                    |     |   | P2444                               | 86H | 01H                           | Secondary Air Injection System Pump<br>Stuck On  | C        |
|                    | 81H | Fuel injection system function                | P0171 or P0172                      | 80H | 2FH                           | Long term fuel trim  |          |
| FUEL               |     | (Bank 1)                                      | P0171 or P0172                      | 81H | 24H                           | The number of lambda control clamped   | <u>.</u> |
| SYSTEM             | 82H | Fuel injection system function                | P0174 or P0175                      | 80H | 2FH                           | Long term fuel trim  | F        |
|                    |     | (Bank 2)                                      | P0174 or P0175                      | 81H | 24H                           | The number of lambda control clamped   |          |

#### < ECU DIAGNOSIS >

|         |             |                            |       | li    | e and Test<br>mit<br>display) |   |  |
|---------|-------------|----------------------------|-------|-------|-------------------------------|---|--|
| Item    | OBD-<br>MID | Self-diagnostic test item  | DTC   | TID   | Unitand<br>Scaling<br>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    |  |
|         |             | Multiple Cylinder Misfires | P0307 | 86H   | 24H                           | Misfiring counter at 1000 revolution of the seventh cylinder  |  |
|         |             |                            | P0308 | 87H   | 24H                           | Misfiring counter at 1000 revolution of the eighth cylinder   |  |
|         |             |                            |       | P0300 | 88H                           | 24H   | Misfiring counter at 1000 revolution of the multiple cylinders |
| MISFIRE | A1H         |                            | P0301 | 89H   | 24H                           | Misfiring counter at 200 revolution of the first cylinder     |  |
| MISFINE | АП          |                            | P0302 | 8AH   | 24H                           | Misfiring counter at 200 revolution of the second cylinder    |  |
|         |             |                            | P0303 | 8BH   | 24H                           | Misfiring counter at 200 revolution of the third cylinder     |  |
|         |             |                            | P0304 | 8CH   | 24H                           | Misfiring counter at 200 revolution of the fourth cylinder    |  |
|         |             |                            | P0305 | 8DH   | 24H                           | Misfiring counter at 200 revolution of the fifth cylinder     |  |
|         |             |                            | P0306 | 8EH   | 24H                           | Misfiring counter at 200 revolution of the sixth cylinder     |  |
|         |             |                            | P0307 | 8FH   | 24H                           | Misfiring counter at 200 revolution of the seventh cylinder   |  |
|         |             |                            | P0308 | 90H   | 24H                           | Misfiring counter at 200 revolution of the eighth cylinder    |  |
|         |             |                            | P0300 | 91H   | 24H                           | Misfiring counter at 1000 revolution of the single cylinder   |  |
|         |             |                            | P0300 | 92H   | 24H                           | Misfiring counter at 200 revolution of the single cylinder    |  |
|         |             |                            | P0300 | 93H   | 24H                           | Misfiring counter at 200 revolution of the multiple cylinders |  |

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|         | OBD- |                           |       | li  | e and Test<br>mit<br>display) |  | А  |
|---------|------|---------------------------|-------|-----|-------------------------------|--|----|
| Item    | MID  | Self-diagnostic test item | DTC   | TID | Unit and<br>Scaling<br>ID     | Description  | EC |
|         | A2H  | No. 1 Cylinder Misfire    | P0301 | овн | 24H                           | EWMA (Exponential Weighted Moving<br>Average) misfire counts for last 10 driv-<br>ing cycles | С  |
|         |      |                           | P0301 | 0CH | 24H                           | Misfire counts for last/current driving cy-<br>cles  |    |
|         | АЗН  | No. 2 Cylinder Misfire    | P0302 | ОВН | 24H                           | EWMA (Exponential Weighted Moving<br>Average) misfire counts for last 10 driv-<br>ing cycles | D  |
|         |      |                           | P0302 | 0CH | 24H                           | Misfire counts for last/current driving cy-<br>cles  | E  |
|         | A4H  | No. 3 Cylinder Misfire    | P0303 | ОВН | 24H                           | EWMA (Exponential Weighted Moving<br>Average) misfire counts for last 10 driv-<br>ing cycles | F  |
|         |      |                           | P0303 | 0CH | 24H                           | Misfire counts for last/current driving cy-<br>cles  | G  |
|         | A5H  | No. 4 Cylinder Misfire    | P0304 | овн | 24H                           | EWMA (Exponential Weighted Moving<br>Average) misfire counts for last 10 driv-<br>ing cycles | Н  |
| MISFIRE |      |                           | P0304 | 0CH | 24H                           | Misfire counts for last/current driving cy-<br>cles  |    |
| MISFIRE | A6H  | No. 5 Cylinder Misfire    | P0305 | ОВН | 24H                           | EWMA (Exponential Weighted Moving<br>Average) misfire counts for last 10 driv-<br>ing cycles | I  |
|         |      |                           | P0305 | 0CH | 24H                           | Misfire counts for last/current driving cy-<br>cles  | J  |
|         | A7H  | No. 6 Cylinder Misfire    | P0306 | 0BH | 24H                           | EWMA (Exponential Weighted Moving<br>Average) misfire counts for last 10 driv-<br>ing cycles | K  |
|         |      |                           | P0306 | 0CH | 24H                           | Misfire counts for last/current driving cy-<br>cles  |    |
|         | A8H  | No. 7 Cylinder Misfire    | P0307 | овн | 24H                           | EWMA (Exponential Weighted Moving<br>Average) misfire counts for last 10 driv-<br>ing cycles | L  |
|         |      |                           | P0307 | 0CH | 24H                           | Misfire counts for last/current driving cy-<br>cles  | Μ  |
|         | A9H  | No. 8 Cylinder Misfire    | P0308 | ОВН | 24H                           | EWMA (Exponential Weighted Moving<br>Average) misfire counts for last 10 driv-<br>ing cycles | Ν  |
|         |      |                           | P0308 | 0CH | 24H                           | Misfire counts for last/current driving cy-<br>cles  | 0  |

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#### < SYMPTOM DIAGNOSIS >

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# SYMPTOM DIAGNOSIS ENGINE CONTROL SYSTEM SYMPTOMS

# Symptom Table

#### SYSTEM — BASIC ENGINE CONTROL SYSTEM

|                 |   |                                  |              |                              |                        |                                 | SYM                | PTOM               |                  |                        |                                  |                            |                           |   |
|-----------------|---|----------------------------------|--------------|------------------------------|------------------------|---------------------------------|--------------------|--------------------|------------------|------------------------|----------------------------------|----------------------------|---------------------------|---|
|                 |   | 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 | Reference<br>page   |
| Warrant<br>Fuel | y symptom code                                      | AA<br>1                          | AB           | AC<br>2                      | AD<br>3                | AE<br>2                         | AF                 | AG<br>2            | AH<br>2          | AJ                     | AK                               | AL<br>3                    | AM                        | EC-386  |
| ruei            | Fuel pump circuit<br>Fuel pressure regulator system | 3                                | 1            | 4                            | 4                      | 4                               | 4                  | 4                  | 4                | 4                      |                                  | 4                          |                           | <u>EC-366</u><br>EC-465   |
|                 | Fuel injector circuit                               | 1                                | 1            | 2                            | 3                      | 2                               | 7                  | 2                  | 2                | -                      |                                  | - 2                        |                           | <u>EC-237</u>   |
|                 | Evaporative emission system                         | 3                                | 3            | 4                            | 4                      | 4                               | 4                  | 4                  | 4                | 4                      |                                  | 4                          |                           | EC-63   |
| Air             | Positive crankcase ventilation system               |                                  |              | 4                            | 4                      | 4                               | 4                  | 4                  | 4                | 4                      |                                  | 4                          | 1                         | EC-401  |
|                 | Incorrect idle speed adjustment                     | 3                                | 3            |                              |                        |                                 | 1                  | 1                  | 1                | 1                      |                                  | 1                          |                           | EC-14   |
|                 | Electric throttle control actuator                  | 1                                | 1            | 2                            | 3                      | 3                               | 2                  | 2                  | 2                | 2                      |                                  | 2                          |                           | <u>EC-358,</u><br><u>EC-365</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                          |                           | EC-390  |
| Main po         | wer supply and ground circuit                       | 2                                | 2            | 3                            | 3                      | 3                               |                    | 3                  | 3                |                        | 2                                | 3                          |                           | <u>EC-114</u>   |
| Mass ai         | r flow sensor circuit                               | 1                                |              |                              | 2                      |                                 |                    |                    |                  |                        |                                  |                            |                           | <u>EC-144,</u><br>EC-153  |
| Engine          | coolant temperature sensor circuit                  |                                  |              |                              |                        |                                 | 3                  |                    |                  | 3                      |                                  |                            |                           | <u>EC-166,</u><br><u>EC-172</u>   |
| Air fuel        | ratio (A/F) sensor 1 circuit                        |                                  | 1            | 2                            | 3                      | 2                               |                    | 2                  | 2                |                        |                                  | 2                          |                           | <u>EC-179,</u><br><u>EC-183,</u><br><u>EC-186,</u><br><u>EC-190,</u><br><u>EC-375</u> |
| Throttle        | position sensor circuit                             |                                  |              |                              |                        |                                 | 2                  |                    |                  | 2                      |                                  |                            |                           | EC-169,<br>EC-240,<br>EC-336,<br>EC-338,<br>EC-367                                    |
|                 | ensor circuit                                       |                                  |              | 2                            |                        |                                 |                    |                    |                  |                        |                                  | 3                          |                           | <u>EC-249</u>   |
|                 | haft position sensor (POS) circuit                  | 2                                | 2            |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           | <u>EC-251</u>   |
| Camsha          | tt position sensor (PHASE) circuit                  | 3                                | 2            |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           | <u>EC-255</u>   |

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|  |                   |        |                         |                  |               | SYM           | ртом               |           |                |                 |             |             |                                 | Δ  |
|--|-------------------|--------|-------------------------|------------------|---------------|---------------|--------------------|-----------|----------------|-----------------|-------------|-------------|---------------------------------|----|
|  | HA)               |        |                         |                  | NOI           |               |                    |           |                | нвн             |             |             |                                 | A  |
|  | (EXCP. H/         |        | SPOT                    |                  | ACCELERATION  |               |                    |           |                | ATURE           | NOI         | N           |                                 | EC |
|  | START/RESTART (E) |        |                         | KNOCK/DETONATION | POOR ACCE     | LE            | TING               | _         | return to Idle | ER TEMPERATURE  | CONSUMPTION | CONSUMPTION | Reference<br>page               | С  |
|  |                   | STALL  | HESITATION/SURGING/FLAT | KNOCK/DE         | OF POWER/POOR | IDLE/LOW IDLE | ROUGH IDLE/HUNTING | VIBRATION |                | OVERHEATS/WATER | SIVE FUEL   | OIL         |                                 | D  |
|  | HARD/NO           | ENGINE | HESITA                  | SPARK            | LACK O        | HIGH ID       | ROUGH              | IDLING    | SLOW/NO        | OVERH           | EXCESSIVE   | EXCESSIVE   |                                 | E  |
| Warranty symptom code                              | AA                | AB     | AC                      | AD               | AE            | AF            | AG                 | AH        | AJ             | AK              | AL          | AM          |                                 | _  |
| ECM  | 2                 | 2      | 3                       | 3                | 3             | 3             | 3                  | 3         | 3              | 3               | 3           |             | <u>EC-316,</u><br><u>EC-318</u> | F  |
| Intake valve timing control solenoid valve circuit |                   | 3      | 2                       |                  | 1             | 3             | 2                  | 2         | 3              |                 | 3           |             | <u>EC-141</u>                   | 0  |
| Refrigerant pressure sensor circuit                |                   | 2      |                         |                  |               | 3             |                    |           | 3              |                 | 4           |             | <u>EC-402</u>                   | G  |
| Hybrid vehicle control ECU                         | 1                 | 1      | 2                       |                  | 1             | 1             | 3                  | 3         | 1              | 3               |             |             | <u>HBC-9</u>                    |    |

1 - 6: The numbers refer to the order of inspection.

(continued on next table)

#### SYSTEM — ENGINE MECHANICAL & OTHER

|          |   |                                  |              |                              |                        |                                 | SYM                | PTON               | 1                |                        |                                  |                            |                           |                   |                  |
|----------|---|----------------------------------|--------------|------------------------------|------------------------|---------------------------------|--------------------|--------------------|------------------|------------------------|----------------------------------|----------------------------|---------------------------|-------------------|------------------|
|          |   | 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 | Reference<br>page | J<br>K<br>L<br>M |
| Warranty | / symptom code                                | AA                               | AB           | AC                           | AD                     | AE                              | AF                 | AG                 | AH               | AJ                     | AK                               | AL                         | AM                        |                   |                  |
| Fuel     | Fuel tank                                     | 5                                |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           | <u>FL-11</u>      | 0                |
|          | Fuel piping                                   | 5                                |              | 5                            | 5                      | 5                               |                    | 5                  | 5                |                        |                                  | 5                          | Ī                         | <u>EM-35</u>      | 0                |
|          | Vapor lock                                    |                                  | 5            |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           | _                 |                  |
|          | Valve deposit                                 |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           | _                 | Ρ                |
|          | Poor fuel (Heavy weight gasoline, Low octane) | 5                                |              | 5                            | 5                      | 5                               |                    | 5                  | 5                |                        |                                  | 5                          |                           |                   |                  |

#### < SYMPTOM DIAGNOSIS >

|                  |   |                                  |              |                              |                        |                                 | SYM                | PTON               | 1                |                        |                                  |                            |                           |   |
|------------------|---|----------------------------------|--------------|------------------------------|------------------------|---------------------------------|--------------------|--------------------|------------------|------------------------|----------------------------------|----------------------------|---------------------------|---|
|                  |   | HARD/NO START/RESTART (EXCP. HA) | ENGINE STALL | HESITATION/SURGING/FLAT SPOT | SPARK KNOCK/DETONATION | LACK OF POWER/POOR ACCELERATION | HIGH IDRE/LOW IDLE | ROUGH IDLE/HUNTING | IDLING VIBRATION | SLOW/NO RETURN TO IDLE | OVERHEATS/WATER TEMPERATURE HIGH | EXCESSIVE FUEL CONSUMPTION | EXCESSIVE OIL CONSUMPTION | Reference<br>page   |
| Warranty s       | ymptom code   | AA                               | AB           | AC                           | AD                     | AE                              | AF                 | AG                 | AH               | AJ                     | AK                               | AL                         | AM                        |   |
| Air              | Air duct  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           | <u>EM-24</u>  |
|                  | Air cleaner   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           | <u>EM-24</u>  |
|                  | Air leakage from air duct<br>(Mass air flow sensor — electric throt-<br>tle control actuator) |                                  | 5            | 5                            |                        | 5                               |                    | 5                  | 5                |                        |                                  | 5                          |                           | <u>EM-24</u>  |
|                  | Electric throttle control actuator  | 5                                |              |                              | 5                      |                                 | 5                  |                    |                  | 5                      |                                  |                            |                           | EM-25   |
|                  | Air leakage from intake manifold/Col-<br>lector/Gasket  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           | <u>EM-25</u>  |
| Cranking         | Signal plate  | 6                                |              |                              |                        |                                 |                    |                    |                  |                        |                                  | 1                          |                           | <u>EM-71</u>  |
| Engine           | Cylinder head   | 5                                | 5            | 5                            | 5                      | 5                               |                    | 5                  | 5                |                        |                                  | 5                          |                           | <u>EM-62</u>  |
|                  | Cylinder head gasket  | Ŭ                                | •            |                              |                        |                                 |                    | -                  | Ŭ                |                        | 4                                |                            | 3                         |   |
|                  | Cylinder block  | -                                |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |   |
|                  | Piston  | -                                |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            | 4                         |   |
|                  | Piston ring   | 6                                | 6            | 6                            | 6                      | 6                               |                    | 6                  | 6                |                        |                                  | 6                          |                           | <u>EM-75</u>  |
|                  | Connecting rod  | -                                |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |   |
|                  | Bearing   | -                                |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |   |
|                  | Crankshaft  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |   |
| Valve<br>mecha-  | Timing chain  | -                                |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           | <u>EM-51</u>  |
| nism             | Camshaft  | -                                |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           | <u>EM-40</u>  |
|                  | Intake valve timing control   | 5                                | 5            | 5                            | 5                      | 5                               |                    | 5                  | 5                |                        |                                  | 5                          |                           | <u>EM-51</u>  |
|                  | Intake valve  | -                                |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            | 3                         | <u>EM-62</u>  |
|                  | Exhaust valve   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |   |
| Exhaust          | Exhaust manifold/Tube/Muffler/Gasket  | _                                | _            | _                            | _                      | _                               |                    | _                  | _                |                        |                                  | _                          |                           | <u>EM-29</u> ,  |
|                  | Three way catalyst  | 5                                | 5            | 5                            | 5                      | 5                               |                    | 5                  | 5                |                        |                                  | 5                          |                           | <u>EX-6</u>   |
| L sub-states     | HC adsorption catalyst  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           | <u>EX-6</u>   |
| Lubrica-<br>tion | Oil pan/Oil strainer/Oil pump/Oil filter/<br>Oil gallery/Oil cooler                           | 5                                | 5            | 5                            | 5                      | 5                               |                    | 5                  | 5                |                        |                                  | 5                          |                           | <u>EM-32,</u><br><u>LU-12,</u><br><u>LU-10,</u><br><u>LU-15</u> |
|                  | Oil level (Low)/Filthy oil  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           | <u>LU-8</u>   |

#### < SYMPTOM DIAGNOSIS >

#### [QR25DE]

|          |  |                   |          |                            |                        |              | SYM                | PTON               | 1                |                |                                  |             |             |                   |         |
|----------|--|-------------------|----------|----------------------------|------------------------|--------------|--------------------|--------------------|------------------|----------------|----------------------------------|-------------|-------------|-------------------|---------|
|          |  | (EXCP. HA)        |          | SPOT                       |                        | ACCELERATION |                    |                    |                  |                | TURE HIGH                        | NO          | 7           |                   | A<br>EC |
|          |  | START/RESTART (EX |          | HESITATION/SURGING/FLAT SF | SPARK KNOCK/DETONATION | POOR ACCEI   | Ē                  | TING               |                  | RETURN TO IDLE | OVERHEATS/WATER TEMPERATURE HIGH | CONSUMPTION | CONSUMPTION | Reference<br>page | С       |
|          |  |                   | STALL    | ON/SURG                    | NOCK/DE                | POWER/POOR   | E/LOW ID           | NUH/AJC            | BRATION          |                | ATS/WATE                         | VE FUEL     | oIL         |                   | D       |
|          |  | HARD/NO           | ENGINE S | HESITATIO                  | SPARK KI               | LACK OF      | HIGH IDLE/LOW IDLE | ROUGH IDLE/HUNTING | IDLING VIBRATION | SLOW/NO        | OVERHE/                          | EXCESSIVE   | EXCESSIVE   |                   | E       |
| Warranty | symptom code                             | AA                | AB       | AC                         | AD                     | AE           | AF                 | AG                 | AH               | AJ             | AK                               | AL          | AM          |                   |         |
| Cooling  | Radiator/Hose/Radiator filler cap        |                   |          |                            |                        |              |                    |                    |                  |                |                                  |             |             | <u>CO-14</u>      | F       |
|          | Thermostat                               | _                 |          |                            |                        |              |                    |                    |                  | 5              |                                  |             |             | <u>CO-19</u>      | -       |
|          | Water pump                               |                   |          |                            |                        |              |                    |                    |                  |                | -                                |             |             | <u>CO-17</u>      | G       |
|          | Water gallery                            | 5                 | 5        | 5                          | 5                      | 5            |                    | 5                  | 5                |                | 4                                | 5           |             | <u>CO-21</u>      |         |
|          | Cooling fan                              | 1                 |          |                            |                        |              |                    |                    |                  |                |                                  |             |             | <u>CO-16</u>      | -       |
|          | Coolant level (Low)/Contaminated coolant |                   |          |                            |                        |              |                    |                    |                  | 5              |                                  |             |             | <u>CO-10</u>      | Н       |

1 - 6: The numbers refer to the order of inspection.

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#### NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS >

#### NORMAL OPERATING CONDITION

#### Description

INFOID:000000005442001

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 1,800 rpm under no load (for example, the selector lever position is P and engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled. **NOTE:** 

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, <u>EC-27</u>. <u>"System Description"</u>.

# PRECAUTION PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT **PRE-TENSIONER**" INFOID:000000005777258

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the "SRS AIR BAG" and "SEAT BELT" of this Service Manual.

#### WARNING:

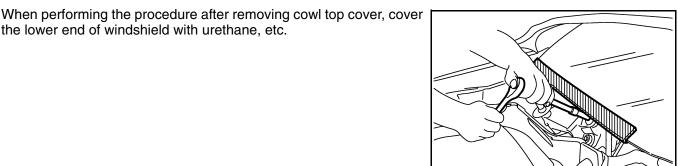
- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the "SRS AIR BAG".
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

#### WARNING:

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

#### Precaution for Procedure without Cowl Top Cover



 $\langle \mathcal{A} \rangle$ 

# the lower end of windshield with urethane, etc.

# On Board Diagnostic (OBD) System of Engine

INFOID:000000005442004

PIIB3706

INFOID:000000005777259

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration. CAUTION:

- Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-61, "Description".

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# PRECAUTIONS

#### < PRECAUTION >

INFOID:000000005442005

- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EVAP system or fuel injection system, etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.

#### **General Precautions**

- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- · Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- · Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.
- Do not disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.

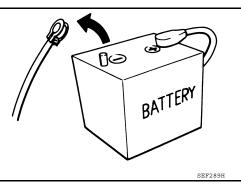
The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.

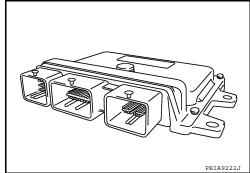
- If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.
- **Diagnostic trouble codes**
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values
- When connecting ECM harness connector (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.
  - 2 ECM
  - Α Loosen

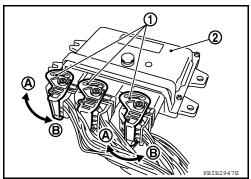
• When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).

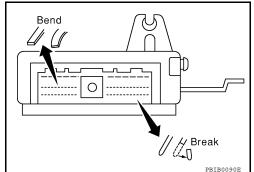
Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.

- · Securely connect ECM harness connectors. A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system mal-







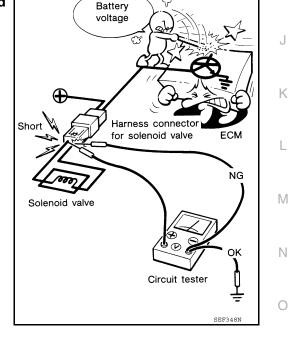


< PRECAUTION >

functions due to receiving external noise, degraded operation of ICs, etc.

- Keep engine control system parts and harness dry.
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to <u>EC-405, "Reference Value"</u>.
- Handle mass air flow sensor carefully to avoid damage.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).
- After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check. The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.
- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and

damage the ECM power transistor.

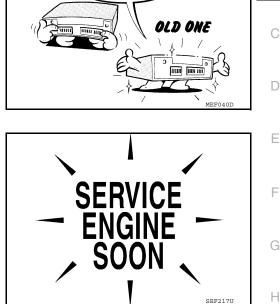


- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.

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Perform ECM input/output signal)

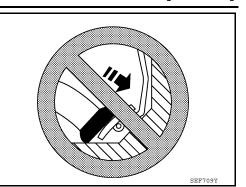
inspection before.

replacement.

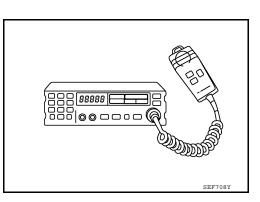
#### PRECAUTIONS

#### < PRECAUTION >

- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.



- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.
- Keep the antenna as far as possible from the electronic control units.
- Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.
- Do not let them run parallel for a long distance.
- Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
- Be sure to ground the radio to vehicle body.



# PREPARATION

| mmercial Service                         |  | INFOID:00000005442007  |
|--|--|--|
| ool name<br>Kent-Moore No.)              |  | Description  |
| eak detector<br>e.: (J-41416)            |  | Locating the EVAP leak   |
| VAP service port<br>dapter               | S-NT703                                    | Applying positive pressure through EVAP service port           |
| e.: (J-41413-OBD)                        | C A A A A A A A A A A A A A A A A A A A    |  |
| uel filler cap adapter<br>e.: (MLR-8382) | S-NT704                                    | Checking fuel tank vacuum relief valve opening pressure        |
|  | OFF COND                                   |  |
|  | S-NT815                                    |  |
| ocket wrench                             | 19 mm<br>(0.75 in) 10 mm<br>32 mm<br>32 mm | Removing and installing engine coolant tempera-<br>ture sensor |

Description

Checking fuel pressure

#### NOTE:

Tool number (Kent-Moore No.)

Tool name

(J-44321)

kit

Fuel pressure gauge

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

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# < PREPARATION > PREPARATION

# PREPARATION

**Special Service Tools** 

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# PREPARATION

#### < PREPARATION >

| Tool name<br>(Kent-Moore No.)   |         | Description  |
|---|---------|--|
| Oxygen sensor thread<br>cleaner<br>i.e.: (J-43897-18)<br>(J-43897-12)   | AEM488  | Reconditioning the exhaust system threads before<br>installing a new oxygen sensor. Use with anti-<br>seize lubricant shown below.<br>a: 18 mm diameter with pitch 1.5 mm for Zirco-<br>nia Oxygen Sensor<br>b: 12 mm diameter with pitch 1.25 mm for Tita-<br>nia Oxygen Sensor |
| Anti-seize lubricant<br>i.e.: (Permatex <sup>TM</sup><br>133AR or equivalent<br>meeting MIL specifica-<br>tion MIL-A-907) | S-NT779 | Lubricating oxygen sensor thread cleaning tool<br>when reconditioning exhaust system threads.  |

# < ON-VEHICLE MAINTENANCE > ON-VEHICLE MAINTENANCE FUEL PRESSURE

| Inspection  | INFOID:000000005442008 |
|---|------------------------|
| FUEL PRESSURE RELEASE   |                        |
| NOTE:<br>If following procedure performed, a certain DTC may be detected.   | С                      |
| (P) With CONSULT-III  |                        |
| 1. Lift up the vehicle.   | D                      |
| 2. Turn ignition switch ON (READY).   |                        |
| 3. Depress the accelerator pedal and keep it.   | E                      |
| <ol> <li>Shift the selector lever to N position with engine running.</li> <li>CAUTION:</li> </ol>   |                        |
| Never leave the selector lever in the N position for a long period of time. In  | -                      |
| <ul> <li>engine operates but electricity cannot be generated.</li> <li>5. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT</li> </ul>                        | F-111                  |
| 6. After engine stalls, turn ignition switch OFF.   |                        |
| 🕅 Without CONSULT-III   | G                      |
| 1. Turn ignition switch OFF.  |                        |
| 2. Remove fuel pump fuse located in IPDM E/R.   | Н                      |
| 3. Turn ignition switch ON (READY).   |                        |
| 4. Depress the accelerator pedal and keep it.   |                        |
| <ol> <li>After engine stalls, turn ignition switch OFF.</li> <li>Reinstall fuel pump fuse after servicing fuel system.</li> </ol>   | 1                      |
| FUEL PRESSURE CHECK   |                        |
| CAUTION:  | J                      |
| Before disconnecting fuel line, release fuel pressure from fuel line to eliminate dan NOTE:   | ger.                   |
| • Prepare pans or saucers under the disconnected fuel line because the fuel may   |                        |
| <ul> <li>pressure cannot be completely released because HL32 models do not have fuel resource - Use Fuel Pressure Gauge Kit [SST: (J-44321)] to check fuel pressure.</li> </ul> | eturn system.          |
| 1. Release fuel pressure to zero.   | L                      |
| 2. Disconnect the fuel quick connector on the engine side.  |                        |
| 3. Install fuel pressure gauge adapter (B) with fuel pressure gauge   |                        |
| (A).  |                        |
| 1 : Fuel feed hose  |                        |
| 4. Turn ignition switch ON and check for fuel leakage.  | B 1 N                  |
| 5. Check DTC.<br>If DTC is detected, erase DTC and go to next steps.  |                        |
| If DTC is not detected, go to next steps.   |                        |
| 6. Activate "INSPECTION MODE 1" ( <u>HBC-104</u> ) to start engine,   |                        |
| <ul><li>and check for fuel leakage.</li><li>7. Read the indication of fuel pressure gauge.</li></ul>  | ALBIA0159ZZ P          |
|   |                        |

 If result is unsatisfactory, check fuel hoses and fuel tubes for clogging. If OK, Replace "fuel filter and fuel pump assembly". If NG, Repair or replace.



#### < ON-VEHICLE MAINTENANCE >

# EVAP LEAK CHECK

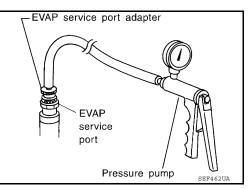
#### Inspection

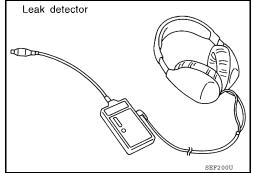
#### **CAUTION:**

- 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 [commercial service tool: (J-41413-OBD)] to the EVAP service port may cause a leak.

#### (I) WITH CONSULT-III

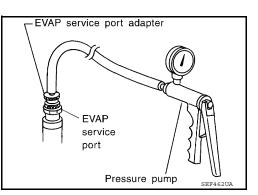
- To locate the EVAP leak, install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.
- 2. Turn ignition switch ON.
- 3. Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-III.
- 4. Touch "START". A bar graph (Pressure indicating 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.
- 6. Remove EVAP service port adapter [commercial service tool: (J-41413-OBD)] and hose with pressure pump.
- Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to <u>EC-63, "System Diagram"</u>.





#### **WITHOUT CONSULT-III**

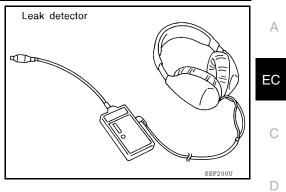
- 1. To locate the EVAP leak, install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.
- 2. Apply battery voltage between the terminals of EVAP canister vent control valve to make a closed EVAP system.
- To locate the leak, deliver positive pressure 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).
- 4. Remove EVAP service port adapter [commercial service tool: (J-41413-OBD)] and hose with pressure pump.



# **EVAP LEAK CHECK**

#### < ON-VEHICLE MAINTENANCE >

5. Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to <u>EC-63</u>, "System Diagram".



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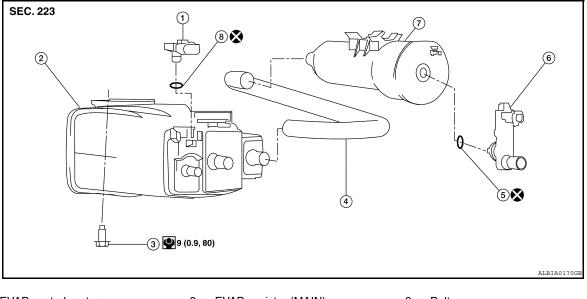
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# **EVAP CANISTER**

# < ON-VEHICLE REPAIR > **ON-VEHICLE REPAIR EVAP CANISTER**

INFOID:000000005442010

INFOID:000000005442011



EVAP control system pressure sen- 2. EVAP canister (MAIN) 1. sor Hose

5.

O-ring

- Bolt З.
- EVAP canister vent control valve 6.

7. EVAP canister (SUB)

#### **Removal and Installation**

#### REMOVAL

4.

- 1. Lift up the vehicle.
- 2. Remove EVAP canister fixing bolt.
- 3. Remove EVAP canister.

#### NOTE:

The EVAP canister vent control valve and EVAP canister system pressure sensor can be removed without removing the EVAP canister.

#### INSTALLATION

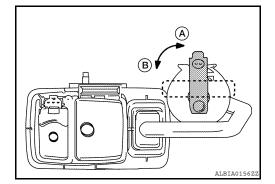
Install in the reverse order of removal.

#### NOTE:

Tighten EVAP canister fixing bolt to the specified torque.

#### DISASSEMBLY

- 1. Turn EVAP canister vent control valve counterclockwise.
  - A : Lock
  - В : Unlock
- 2. Remove the EVAP canister vent control valve.



# **EVAP CANISTER**

#### < ON-VEHICLE REPAIR >

#### ASSEMBLY Assemble in the reverse order of disassembly. CAUTION: Always replace O-ring with a new one.

#### Inspection

Check EVAP canister as follows:

- 1. Block port (B).
- 2. Blow air into port (A) and check that it flows freely out of port (C).
- 3. Release blocked port (B).
- 4. Apply vacuum pressure to port (B) and check that vacuum pressure exists at the ports (A) and (C).
- 5. Block port (A) and (B).
- 6. Apply pressure to port (C) and check that there is no leakage.

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#### SERVICE DATA AND SPECIFICATIONS (SDS)

# SERVICE DATA AND SPECIFICATIONS (SDS) SERVICE DATA AND SPECIFICATIONS (SDS)

# Idle Speed

INFOID:000000005442013

1.0 - 5.0 g·m/sec at idle\*

4.0 - 12.0 g·m/sec at 2,500 rpm\*

[QR25DE]

| Condition                               | Specification  |
|---|--|
| No load (in N position)                 | 1,000 ± 50 rpm   |
| Ignition Timing                         | INFOID:00000005442014  |
| Condition                               | Specification  |
| No load (in N position)                 | $21 \pm 5^{\circ}$ BTDC  |
|   |  |
|   | INFOID:000000005442015 Specification (Using CONSULT-III or GST)    |
| Calculated Load Value Condition At idle |  |
| Condition                               | Specification (Using CONSULT-III or GST)                           |
| Condition<br>At idle<br>At 2,500 rpm    | Specification (Using CONSULT-III or GST)<br>10 – 35 %              |
| Condition                               | Specification (Using CONSULT-III or GST)<br>10 – 35 %<br>10 – 35 % |

\*: Engine is warmed up to normal operating temperature and running under no load.

Mass air flow (Using CONSULT-III or GST)

Revision: September 2009