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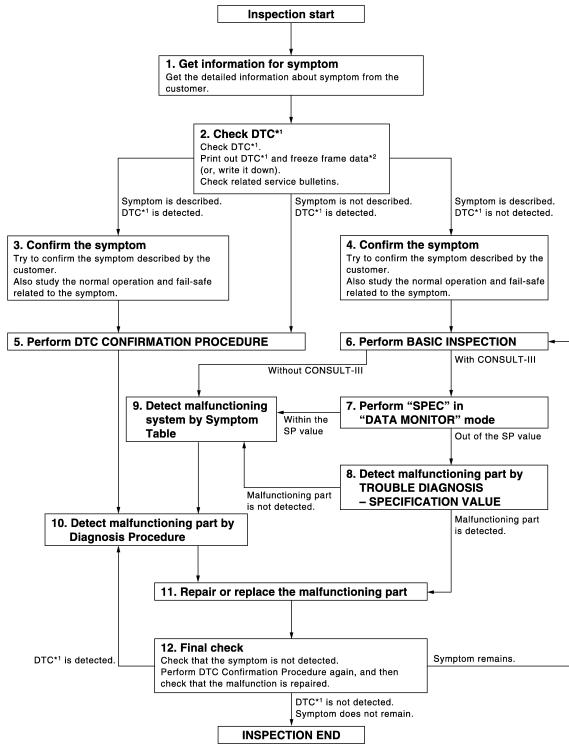
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# **BASIC INSPECTION**

# DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

#### **OVERALL SEQUENCE**



<sup>\*1:</sup> Include 1st trip DTC.

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<sup>\*2:</sup> Include 1st trip freeze frame data.

### DIAGNOSIS AND REPAIR WORK FLOW

[VQ35HR1 < 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 EC-21, "Diagnostic Work Sheet".)

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>> 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-121, "Diagnosis Description".)
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to EC-680, "Symptom Table".)
- Check related service bulletins for information.

#### Are any symptoms described and is any DTCs detected?

Symptom is described, DTC is detected>>GO TO 3.

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

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

# 3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).

Also study the normal operation and fail-safe related to the symptom. Refer to EC-684, "Description" and EC-663, "Fail-safe".

Diagnosis Work Sheet is useful to verify the incident.

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

>> GO TO 5.

# 4. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.

Also study the normal operation and fail-safe related to the symptom. Refer to EC-684, "Description" and EC-663, "Fail-safe".

Diagnosis Work Sheet is useful to verify the incident.

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

>> GO TO 6.

# $oldsymbol{5}$ .PERFORM DTC CONFIRMATION PROCEDURE

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

If two or more DTCs are detected, refer to EC-665, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

#### NOTE:

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

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

#### Is DTC detected?

YES >> GO TO 10.

NO >> Check according to EC-154, "Description".

## 6.PERFORM BASIC INSPECTION

Perform EC-22, "BASIC INSPECTION: Special Repair Requirement".

### Will CONSULT-III be used?

**EC-19** Revision: 2009 June 2010 M35/M45

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### DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION > [VQ35HR]

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

# 7. PERFORM SPEC IN DATA MONITOR MODE

#### (P)With CONSULT-III

Check that "MAS A/F SE-B1", "MAS A/F SE-B2", "B/FUEL SCHDL", "A/F ALPHA-B1" and "A/F ALPHA-B2" are within the SP value using CONSULT-III "SPEC" in "DATA MONITOR" mode. Refer to <a href="EC-146">EC-146</a>, "Component Function Check".

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

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

### 8.DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-147, "Diagnosis Procedure".

### Is a malfunctioning part detected?

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

### 9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to <u>EC-680</u>, "Symptom Table" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptoms.

>> GO TO 10.

# 10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

#### NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident".

#### Is a malfunctioning part detected?

YES >> GO TO 11.

NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CON-SULT-III. Refer to EC-645, "Reference Value".

# 11.REPAIR OR REPLACE THE MALFUNCTIONING PART

- 1. Repair or replace the malfunctioning part.
- Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement
- Check DTC. If DTC is displayed, erase it. Refer to <u>EC-121, "Diagnosis Description"</u>.

>> GO TO 12.

# 12. FINAL CHECK

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then check that the malfunction have been completely repaired.

When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and check that the symptom is not detected.

#### Is DTC detected and does symptom remain?

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

YES-2 >> Symptom remains: GO TO 6.

NO >> Before returning the vehicle to the customer, always erase unnecessary DTC in ECM and TCM (Transmission Control Module). (Refer to <a href="EC-121">EC-121</a>, "Diagnosis Description".) If the completion of SRT is needed, drive vehicle under the specific driving pattern. Refer to <a href="EC-671">EC-671</a>, "How to Set SRT Code".

[VQ35HR]

# **Diagnostic Work Sheet**

INFOID:0000000005353317

#### DESCRIPTION

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

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

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

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

#### **KEY POINTS**

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

**Symptoms** 

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### WORKSHEET SAMPLE

Customer na	me MR/MS	Model & Year	VIN			
Engine #		Trans. Mileage				
Incident Date	Э	Manuf. Date	In Service Date			
Fuel and fue	l filler cap	☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.				
	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]				
Symptoms	□ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]				
- Сутрюто - Сутрото	☐ Driveability	☐ Stumble       ☐ Surge       ☐ Knock       ☐ Lack of power         ☐ Intake backfire       ☐ Exhaust backfire         ☐ Others [       ]				
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Ust after stopping ☐ While loading				
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime				
Frequency	☐ All the time ☐ Under certain conditions ☐ Sometimes					
Weather conditions		☐ Not affected				
Weather		☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]				
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐	Cold ☐ Humid °F			
		☐ Cold ☐ During warm-up ☐ After warm-up				
Engine conditions		Engine speed	4,000 6,000 8,000 rpm			
Road conditions						
Driving conditions		□ Not affected     □ At starting □ While idling □ At racing     □ While accelerating □ While cruising     □ While decelerating □ While turning (RH/LH)				
		Vehicle speed				
Malfunction indicator lamp   □ Turned on □ Not turned on						

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**EC-21** Revision: 2009 June 2010 M35/M45

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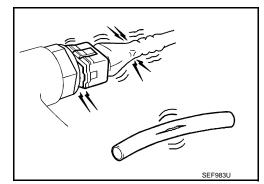
# INSPECTION AND ADJUSTMENT BASIC INSPECTION

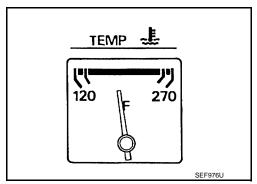
# BASIC INSPECTION: Special Repair Requirement

#### INFOID:0000000005353318

# 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 leakage
- Air cleaner clogging
- Gasket
- 3. Check that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
- 4. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge. Ensure engine stays below 1,000 rpm.

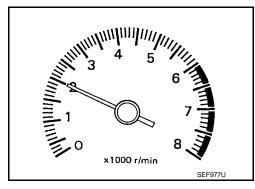




- 5. Run engine at approximately 2,000 rpm for approximately 2 minutes under no load.
- 6. Check that no DTC is displayed with CONSULT-III or GST.

#### Are any DTCs detected?

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



# 2. REPAIR OR REPLACE

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

>> GO TO 3

# 3. CHECK IDLE SPEED

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

[VQ35HR] < BASIC INSPECTION >

Rev engine (2,000 to 3,000 rpm) 2 or 3 times under no load, then run engine at idle speed for approximately 1 minute.

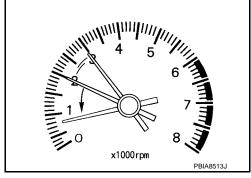
Check idle speed.

For procedure, refer to EC-26, "IDLE SPEED: Special Repair Requirement".

For specification, refer to EC-697, "Idle Speed".

### Is the inspection result normal?

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



# f 4.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- Stop engine.
- 2. Perform EC-27, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Require-

>> GO TO 5.

## ${f 5}$ .PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 6.

### 6.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-27, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

### Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 7.

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

### 7. CHECK IDLE SPEED AGAIN

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

For procedure, refer to EC-26, "IDLE SPEED: Special Repair Requirement".

For specification, refer to EC-697, "Idle Speed".

#### Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 8.

## 8.DETECT MALFUNCTIONING PART

Check the Following.

- Check camshaft position sensor and circuit. Refer to <u>EC-352</u>, "Component Inspection".
- Check crankshaft position sensor and circuit. Refer to <u>EC-345</u>. "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 9.

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

# 9. CHECK ECM FUNCTION

- Substitute with a non-malfunctioning ECM to check ECM function. (ECM may be the cause of the incident, although this is rare.)
- 2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to BL-224, "ECM Re-Communicating Function".

>> GO TO 4.

# 10. CHECK IGNITION TIMING

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

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[VQ35HR]

## < BASIC INSPECTION >

For procedure, refer to EC-26, "IGNITION TIMING: Special Repair Requirement".

For specification, refer to EC-697, "Ignition Timing".

### Is the inspection result normal?

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

# 11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- 1. Stop engine.
- Perform <u>EC-27</u>, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 12.

# 12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 13.

# 13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-27, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

### Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 14.

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

# 14. CHECK IDLE SPEED AGAIN

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

For procedure, refer to EC-26, "IDLE SPEED: Special Repair Requirement".

For specification, refer to EC-697, "Idle Speed".

#### Is the inspection result normal?

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

# 15. CHECK IGNITION TIMING AGAIN

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

For procedure, refer to EC-26, "IGNITION TIMING: Special Repair Requirement".

For specification, refer to EC-697, "Ignition Timing".

#### Is the inspection result normal?

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

# 16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-60, "Removal and Installation".

#### Is the inspection result normal?

YES >> GO TO 17.

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

# 17. DETECT MALFUNCTIONING PART

#### Check the following.

- Check camshaft position sensor and circuit. Refer to EC-352, "Component Inspection".
- Check crankshaft position sensor and circuit. Refer to EC-345, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 18.

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

# 18. CHECK ECM FUNCTION

[VQ35HR] < BASIC INSPECTION >

Substitute with a non-malfunctioning ECM to check ECM function. (ECM may be the cause of the incident, although this is rare.)

2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to BL-224, "ECM Re-Communicating Function".

>> GO TO 4.

# 19. INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, go to EC-25, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Special Repair Requirement".

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#### >> INSPECTION END

# ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Description

INEOID:000000005353319

When replacing ECM, the following procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Special Repair Requirement INFOID:0000000005353320

 ${f 1}$  .PERFORM INITIALIZATION OF IVIS (NATS) SYSTEM AND REGISTRATION OF ALL IVIS (NATS) IGNI-TION KEY IDS

Refer to BL-224, "ECM Re-Communicating Function".

### >> GO TO 2.

### 2. PERFORM VIN REGISTRATION

Refer to EC-26, "VIN REGISTRATION: Special Repair Requirement".

>> GO TO 3.

# 3.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-27, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement"

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>> GO TO 4.

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# 4. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

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>> GO TO 5.

# 5. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-27, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

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>> GO TO 6.

# $\mathsf{6}.$ PERFORM EXHAUST VALVE TIMING CONTROL LEARNING

Refer to EC-29, "EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement".

>> END

IDLE SPEED

< BASIC INSPECTION > [VQ35HR]

### **IDLE SPEED: Description**

NFOID:000000000535332

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

### IDLE SPEED: Special Repair Requirement

INFOID:0000000005353322

# 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**

INFOID:0000000005353323

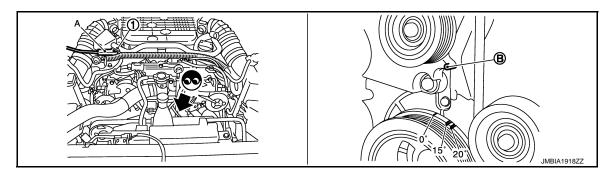
This describes how to check the ignition timing. For the actual procedure, follow the instructions in "BASIC INSPECTION".

## IGNITION TIMING: Special Repair Requirement

INFOID:0000000005353324

# 1. CHECK IGNITION TIMING

1. Attach timing light to loop wire as shown.



- 1. Loop wire
- A. Timing light

B. Timing indicator

#### 2. Check ignition timing.

# >> INSPECTION END

### VIN REGISTRATION

### VIN REGISTRATION: Description

INFOID:0000000005353325

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

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

## VIN REGISTRATION: Special Repair Requirement

INFOID:0000000005353326

# 1. CHECK VIN

Check the VIN of the vehicle and note it. Refer to GI-47, "Model Variation".

>> GO TO 2.

[VQ35HR] < BASIC INSPECTION > 2.perform vin registration Α (P)With CONSULT-III 1. Turn ignition switch ON with engine stopped. Select "VIN REGISTRATION" in "WORK SUPPORT" mode. EC Follow the instructions on the CONSULT-III display. >> END ACCELERATOR PEDAL RELEASED POSITION LEARNING ACCELERATOR PEDAL RELEASED POSITION LEARNING: Description INFOID-000000005353327 D Accelerator Pedal Released Position Learning is a function of ECM to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each the time harness connector of the accelerator pedal position sensor or ECM is disconnected. Е ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement INFOID:0000000005353328 1.START Check that accelerator pedal is fully released. Turn ignition switch ON and wait at least 2 seconds. Turn ignition switch OFF and wait at least 10 seconds. 3. Turn ignition switch ON and wait at least 2 seconds. 4. Turn ignition switch OFF and wait at least 10 seconds. >> END THROTTLE VALVE CLOSED POSITION LEARNING THROTTLE VALVE CLOSED POSITION LEARNING: Description INFOID:0000000005353329 Throttle Valve Closed Position Learning is a function of ECM to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected. THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement INFOID:0000000005353330 1.START Check that accelerator pedal is fully released. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Check that throttle valve moves during the above 10 seconds by confirming the operating sound. N >> END IDLE AIR VOLUME LEARNING C IDLE AIR VOLUME LEARNING: Description Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps engine idle speed within the specific range. It must be performed under the following conditions: • Each time electric throttle control actuator or ECM is replaced. Idle speed or ignition timing is out of specification. IDLE AIR VOLUME LEARNING: Special Repair Requirement

Revision: 2009 June **EC-27** 2010 M35/M45

1.PRECONDITIONING

Check that all of the following conditions are satisfied.

< BASIC INSPECTION > [VQ35HR]

Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9 V (At idle)
- Engine coolant temperature: 70 105°C (158 221°F)
- Selector lever: P or N
- Electric load switch: OFF

(Air conditioner, headlamp, rear window defogger)

On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is started the headlamp will not illuminate.

- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
- With CONSULT-III: Drive vehicle until "ATF TEMP SE 1" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9 V.
- Without CONSULT-III: Drive vehicle for 10 minutes.

#### Will CONSULT-III be used?

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

# 2.perform idle air volume learning

#### (P)With CONSULT-III

- Perform Accelerator Pedal Released Position Learning. Refer to <u>EC-27</u>. "ACCELERATOR PEDAL <u>RELEASED POSITION LEARNING</u>: <u>Special Repair Requirement"</u>.
- 2. Perform Throttle Valve Closed Position Learning. <u>EC-27</u>, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- 3. Start engine and warm it up to normal operating temperature.
- 4. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
- 5. Touch "START" and wait 20 seconds.

#### Is "CMPLT" displayed on CONSULT-III screen?

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

# 3.PERFORM IDLE AIR VOLUME LEARNING

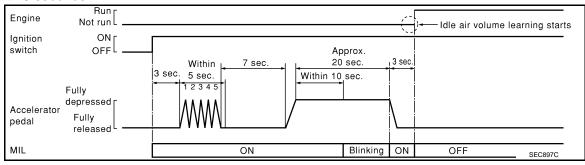
#### **⋈**Without CONSULT-III

#### 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.
- Perform Accelerator Pedal Released Position Learning. Refer to <u>EC-27</u>, "ACCELERATOR PEDAL <u>RELEASED POSITION LEARNING</u>: Special Repair Requirement".
- Perform Throttle Valve Closed Position Learning. <u>EC-27</u>, "THROTTLE VALVE CLOSED POSITION <u>LEARNING</u>: Special Repair Requirement".
- 3. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- 6. Repeat the following procedure quickly 5 times within 5 seconds.
- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.
- Wait 7 seconds, fully depress the accelerator pedal for approx. 20 seconds until the MIL stops blinking and turns ON.
- 8. Fully release the accelerator pedal within 3 seconds after the MIL turns ON.
- Start engine and let it idle.

[VQ35HR] < BASIC INSPECTION >

#### 10. Wait 20 seconds.



>> GO TO 4.

# 4. CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine 2 or 3 times and check that idle speed and ignition timing are within the specifications. Refer to EC-697, "Idle Speed" and EC-697, "Ignition Timing".

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

## ${f 5}$ .DETECT MALFUNCTIONING PART-I

Check the following

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

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

### $\mathsf{6}.\mathsf{DETECT}$ MALFUNCTIONING PART-II

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

It is useful to perform "TROUBLE DIAGNOSIS - SPECIFICATION VALUE". Refer to EC-146, "Description". If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning again:

- · Engine stalls.
- Incorrect idle.

>> INSPECTION END

## EXHAUST VALVE TIMING CONTROL LEARNING

# EXHAUST VALVE TIMING CONTROL LEARNING: Description

Exhaust Valve Timing Control Learning is a function of ECM to learn the characteristic of exhaust valve timing control magnet retarder by comparing the target angle of exhaust camshaft with the actual retarded angle of exhaust camshaft. It must be performed each time exhaust valve timing control magnet retarder is disconnected or replaced, or ECM is replaced.

# EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement

INFOID:0000000005353334

INFOID:0000000005353333

# **1.**START

### (E)With CONSULT-III

- Start engine and warm it up to normal operating temperature.
- Set selector lever position to N and confirm that the following electrical or mechanical loads are not applied.
- Headlamp switch is OFF

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< BASIC INSPECTION > [VQ35HR]

- Air conditioner switch is OFF
- Rear window defogger switch is OFF
- Steering wheel is in the straight-ahead position, etc.
- 3. Keep the engine speed between 2,200 and 4,000 rpm.
- Select "EXH V/T CONTROL LEARN" in "WORK SUPPORT" mode with CONSULT-III.
- Touch "START" and wait 20 seconds.
- 6. Check that "CMPLT" is displayed on CONSULT-III screen.

Learning completed : CMPLT Learning not yet : YET

#### **®Without CONSULT-III**

- 1. Start engine and warm it up to normal operating temperature.
- 2. Set selector lever position to N and confirm that the following electrical or mechanical loads are not applied.
- Headlamp switch is OFF
- Air conditioner switch is OFF
- Rear window defogger switch is OFF
- Steering wheel is in the straight-ahead position, etc.
- 3. Keep the engine speed between 2,200 and 4,000 rpm at 20 seconds.

>> END

### MIXTURE RATIO SELF-LEARNING VALUE CLEAR

### MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Description

INFOID:0000000005353335

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:0000000005353336

# 1.START

#### (P)With CONSULT-III

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

#### With GST

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

>> END

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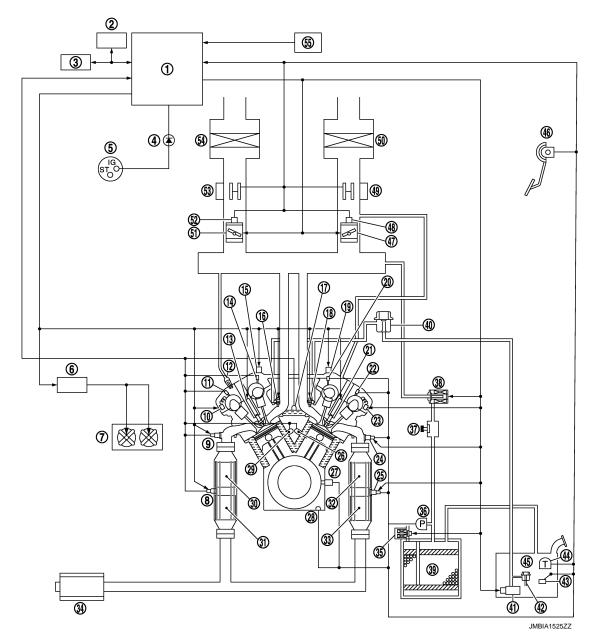
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# **FUNCTION DIAGNOSIS**

# **ENGINE CONTROL SYSTEM**

System Diagram

INFOID:0000000005353337



- 1. ECM
- 4. MIL
- 7. Cooling fan
- Exhaust valve timing control magnet 11.
   retarder (bank 1)
- 13. Spark plug
- 16. Fuel injector

Revision: 2009 June

19. Intake valve timing control solenoid valve (bank 2)

- 2. Data link connector
- 5. Ignition switch
- 8. Heated oxygen sensor 2 (bank 1)
- Exhaust valve timing control position sensor (bank 1)
- 14. Camshaft position sensor (bank 1)
- Engine coolant temperature sensor
- 20. Camshaft position sensor (bank 2)

- 3. CAN communication
- 6. Cooling fan control module
- 9. A/F sensor 1 (bank 1)
- 12. PCV valve
- 15. Intake valve timing control solenoid valve (bank 1)
- 18. Fuel injector
- 21. Spark plug

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### **ENGINE CONTROL SYSTEM**

< FUN	ICTION DIAGNOSIS >				[VQ35HR]
22.	Exhaust valve timing control position sensor (bank 2)	23.	Exhaust valve timing control magnet retarder (bank 2)	24.	A/F sensor 1 (bank 2)
25.	Heated oxygen sensor 2 (bank 2)	26.	Knock sensor (bank 2)	27.	Crankshaft position sensor
28.	Engine oil temperature sensor	29.	Knock sensor (bank 1)	30.	Three way catalyst 1
31.	Three way catalyst 2	32.	Three way catalyst 1	33.	Three way catalyst 2
34.	Muffler	35.	EVAP canister vent control valve	36.	EVAP control system pressure sensor
37.	EVAP service port	38.	EVAP canister purge volume control solenoid valve	39.	EVAP canister

43. Fuel level sensor 44. Fuel tank temperature sensor 45. Fuel tank

41. Fuel pump

46. Accelerator pedal position sensor 47. Electric throttle control actuator 48. Throttle position sensor (bank 2) (bank 2)

49. Mass air flow sensor (with intake air 50. Air cleaner (bank 2) 51. Electric throttle control actuator temperature sensor) (bank 1)

52. Throttle position sensor (bank 1) 53. Mass air flow sensor (with intake air 54. Air cleaner (bank 1) temperature sensor)

55. PNP signal

40. Fuel damper

# System Description

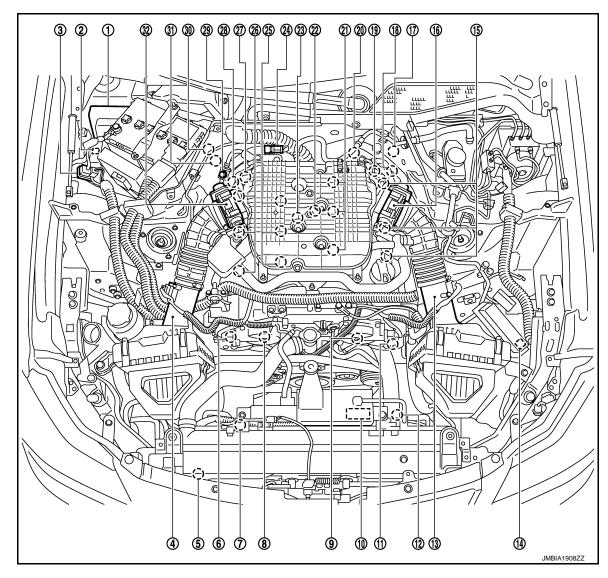
INFOID:0000000005353338

42. Fuel pressure regulator

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

# **Component Parts Location**

INFOID:0000000005353339



- IPDM E/R
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- 13. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. Electric throttle control actuator (bank 2)
- 19. Camshaft position sensor (bank 2)
- 22. Knock sensor (bank 2)
- 25. Fuel injector (bank 1)
- 28. Exhaust valve timing control position 29. EVAP service port sensor (bank 1)
- 31. Crankshaft position sensor

- ICC brake hold relay (ICC models)
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- 11. Exhaust valve timing control magnet 12. retarder (bank 2)
- Cooling fan relay
- 17. A/F sensor 1 (bank 2)
- Engine coolant temperature sensor 20.
- 23. Knock sensor (bank 1)
- 26. Ignition coil (with power transistor) and spark plug (bank 1)
- 32. Electric throttle control actuator (bank 1)

- 3. Battery current sensor
- 6. Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- Cooling fan motor-1
- 15. Ignition coil (with power transistor) and spark plug (bank 2)
- 18. Exhaust valve timing control position sensor (bank 2)
- 21. Fuel injector (bank 2)
- 24. EVAP canister purge volume control solenoid valve
- 27. Camshaft position sensor (bank 1)

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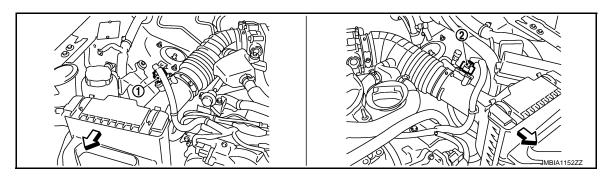
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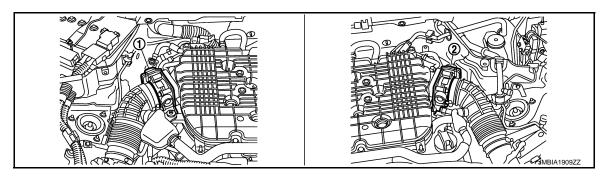
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30. A/F sensor 1 (bank 1)

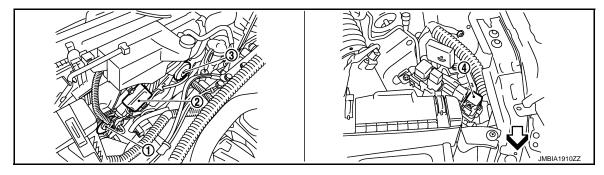


- Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)

 $\ \ \ \ \ \ \ \ \ \ \$  : Vehicle front

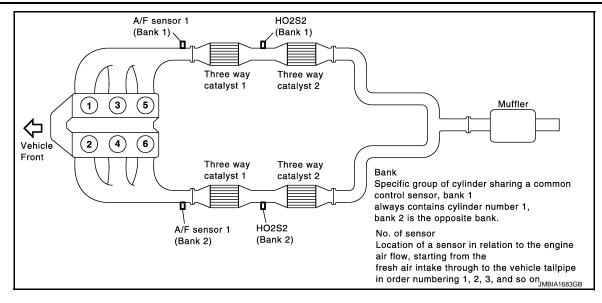


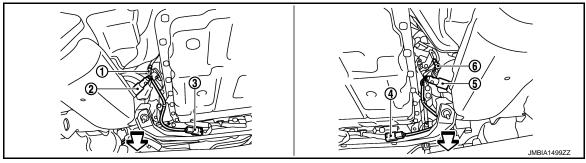
- Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



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

- 4. Cooling fan relay

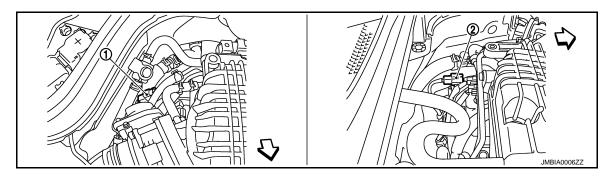




- 1. A/F sensor 1 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2)
- Heated oxygen sensor 2 (bank 2) harness connector

- 4. Heated oxygen sensor 2 (bank 1) harness connector
- 5. Heated oxygen sensor 2 (bank 1)
- 6. A/F sensor 1 (bank 1)

: Vehicle front



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

: Vehicle front

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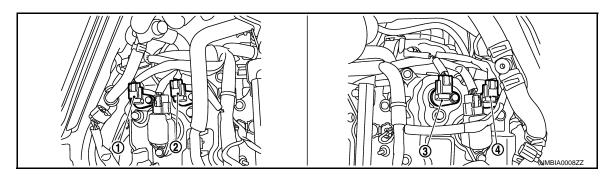
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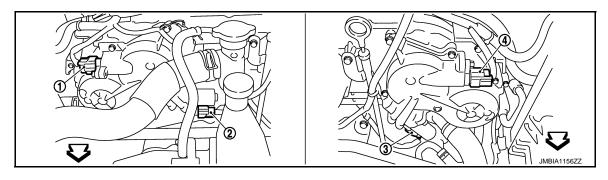
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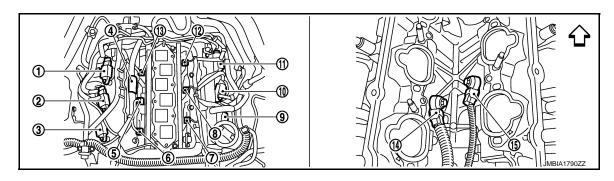


- Exhaust valve timing control position 2. sensor (bank 1)
- 4. Exhaust valve timing control position sensor (bank 2)
- 2. Camshaft position sensor (bank 1)
- 3. Camshaft position sensor (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- 4. Exhaust valve timing control magnet retarder (bank 2) harness connector
- < : Vehicle front</li>

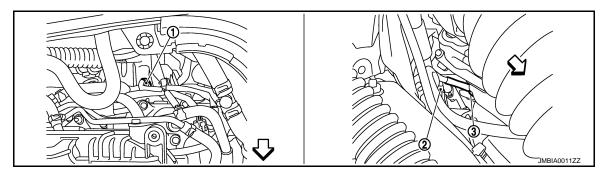
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



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

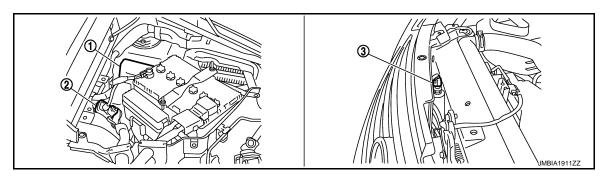
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- 14. Knock sensor (bank 2)

- Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6
- 15. Knock sensor (bank 1)



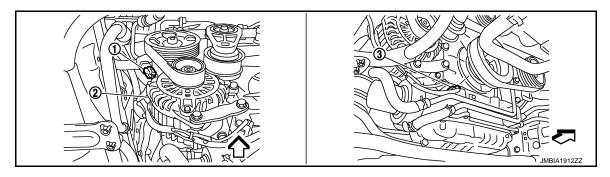
- Engine coolant temperature sensor 2.
  - A/F sensor 1 (bank 1)
- 3. Crankshaft position sensor

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→ : Vehicle front



1. IPDM E/R

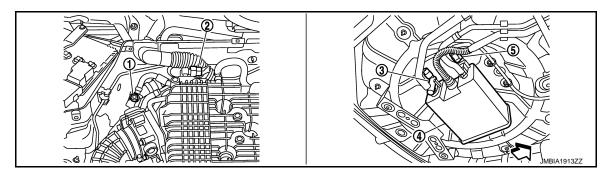
- 2. Battery current sensor
- Refrigerant pressure sensor



- Power steering pressure sensor
- 2. Alternator

Engine oil temperature sensor

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→ : Vehicle front



- EVAP service port
- 2. EVAP canister purge volume control 3. EVAP canister vent control valve solenoid valve

**EC-37** Revision: 2009 June 2010 M35/M45

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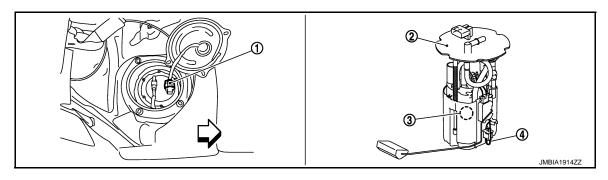
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4. EVAP canister

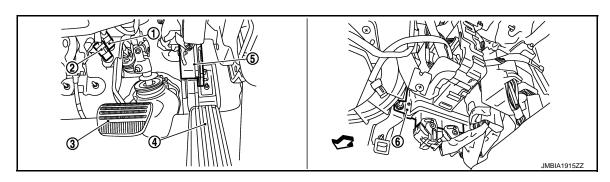
EVAP control system pressure sensor

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→ : Vehicle front

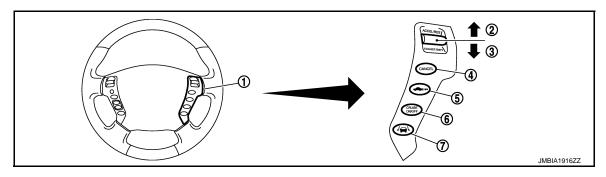


- Fuel level sensor unit and fuel pump 2. (main) harness connector
- Fuel level sensor unit and fuel pump 3. Fuel pressure regulator (main)
- 4. Fuel tank temperature sensor

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⇒ : Vehicle front

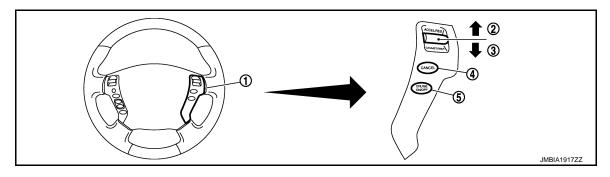


- 1. Stop lamp switch
- ASCD brake switch (ASCD models)
   Brake pedal ICC brake switch (ICC models)
- 4. Accelerator pedal
- 5. Accelerator pedal position sensor 6. ECM



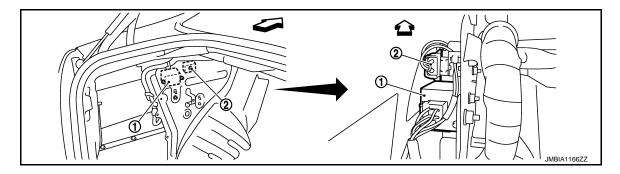
- ICC steering switch
- 4. CANCEL switch
- 7. LDP switch

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



- 1. ASCD steering switch
- 2. RESUME/ACCELERATE switch
- 3. SET/COAST switch

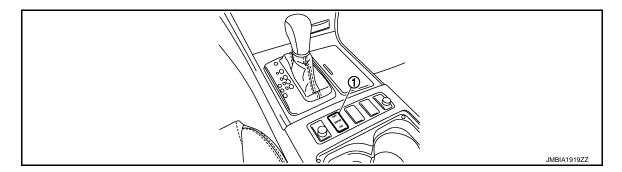
- 4. CANCEL switch
- 5. MAIN switch



1. FPCM

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⇒ : Vehicle front

2. Dropping resistor



1. Snow mode switch

## Component Description

INFOID:0000000005353340

Component Reference A/F sensor 1 EC-237, "Description" A/F sensor 1 heater EC-174, "Description" Accelerator pedal position sensor EC-558, "Description" ASCD brake switch EC-533, "Description" ASCD steering switch EC-522, "Description" EC-498, "Description" Battery current sensor Camshaft position sensor EC-346, "Description" Crankshaft position sensor EC-340, "Description" Cooling fan control module EC-589, "Description"

Revision: 2009 June **EC-39** 2010 M35/M45

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### **ENGINE CONTROL SYSTEM**

### < FUNCTION DIAGNOSIS >

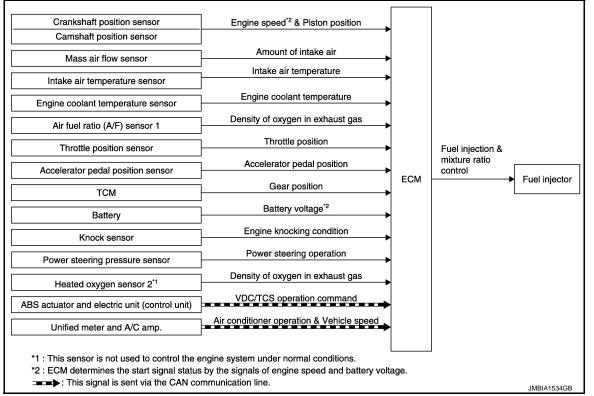
[VQ35HR]

Component	Reference
Cooling fan motor	EC-589, "Description"
Electric throttle control actuator	EC-484, "Description"
Engine coolant temperature sensor	EC-220, "Description"
Engine oil temperature sensor	EC-316, "Description"
EVAP canister purge volume control solenoid valve	EC-369, "Description"
EVAP canister vent control valve	EC-379, "Description"
EVAP control system pressure sensor	EC-391, "Description"
Exhaust valve timing control magnet retarder	EC-190, "Description"
Exhaust valve timing control position sensor	EC-453, "Description"
Fuel injector	EC-598, "Description"
Fuel level sensor	EC-423, "Description"
Fuel pump	EC-602, "Description"
Fuel tank temperature sensor	EC-307, "Description"
Heated oxygen sensor 2	EC-264, "Description"
Heated oxygen sensor 2 heater	EC-179, "Description"
ICC brake switch	EC-541, "Description"
ICC steering switch	EC-527, "Description"
Ignition coil with power transistor	EC-617, "Description"
Intake air temperature sensor	EC-214, "Description"
Intake valve timing control solenoid valve	EC-185, "Description"
Knock sensor	EC-335, "Description"
Mass air flow sensor	EC-195, "Description"
PCV valve	EC-635, "Description"
Power steering pressure sensor	EC-435, "Description"
Refrigerant pressure sensor	EC-637, "Description"
Snow mode switch	EC-641, "Description"
Stop lamp switch	EC-554, "Description"
Throttle control motor	EC-479, "Description"
Throttle control motor relay	EC-492, "Description"
Throttle position sensor	EC-224, "Description"

[VQ35HR]

# **MULTIPORT FUEL INJECTION SYSTEM**

System Diagram INFOID:0000000005353341



## System Description

INPUT/OUTPUT SIGNAL CHART

INFOID:0000000005353342

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

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

**EC-41** Revision: 2009 June 2010 M35/M45

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

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

#### SYSTEM DESCRIPTION

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

### VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

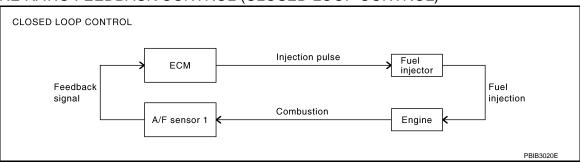
#### <Fuel increase>

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

#### <Fuel decrease>

- During deceleration
- · During high engine speed operation

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



The mixture ratio feedback system provides the best air-fuel mixture ratio for drivability and emission control. The three way catalyst 1 can better reduce CO, HC and NOx emissions. This system uses A/F sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about A/F sensor 1, refer to EC-237, "Description". This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

This stage is referred to as the closed loop control condition.

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

Open Loop Control

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

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

#### MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from A/F sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.

### MULTIPORT FUEL INJECTION SYSTEM

### < FUNCTION DIAGNOSIS > [VQ35HR]

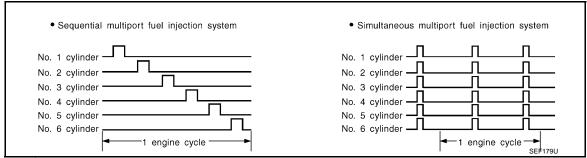
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

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

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

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

### **FUEL INJECTION TIMING**



Two types of systems are used.

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

• Simultaneous Multiport Fuel Injection System

Fuel is injected simultaneously into all six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.

The six injectors will then receive the signals 2 times for each engine cycle.

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

#### **FUEL SHUT-OFF**

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

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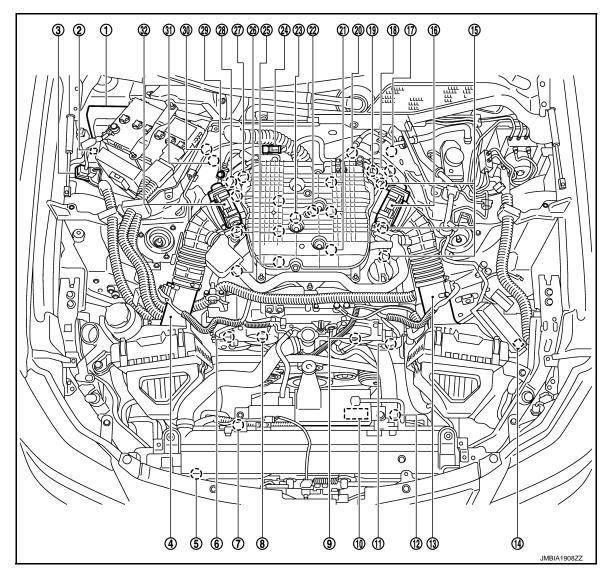
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### Component Parts Location

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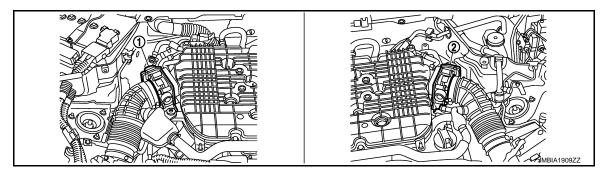
- IPDM E/R
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- Mass air flow sensor (with intake air 14. Cooling fan relay temperature sensor) (bank 2)
- 16. Electric throttle control actuator (bank 2)
- 19. Camshaft position sensor (bank 2)
- 22. Knock sensor (bank 2)
- 25. Fuel injector (bank 1)
- 28. Exhaust valve timing control position 29. EVAP service port sensor (bank 1)
- 31. Crankshaft position sensor

- ICC brake hold relay (ICC models)
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- 11. Exhaust valve timing control magnet 12. retarder (bank 2)
- 17. A/F sensor 1 (bank 2)
- Engine coolant temperature sensor 20.
- 23. Knock sensor (bank 1)
- 26. Ignition coil (with power transistor) and spark plug (bank 1)
- 32. Electric throttle control actuator (bank 1)

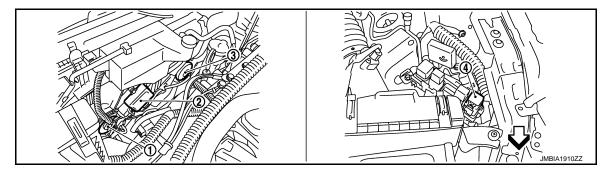
- 3. Battery current sensor
- 6. Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- Cooling fan motor-1
- 15. Ignition coil (with power transistor) and spark plug (bank 2)
- 18. Exhaust valve timing control position sensor (bank 2)
- 21. Fuel injector (bank 2)
- 24. EVAP canister purge volume control solenoid valve
- 27. Camshaft position sensor (bank 1)
- 30. A/F sensor 1 (bank 1)

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





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



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

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□ : Vehicle front

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**EC-45** Revision: 2009 June 2010 M35/M45

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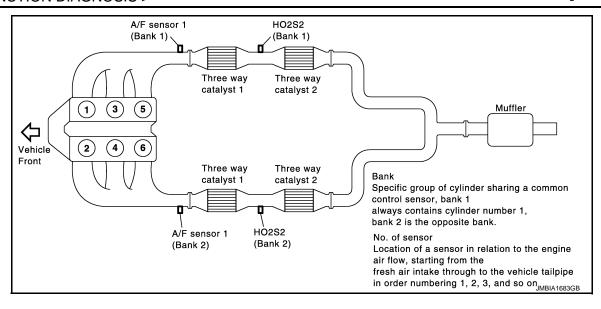
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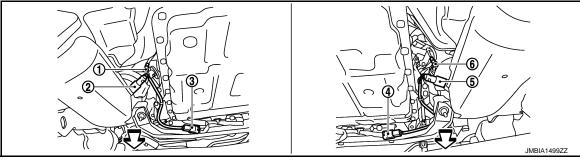
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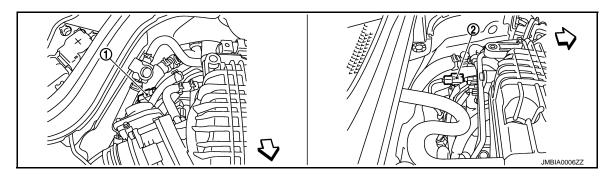
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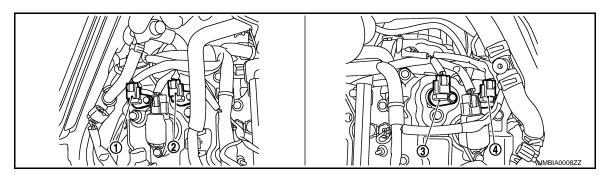


- 1. A/F sensor 1 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2)
- 3. Heated oxygen sensor 2 (bank 2) harness connector

- 4. Heated oxygen sensor 2 (bank 1) harness connector
- 5. Heated oxygen sensor 2 (bank 1)
- 6. A/F sensor 1 (bank 1)

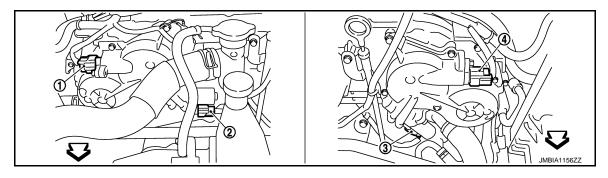


- 1. A/F sensor 1 (bank 1) harness con- 2. nector
- A/F sensor 1 (bank 2) harness connector



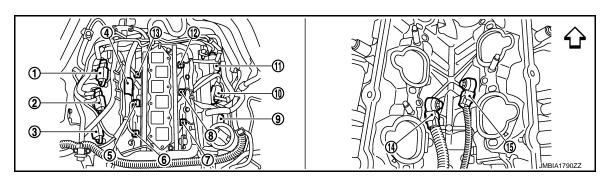
- Exhaust valve timing control position 2. sensor (bank 1)
  - 2. Camshaft position sensor (bank 1)
- 3. Camshaft position sensor (bank 2)

4. Exhaust valve timing control position sensor (bank 2)



- 1. Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- 4. Exhaust valve timing control magnet retarder (bank 2) harness connector
- < : Vehicle front</li>

- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- 1. Ignition coil No. 5 (with power transistor)
- 4. Condenser
- 7. Fuel injector No. 2
- 10. Ignition coil No. 4 (with power transistor)
- 13. Fuel injector No. 5
- : Vehicle front

- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- 14. Knock sensor (bank 2)

- 3. Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6
- 15. Knock sensor (bank 1)

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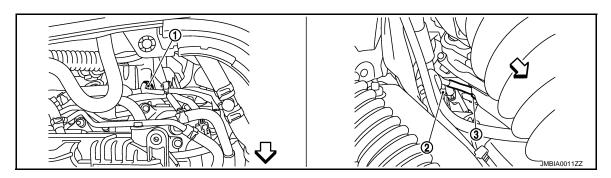
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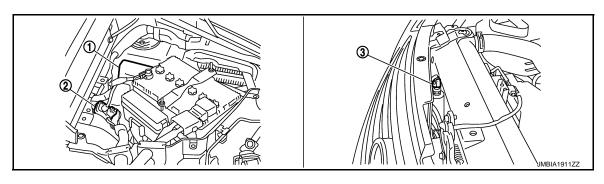
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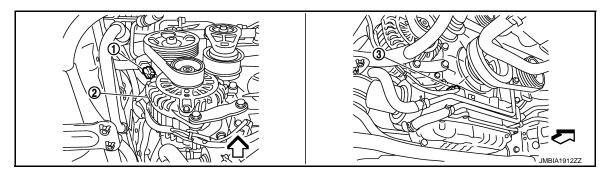
- Engine coolant temperature sensor 2. A/F sensor 1 (bank 1)
- 3. Crankshaft position sensor





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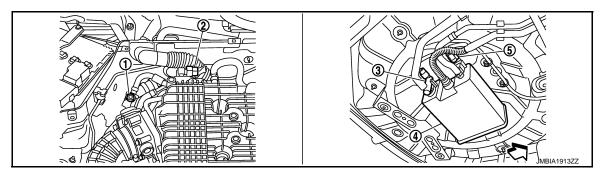
- Battery current sensor
- Refrigerant pressure sensor



- Power steering pressure sensor
- 2. Alternator

Engine oil temperature sensor





- 1. EVAP service port
- EVAP canister purge volume control 3. EVAP canister vent control valve solenoid valve

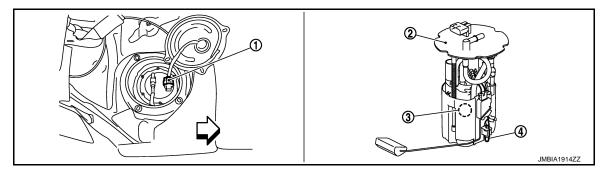
### **MULTIPORT FUEL INJECTION SYSTEM**

## < FUNCTION DIAGNOSIS > [VQ35HR]

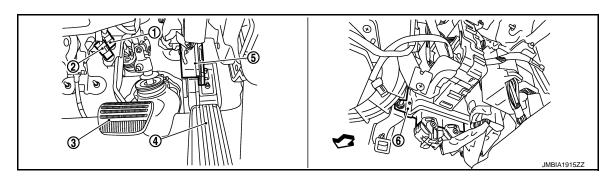
4. EVAP canister

EVAP control system pressure sensor

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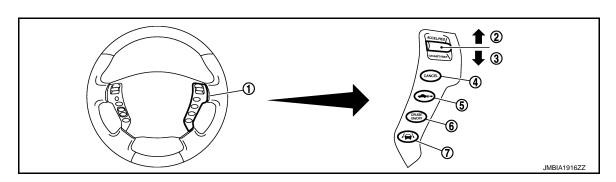
- Fuel level sensor unit and fuel pump 2. (main) harness connector
- Fuel level sensor unit and fuel pump 3. Fuel pressure regulator (main)
- 4. Fuel tank temperature sensor



- 1. Stop lamp switch
- ASCD brake switch (ASCD models) 3
   ICC brake switch (ICC models)
- 4. Accelerator pedal
- 5. Accelerator pedal position sensor
- ECM

Brake pedal

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- 1. ICC steering switch
- 4. CANCEL switch
- 7. LDP switch

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

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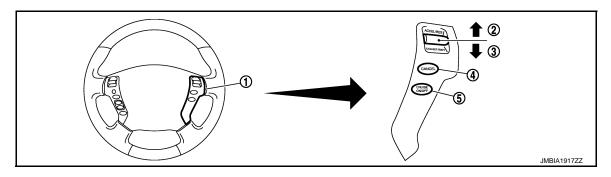
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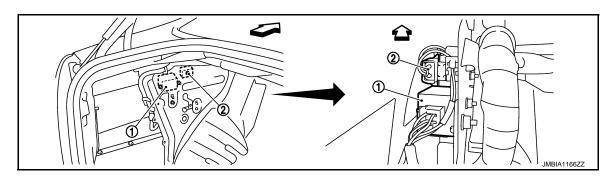
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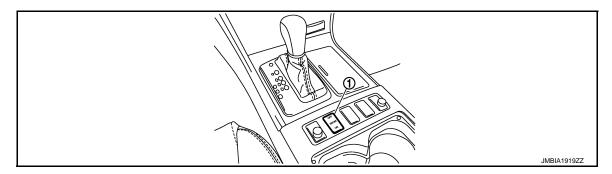
- ASCD steering switch
- 2. RESUME/ACCELERATE switch
- 3. SET/COAST switch

- 4. CANCEL switch
- 5. MAIN switch



1. FPCM

2. Dropping resistor



1. Snow mode switch

# Component Description

INFOID:0000000005353344

Component	Reference	
A/F sensor 1	EC-237, "Description"	
Accelerator pedal position sensor	EC-558, "Description"	
Camshaft position sensor	EC-346, "Description"	
Crankshaft position sensor	EC-340, "Description"	
Engine coolant temperature sensor	EC-220, "Description"	
Fuel injector	EC-598, "Description"	
Heated oxygen sensor 2	EC-264, "Description"	
Intake air temperature sensor	EC-214, "Description"	
Knock sensor	EC-335, "Description"	

# **MULTIPORT FUEL INJECTION SYSTEM**

< FUNCTION DIAGNOSIS > [VQ35HR]

Component	Reference
Mass air flow sensor	EC-195, "Description"
Power steering pressure sensor	EC-435, "Description"
Throttle position sensor	EC-224, "Description"

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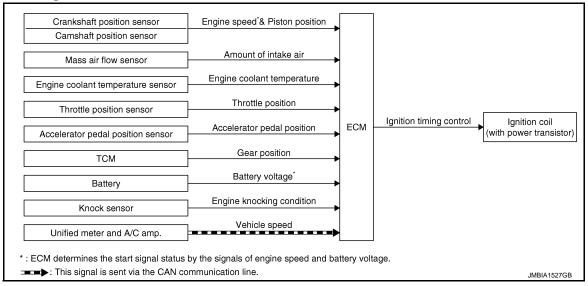
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### **ELECTRIC IGNITION SYSTEM**

### System Diagram

INFOID:0000000005353345



## System Description

INFOID:0000000005353346

#### INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	F.,		
Camshaft position sensor	Engine speed* <sup>2</sup> & Piston position		Ignition coil (with power transistor)
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position	ignition uming	
Accelerator pedal position sensor	Accelerator pedal position		
TCM	Gear position		
Battery	Battery voltage*2		
Knock sensor	Engine knocking		
Unifed meter and A/C amp.	Vehicle speed*1		

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

### SYSTEM DESCRIPTION

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

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

The ECM receives information such as the injection pulse width and camshaft position sensor 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

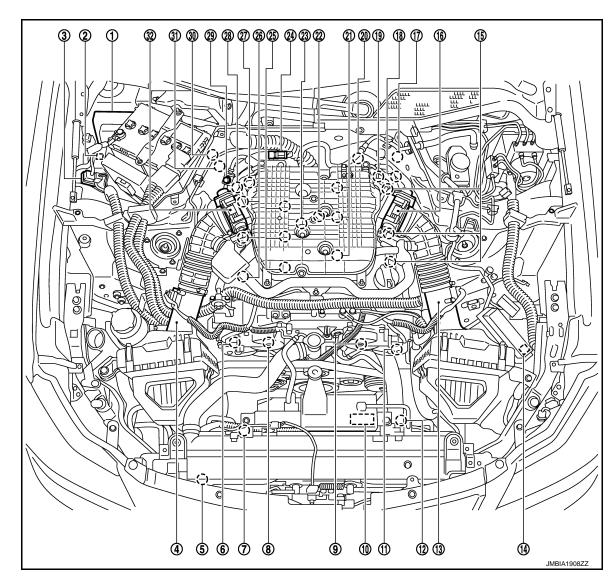
<sup>\*2:</sup> ECM determines the start signal status by the signals of engine speed and battery voltage.

[VQ35HR]

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

### Component Parts Location

INFOID:0000000005353347



- 1. IPDM E/R
- 4. Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- 10. Cooling fan control module
- Mass air flow sensor (with intake air 14. temperature sensor) (bank 2)
- Electric throttle control actuator (bank 2)
- 19. Camshaft position sensor (bank 2)
- 22. Knock sensor (bank 2)
- 25. Fuel injector (bank 1)

- 2. ICC brake hold relay (ICC models)
- 5. Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- Exhaust valve timing control magnet 12. retarder (bank 2)
- 14. Cooling fan relay
- 17. A/F sensor 1 (bank 2)
- 20. Engine coolant temperature sensor
- 23. Knock sensor (bank 1)
- 26. Ignition coil (with power transistor) and spark plug (bank 1)

- 3. Battery current sensor
- Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 12. Cooling fan motor-1
- 15. Ignition coil (with power transistor) and spark plug (bank 2)
- 18. Exhaust valve timing control position sensor (bank 2)
- 21. Fuel injector (bank 2)
- 24. EVAP canister purge volume control solenoid valve
- 27. Camshaft position sensor (bank 1)

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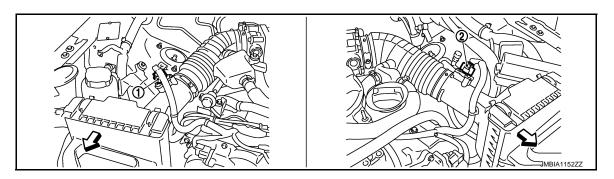
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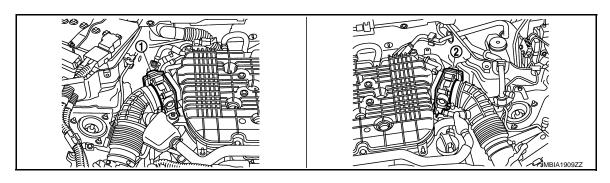
- 28. Exhaust valve timing control position 29. EVAP service port sensor (bank 1)
- 30. A/F sensor 1 (bank 1)

- 31. Crankshaft position sensor
- 32. Electric throttle control actuator (bank 1)

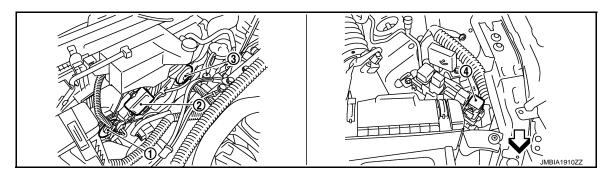


- Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)

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⇒ : Vehicle front

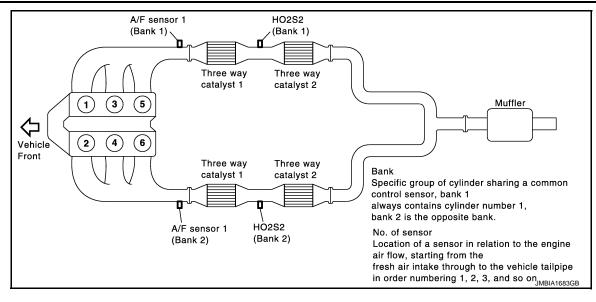


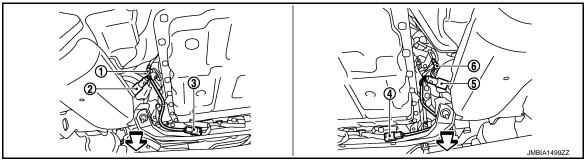
- Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



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

- Cooling fan relay
- : Vehicle front

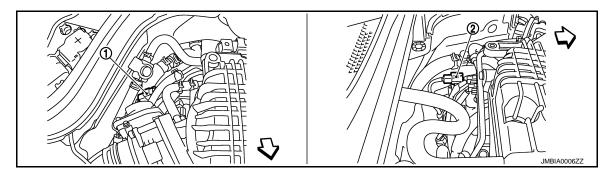




- 1. A/F sensor 1 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2)
- Heated oxygen sensor 2 (bank 2) harness connector

- 4. Heated oxygen sensor 2 (bank 1) harness connector
- 5. Heated oxygen sensor 2 (bank 1)
- 6. A/F sensor 1 (bank 1)

: Vehicle front



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

: Vehicle front

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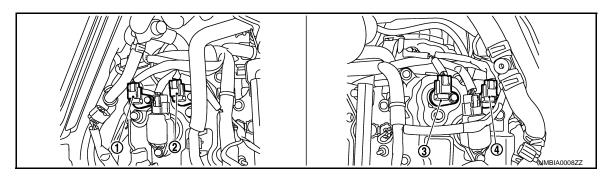
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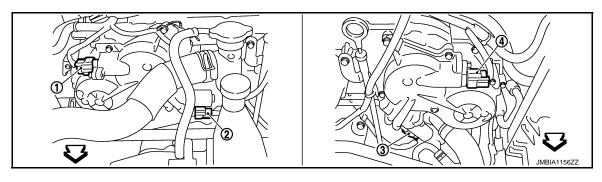
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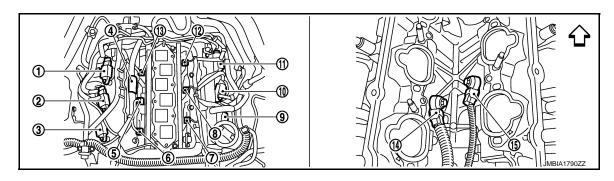


- Exhaust valve timing control position 2. sensor (bank 1)
- 4. Exhaust valve timing control position sensor (bank 2)
- 2. Camshaft position sensor (bank 1)
- 3. Camshaft position sensor (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- 4. Exhaust valve timing control magnet retarder (bank 2) harness connector
- <□ : Vehicle front</li>

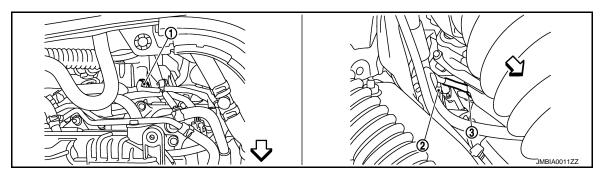
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



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

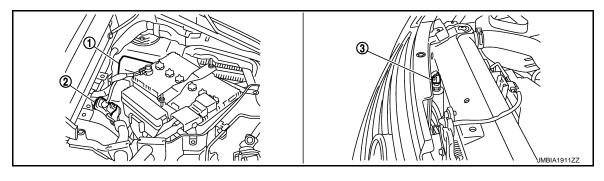
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- 14. Knock sensor (bank 2)

- Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6
- 15. Knock sensor (bank 1)



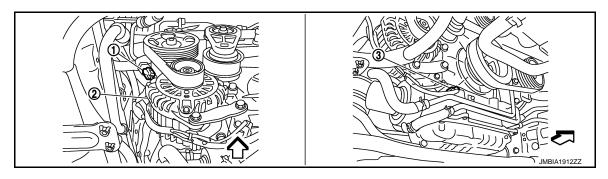
- Engine coolant temperature sensor 2.
  - A/F sensor 1 (bank 1)
- 3. Crankshaft position sensor

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→ : Vehicle front



1. IPDM E/R

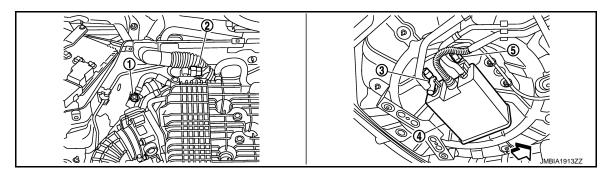
- 2. Battery current sensor
- Refrigerant pressure sensor



- Power steering pressure sensor
  - 2. Alternator

Engine oil temperature sensor

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→ : Vehicle front



- EVAP service port
- 2. EVAP canister purge volume control 3. EVAP canister vent control valve solenoid valve

**EC-57** Revision: 2009 June 2010 M35/M45

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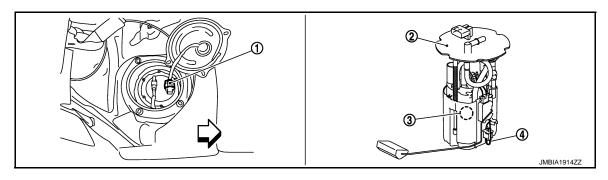
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4. EVAP canister

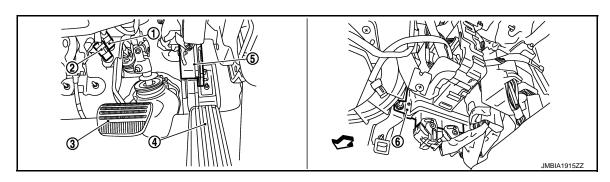
EVAP control system pressure sensor

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→ : Vehicle front



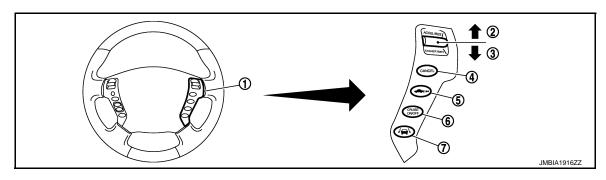
- Fuel level sensor unit and fuel pump 2. (main) harness connector
- Fuel level sensor unit and fuel pump 3. Fuel pressure regulator (main)
- 4. Fuel tank temperature sensor

⟨
⇒ : Vehicle front



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

. Accelerator pedal position sensor 6. ECM

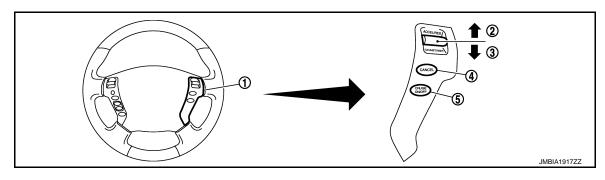


- ICC steering switch
- 4. CANCEL switch
- 7. LDP switch

- 2. RESUME/ACCELERATE switch
- 5. DISTANCE switch
- 3. SET/COAST switch

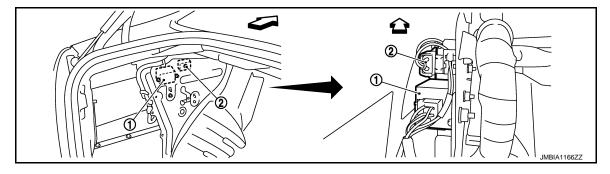
Brake pedal

6. MAIN switch



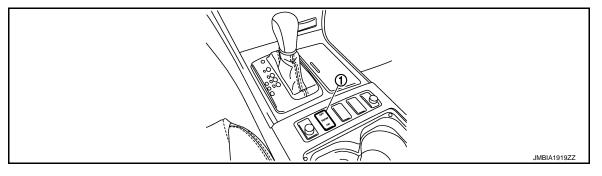
- 1. ASCD steering switch
- 4. CANCEL switch
- 2. RESUME/ACCELERATE switch
- 5. MAIN switch

3. SET/COAST switch



1. FPCM

2. Dropping resistor



1. Snow mode switch

# Component Description

INFOID:0000000005353348

Component	Reference
Accelerator pedal position sensor	EC-558, "Description"
Camshaft position sensor	EC-346, "Description"
Crankshaft position sensor	EC-340, "Description"
Engine coolant temperature sensor	EC-220, "Description"
Knock sensor	EC-335, "Description"
Mass air flow sensor	EC-195, "Description"
Throttle position sensor	EC-224, "Description"

Revision: 2009 June **EC-59** 2010 M35/M45

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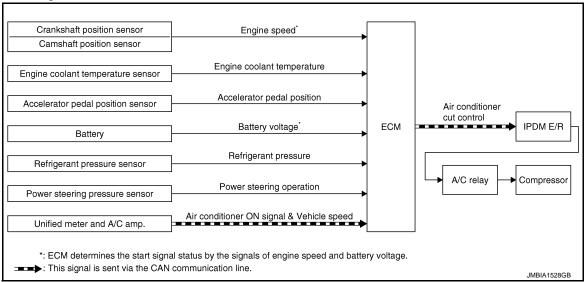
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[VQ35HR]

### AIR CONDITIONING CUT CONTROL

### System Diagram

INFOID:0000000005353349



## System Description

INFOID:0000000005353350

### INPUT/OUTPUT SIGNAL CHART

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

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

#### SYSTEM DESCRIPTION

This system improves engine operation when the air conditioner is used.

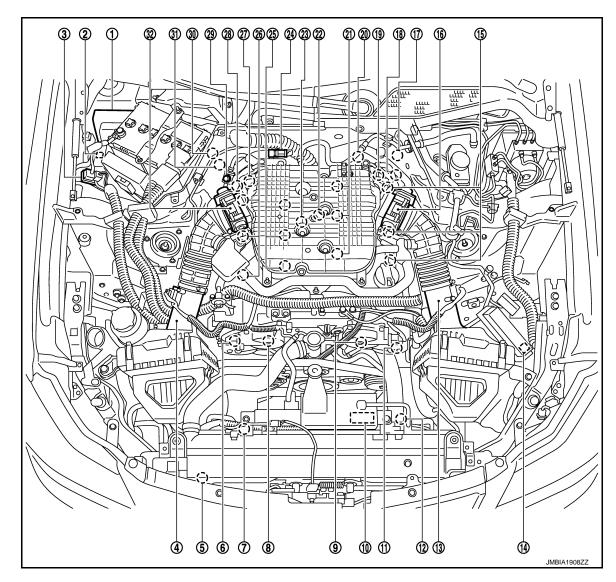
Under the following conditions, the air conditioner is turned off.

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

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

### **Component Parts Location**

INFOID:0000000005353351



- IPDM E/R
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- 13. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. Electric throttle control actuator (bank 2)
- 19. Camshaft position sensor (bank 2)
- 22. Knock sensor (bank 2)
- 25. Fuel injector (bank 1)
- 28. Exhaust valve timing control position 29. EVAP service port sensor (bank 1)
- 31. Crankshaft position sensor

- ICC brake hold relay (ICC models)
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- 11. Exhaust valve timing control magnet 12. retarder (bank 2)
- Cooling fan relay 14.
- 17. A/F sensor 1 (bank 2)
- Engine coolant temperature sensor 20.
- 23. Knock sensor (bank 1)
- 26. Ignition coil (with power transistor) and spark plug (bank 1)
- 32. Electric throttle control actuator (bank 1)

- 3. Battery current sensor
- 6. Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- Cooling fan motor-1
- 15. Ignition coil (with power transistor) and spark plug (bank 2)
- 18. Exhaust valve timing control position sensor (bank 2)
- 21. Fuel injector (bank 2)
- 24. EVAP canister purge volume control solenoid valve
- 27. Camshaft position sensor (bank 1)

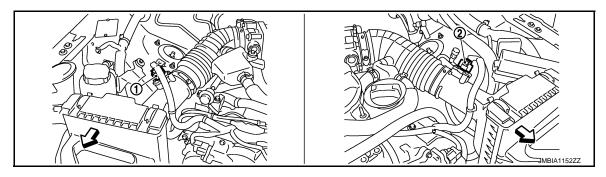
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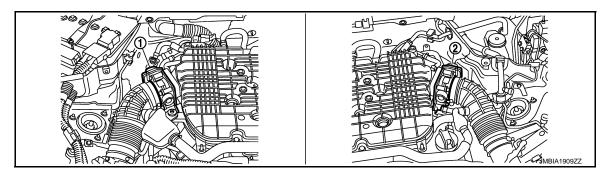
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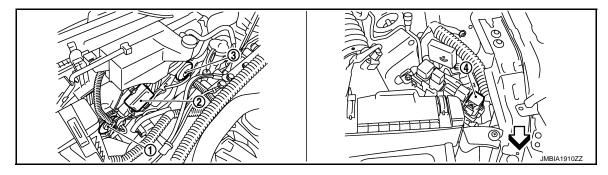


- Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)

 $\ \ \ \ \ \ \ \ \ \ \$  : Vehicle front

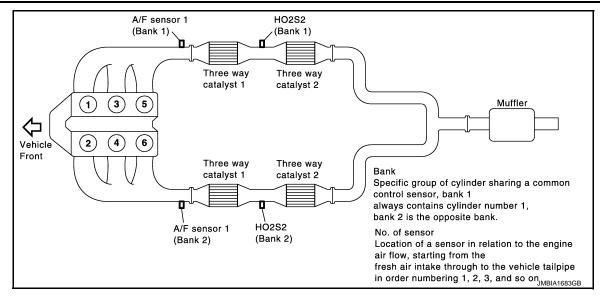


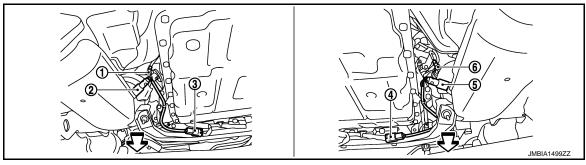
- Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



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

- 4. Cooling fan relay

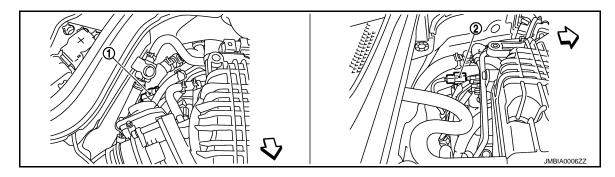




- 1. A/F sensor 1 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2)
- Heated oxygen sensor 2 (bank 2) harness connector

- 4. Heated oxygen sensor 2 (bank 1) harness connector
- 5. Heated oxygen sensor 2 (bank 1)
- 6. A/F sensor 1 (bank 1)

: Vehicle front



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

: Vehicle front

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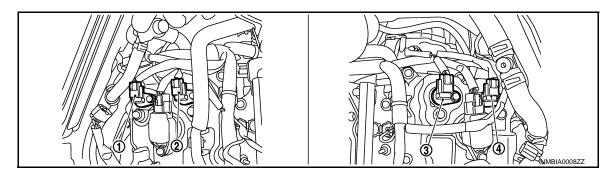
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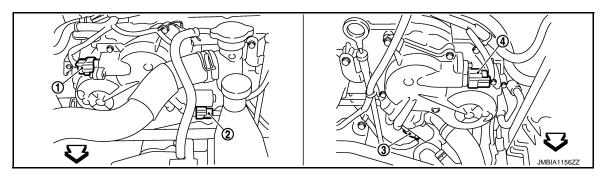
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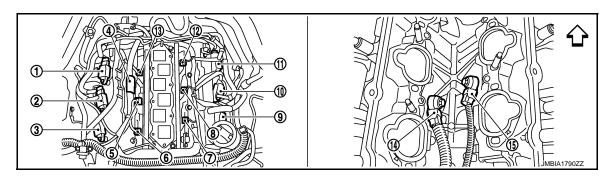


- Exhaust valve timing control position 2. sensor (bank 1)
- 4. Exhaust valve timing control position sensor (bank 2)
- 2. Camshaft position sensor (bank 1)
- 3. Camshaft position sensor (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- 4. Exhaust valve timing control magnet retarder (bank 2) harness connector
- <□ : Vehicle front</li>

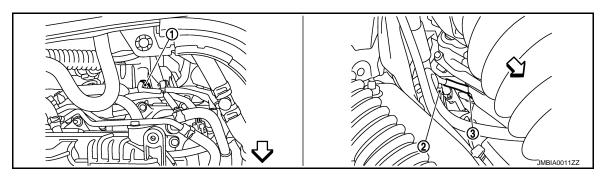
- . Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



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

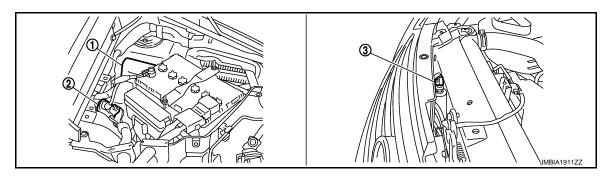
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- 14. Knock sensor (bank 2)

- Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6
- 15. Knock sensor (bank 1)



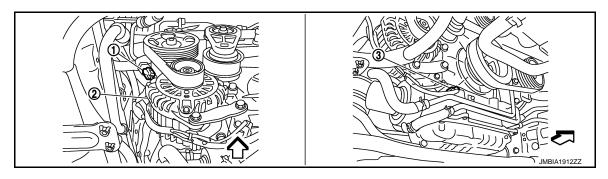
- Engine coolant temperature sensor 2.
  - A/F sensor 1 (bank 1)
- 3. Crankshaft position sensor

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→ : Vehicle front



1. IPDM E/R

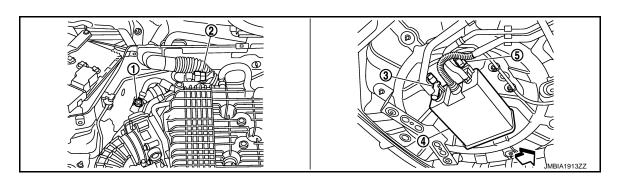
- Battery current sensor
- Refrigerant pressure sensor



- Power steering pressure sensor
- 2. Alternator

Engine oil temperature sensor

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→ : Vehicle front



- EVAP service port
- EVAP canister purge volume control 3. EVAP canister vent control valve solenoid valve

**EC-65** Revision: 2009 June 2010 M35/M45

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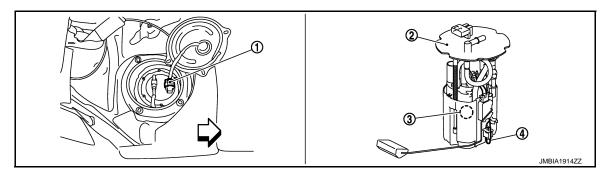
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4. EVAP canister

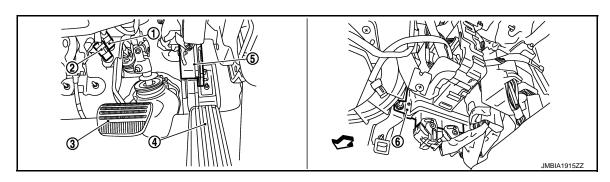
EVAP control system pressure sensor

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→ : Vehicle front



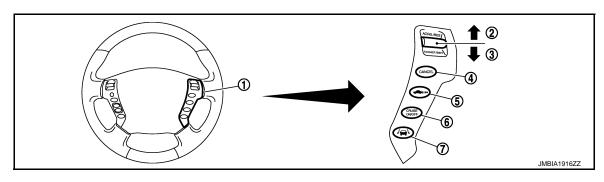
- Fuel level sensor unit and fuel pump 2. (main) harness connector
- Fuel level sensor unit and fuel pump 3. Fuel pressure regulator (main)
- 4. Fuel tank temperature sensor

⟨
⇒ : Vehicle front



- 1. Stop lamp switch
- ASCD brake switch (ASCD models) 3.
   ICC brake switch (ICC models)
- 4. Accelerator pedal

. Accelerator pedal position sensor 6. ECM

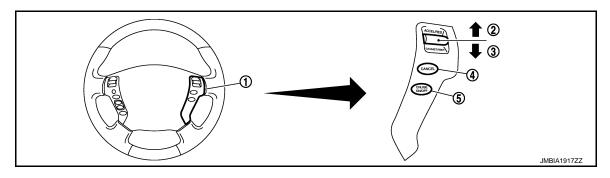


- ICC steering switch
- 1. CANCEL switch
- 7. LDP switch

- 2. RESUME/ACCELERATE switch
- 5. DISTANCE switch
- 3. SET/COAST switch

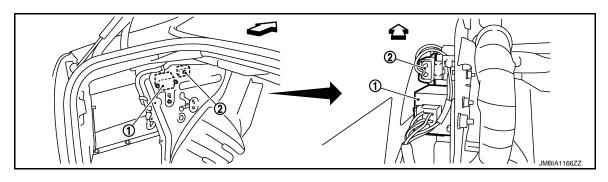
Brake pedal

6. MAIN switch



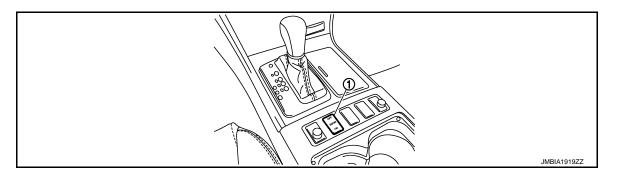
- ASCD steering switch CANCEL switch
  - 2.
- RESUME/ACCELERATE switch
  - 5. MAIN switch

3. SET/COAST switch



**FPCM** 

Dropping resistor



1. Snow mode switch

# **Component Description**

INFOID:0000000005353352

Component	Reference	
Accelerator pedal position sensor	EC-558, "Description"	
Camshaft position sensor	EC-346, "Description"	
Crankshaft position sensor	EC-340, "Description"	
Engine coolant temperature sensor	EC-220, "Description"	
Power steering pressure sensor	EC-435, "Description"	
Refrigerant pressure sensor	EC-637, "Description"	

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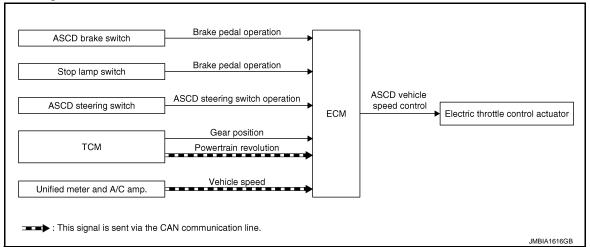
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[VQ35HR]

## AUTOMATIC SPEED CONTROL DEVICE (ASCD)

### System Diagram

INFOID:0000000005353353



## System Description

INFOID:0000000005353354

#### INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control		
Stop lamp switch	Brake pedal operation		Electric throttle control	
ASCD steering switch	ASCD steering switch operation			
TCM	Gear position		actuator	
	Powertrain revolution*			
Unified meter and A/C amp.	Vehicle speed*			

<sup>\*:</sup> This signal is sent to the ECM via the CAN communication line

#### BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.

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

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

Operation status of ASCD is indicated by CRUISE indicated and SET indicator in combination meter. If any malfunction occurs in the ASCD system, CRUISE lamp blinks and ASCD control is deactivated.

#### NOTE:

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

#### **SET OPERATION**

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

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

#### **ACCELERATE OPERATION**

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

### **CANCEL OPERATION**

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

- CANCEL switch is pressed
- More than 2 switches on ASCD steering switch are pressed at the same time (Set speed will be cleared)
- · Brake pedal is depressed

### **AUTOMATIC SPEED CONTROL DEVICE (ASCD)**

< FUNCTION DIAGNOSIS > [VQ35HR]

- Selector lever position is changed to N, P or R
- 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 CRUISE lamp.

- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.
- When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ACCELERATE switch.
- Malfunction for some self-diagnoses regarding ASCD control: SET indicator will blink quickly.

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

#### COAST OPERATION

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

#### **RESUME OPERATION**

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

- · Brake pedal is released
- A/T selector lever is in a position other than P and N
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (89 MPH)

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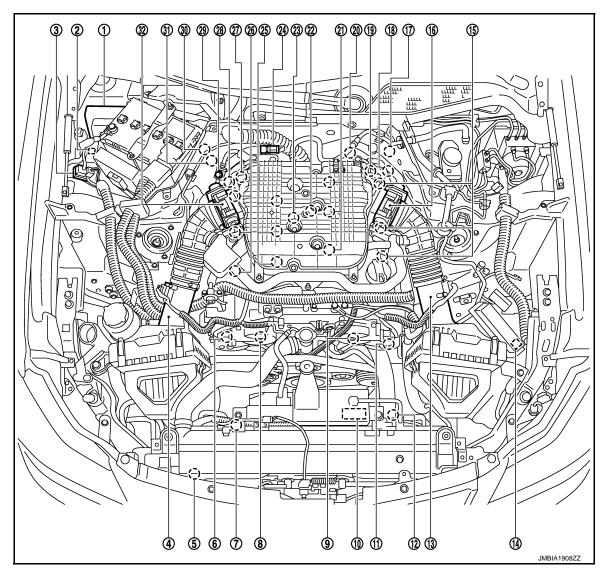
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### **Component Parts Location**

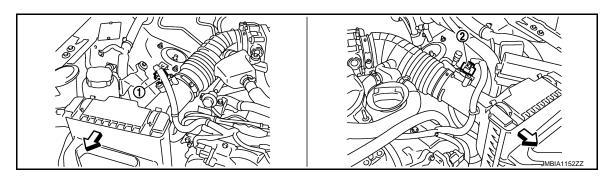
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- IPDM E/R
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- Mass air flow sensor (with intake air 14. Cooling fan relay temperature sensor) (bank 2)
- 16. Electric throttle control actuator (bank 2)
- 19. Camshaft position sensor (bank 2)
- 22. Knock sensor (bank 2)
- 25. Fuel injector (bank 1)
- 28. Exhaust valve timing control position 29. EVAP service port sensor (bank 1)
- 31. Crankshaft position sensor

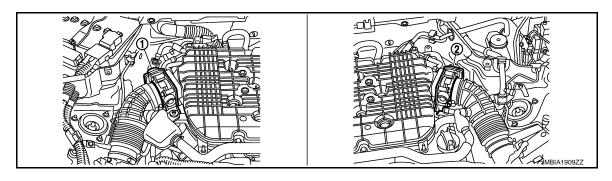
- ICC brake hold relay (ICC models)
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- 11. Exhaust valve timing control magnet 12. retarder (bank 2)
- 17. A/F sensor 1 (bank 2)
- Engine coolant temperature sensor 20.
- 23. Knock sensor (bank 1)
- 26. Ignition coil (with power transistor) and spark plug (bank 1)
- 32. Electric throttle control actuator (bank 1)

- 3. Battery current sensor
- 6. Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- Cooling fan motor-1
- 15. Ignition coil (with power transistor) and spark plug (bank 2)
- 18. Exhaust valve timing control position sensor (bank 2)
- 21. Fuel injector (bank 2)
- 24. EVAP canister purge volume control solenoid valve
- 27. Camshaft position sensor (bank 1)
- 30. A/F sensor 1 (bank 1)

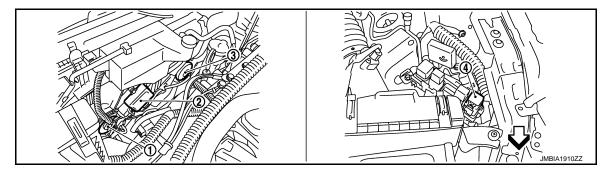


- Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
  - Mass air flow sensor (with intake air temperature sensor) (bank 2)





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



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

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Revision: 2009 June **EC-71** 2010 M35/M45

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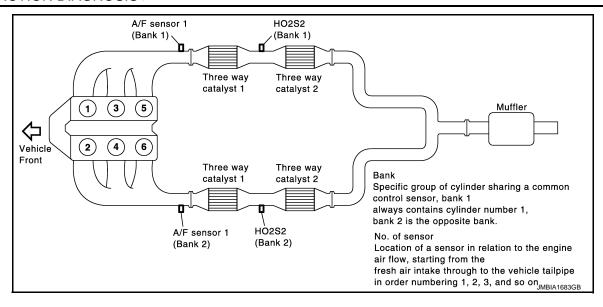
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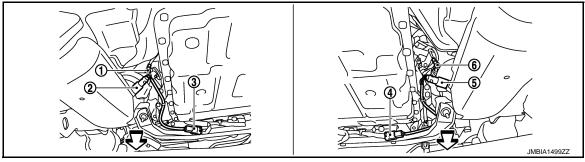
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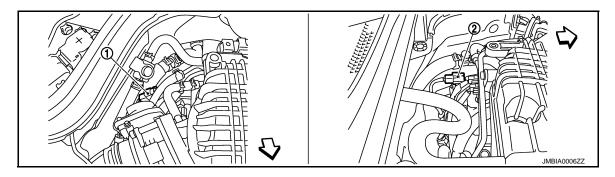




- 1. A/F sensor 1 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2)
- 3. Heated oxygen sensor 2 (bank 2) harness connector

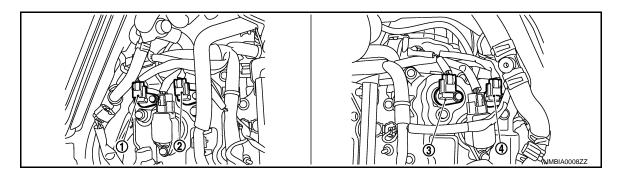
- 4. Heated oxygen sensor 2 (bank 1) harness connector
- 5. Heated oxygen sensor 2 (bank 1)
- 6. A/F sensor 1 (bank 1)

⟨
→ : Vehicle front



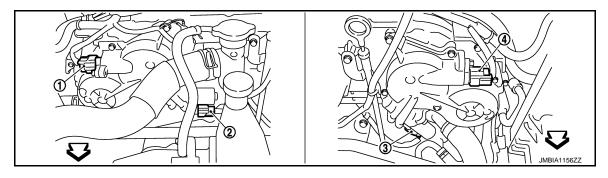
- 1. A/F sensor 1 (bank 1) harness con- 2. nector
- A/F sensor 1 (bank 2) harness connector

: Vehicle front



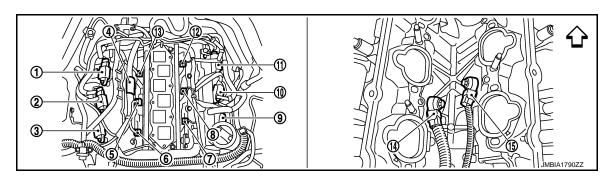
- Exhaust valve timing control position 2. sensor (bank 1)
  - Camshaft position sensor (bank 1)
- 3. Camshaft position sensor (bank 2)

4. Exhaust valve timing control position sensor (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- Exhaust valve timing control magnet retarder (bank 2) harness connector
- : Vehicle front

- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- Fuel injector No. 2 7.
- 10. Ignition coil No. 4 (with power transistor)
- 13. Fuel injector No. 5
- : Vehicle front

- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- 14. Knock sensor (bank 2)

- 3. Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6
- 15. Knock sensor (bank 1)

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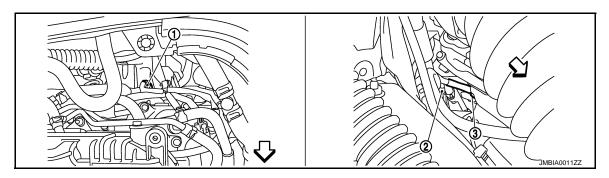
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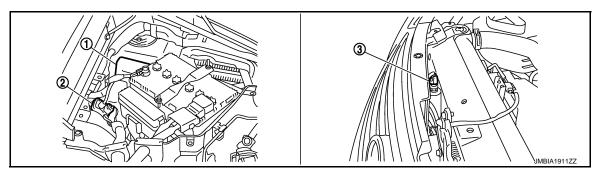
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**EC-73** Revision: 2009 June 2010 M35/M45



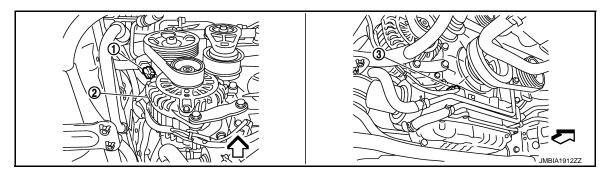
- Engine coolant temperature sensor 2. A/F sensor 1 (bank 1)
- 3. Crankshaft position sensor





IPDM E/R

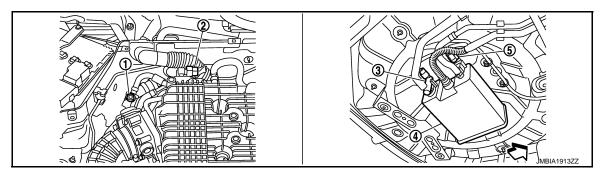
- Battery current sensor
- Refrigerant pressure sensor



- Power steering pressure sensor
- 2. Alternator

Engine oil temperature sensor





- EVAP service port
- EVAP canister purge volume control 3. EVAP canister vent control valve solenoid valve

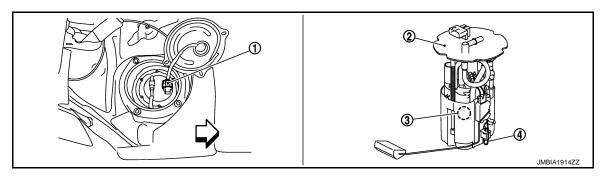
## **AUTOMATIC SPEED CONTROL DEVICE (ASCD)**

# < FUNCTION DIAGNOSIS >

**EVAP** canister

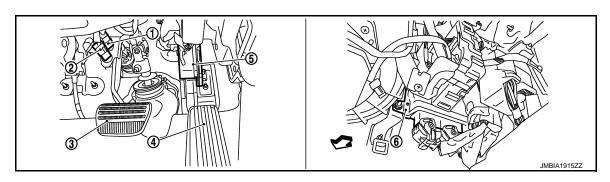
5. EVAP control system pressure sen-

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→ : Vehicle front



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

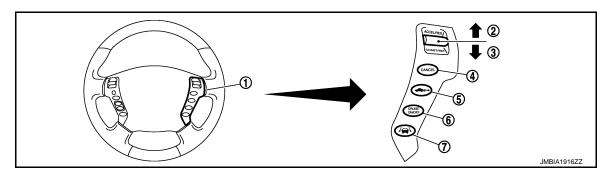
⟨
⇒ : Vehicle front



- Stop lamp switch
- ASCD brake switch (ASCD models) Brake pedal ICC brake switch (ICC models)
- Accelerator pedal

Accelerator pedal position sensor 6. **ECM** 

: Vehicle front



- ICC steering switch
  - **CANCEL** switch
- 7. LDP switch

- RESUME/ACCELERATE switch
- **DISTANCE** switch

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- 3. SET/COAST switch
- MAIN switch 6.

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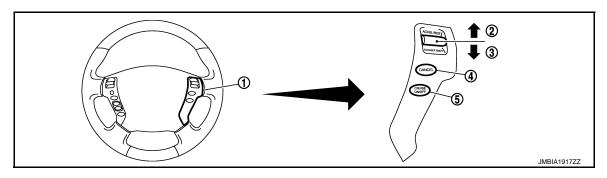
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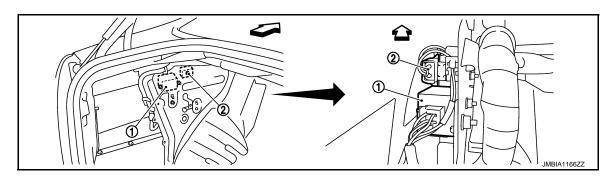
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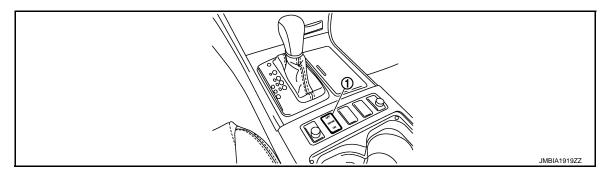
- ASCD steering switch
- 2. RESUME/ACCELERATE switch
- 3. SET/COAST switch

- 4. CANCEL switch
- 5. MAIN switch



1. FPCM

2. Dropping resistor



1. Snow mode switch

# Component Description

INFOID:0000000005353356

Component	Reference
ASCD brake switch	EC-533, "Description"
ASCD indicator	EC-586, "Description"
ASCD steering switch	EC-522, "Description"
Electric throttle control actuator	EC-492, "Description"
Stop lamp switch	EC-533, "Description"

#### **CAN COMMUNICATION**

< FUNCTION DIAGNOSIS >

#### [VQ35HR]

#### **CAN COMMUNICATION**

## System Description

INFOID:0000000005353357

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-29, "CAN Communication Signal Chart", about CAN communication for detail.

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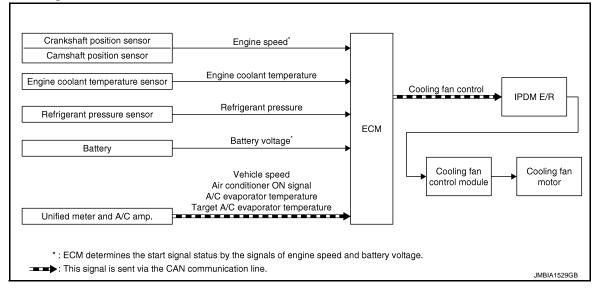
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[VQ35HR]

#### **COOLING FAN CONTROL**

## System Diagram

INFOID:0000000005353358



## System Description

INFOID:0000000005353359

#### INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine and 41	Cooling fan control	IPDM E/R ↓ Cooling fan control module ↓ Cooling fan motor
Camshaft position sensor	- Engine speed*1		
Engine coolant temperature sensor	Engine coolant temperature		
Refrigerant pressure sensor	Refrigerant pressure		
Battery	Battery voltage*1		
	Vehicle speed*2		
Unified meter and A/C amp.	Air conditioner ON signal*2		
onlined meter and A/O amp.	A/C evaporator temperature*2		
	Target A/C evaporator temperature*2		

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

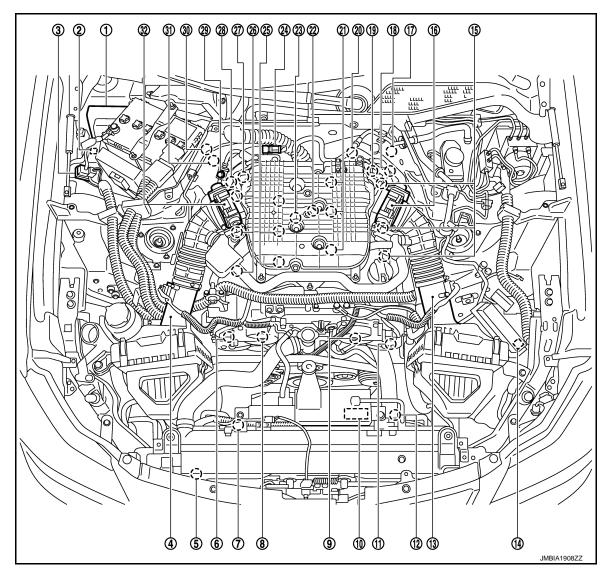
#### SYSTEM DESCRIPTION

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

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

### **Component Parts Location**

INFOID:0000000005353360



- IPDM E/R
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- 13. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. Electric throttle control actuator (bank 2)
- 19. Camshaft position sensor (bank 2)
- 22. Knock sensor (bank 2)
- 25. Fuel injector (bank 1)
- 28. Exhaust valve timing control position 29. EVAP service port sensor (bank 1)
- 31. Crankshaft position sensor

- ICC brake hold relay (ICC models)
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- 11. Exhaust valve timing control magnet 12. retarder (bank 2)
- 14. Cooling fan relay
- 17. A/F sensor 1 (bank 2)
- Engine coolant temperature sensor 20.
- 23. Knock sensor (bank 1)
- 26. Ignition coil (with power transistor) and spark plug (bank 1)
- 32. Electric throttle control actuator (bank 1)

- 3. Battery current sensor
- 6. Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- Cooling fan motor-1
- 15. Ignition coil (with power transistor) and spark plug (bank 2)
- 18. Exhaust valve timing control position sensor (bank 2)
- 21. Fuel injector (bank 2)
- 24. EVAP canister purge volume control solenoid valve
- 27. Camshaft position sensor (bank 1)

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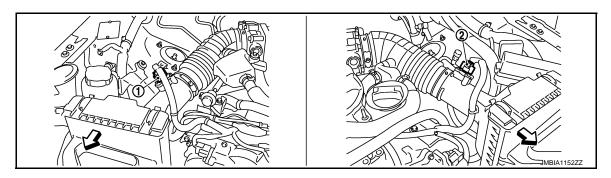
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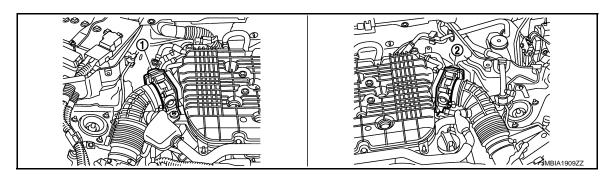
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30. A/F sensor 1 (bank 1)

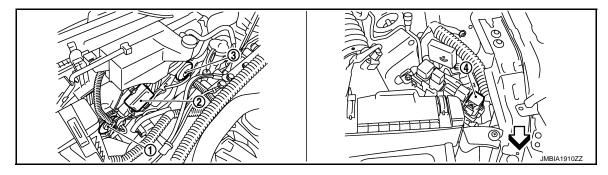


- Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)

 $\ \ \ \ \ \ \ \ \ \ \$  : Vehicle front

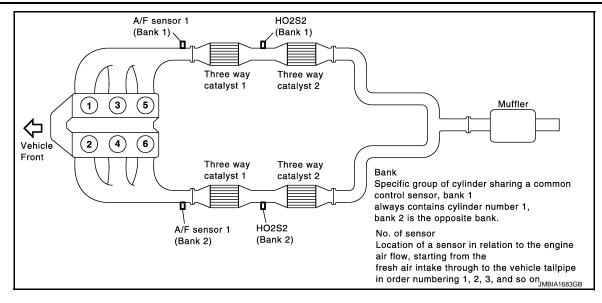


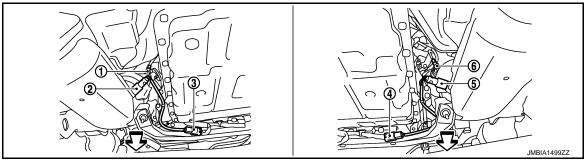
- Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



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

4. Cooling fan relay: Vehicle front

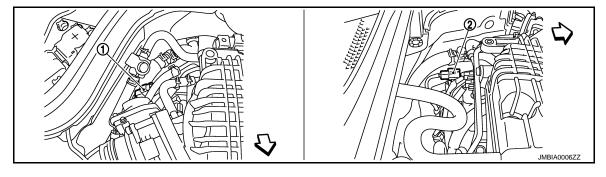




- 1. A/F sensor 1 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2)
- Heated oxygen sensor 2 (bank 2) harness connector

- 4. Heated oxygen sensor 2 (bank 1) harness connector
- 5. Heated oxygen sensor 2 (bank 1)
- 6. A/F sensor 1 (bank 1)

: Vehicle front



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

: Vehicle front

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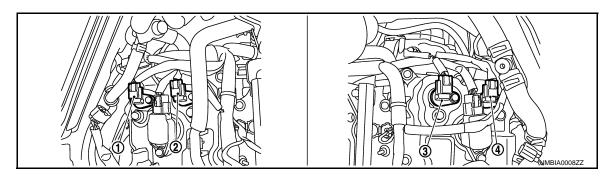
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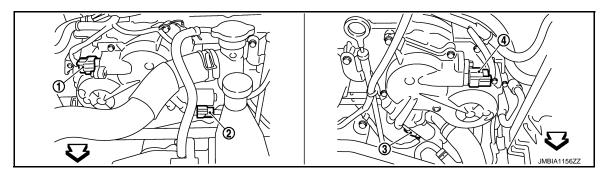
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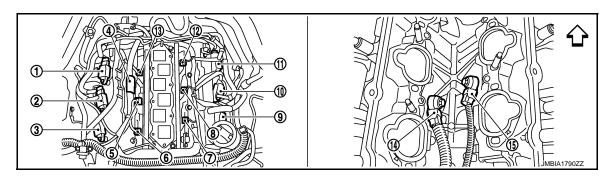


- Exhaust valve timing control position 2. sensor (bank 1)
- 4. Exhaust valve timing control position sensor (bank 2)
- 2. Camshaft position sensor (bank 1)
- 3. Camshaft position sensor (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- 4. Exhaust valve timing control magnet retarder (bank 2) harness connector
- <□ : Vehicle front</li>

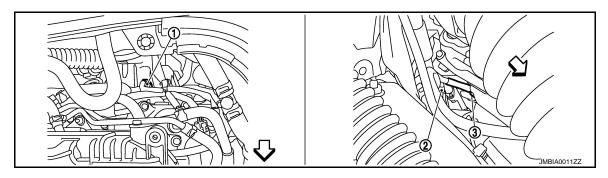
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- 7. Fuel injector No. 2
- Ignition coil No. 4 (with power transistor)
- 13. Fuel injector No. 5

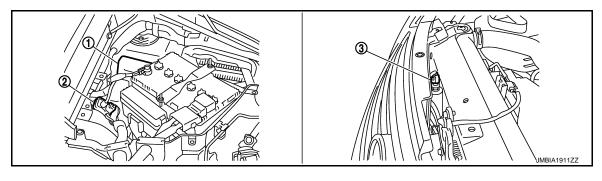
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- 14. Knock sensor (bank 2)

- Ignition coil No. 1 (with power transistor)
- Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6
- 15. Knock sensor (bank 1)



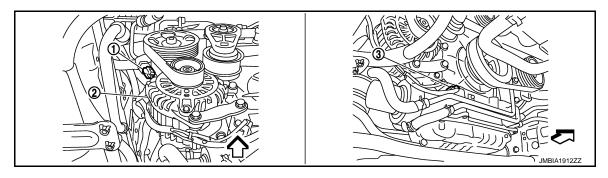
- Engine coolant temperature sensor 2.
- A/F sensor 1 (bank 1)
- 3. Crankshaft position sensor





1. IPDM E/R

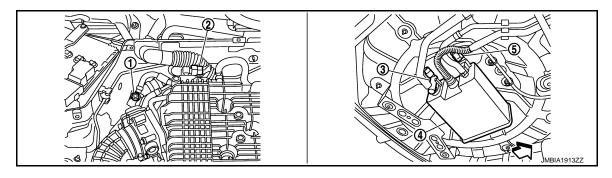
- Battery current sensor
- Refrigerant pressure sensor



- Power steering pressure sensor
- 2. Alternator

Engine oil temperature sensor





- EVAP service port
- 2. EVAP canister purge volume control 3. EVAP canister vent control valve solenoid valve

**EC-83** Revision: 2009 June 2010 M35/M45

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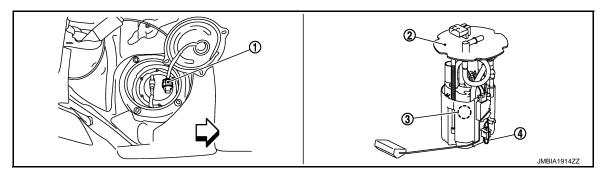
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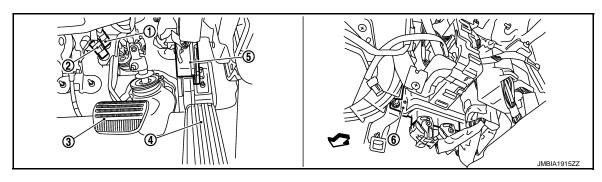
EVAP canister

EVAP control system pressure sensor

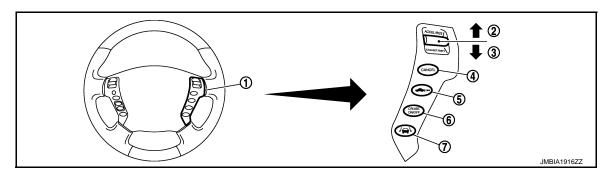
⟨
→ : Vehicle front



- Fuel level sensor unit and fuel pump 2. (main) harness connector
- Fuel level sensor unit and fuel pump 3. Fuel pressure regulator (main)
- 4. Fuel tank temperature sensor
- ⟨
  ⇒ : Vehicle front



- 1. Stop lamp switch
- ASCD brake switch (ASCD models) 3.
   ICC brake switch (ICC models)
- 4. Accelerator pedal
- 5. Accelerator pedal position sensor 6.



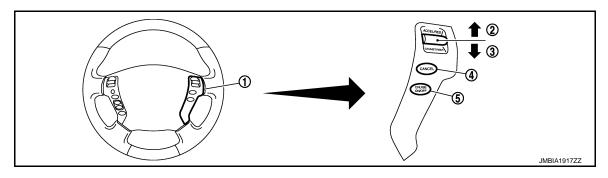
- ICC steering switch
- 4. CANCEL switch
- 7. LDP switch

- 2. RESUME/ACCELERATE switch
- 5. DISTANCE switch
- 3. SET/COAST switch

Brake pedal

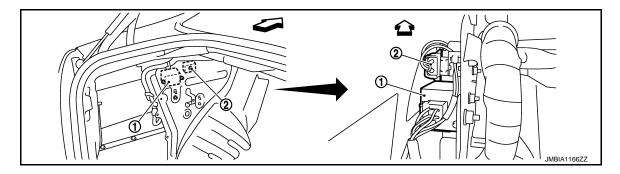
ECM

6. MAIN switch



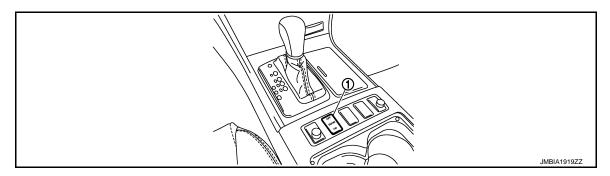
- 1. ASCD steering switch
- 2. RESUME/ACCELERATE switch
- 3. SET/COAST switch

- 4. CANCEL switch
- 5. MAIN switch



1. FPCM

2. Dropping resistor



1. Snow mode switch

# Component Description

INFOID:0000000005353361

Component	Reference
Camshaft position sensor	EC-346, "Description"
Crankshaft position sensor	EC-340, "Description"
Cooling fan control module	EC-589, "Description"
Cooling fan motor	EC-589, "Description"
Engine coolant temperature sensor	EC-220, "Description"
Refrigerant pressure sensor	EC-637, "Description"

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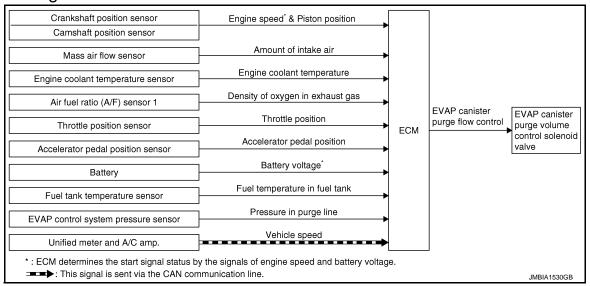
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[VQ35HR]

# **EVAPORATIVE EMISSION SYSTEM**

## System Diagram

INFOID:0000000005353362



## System Description

INFOID:0000000005353363

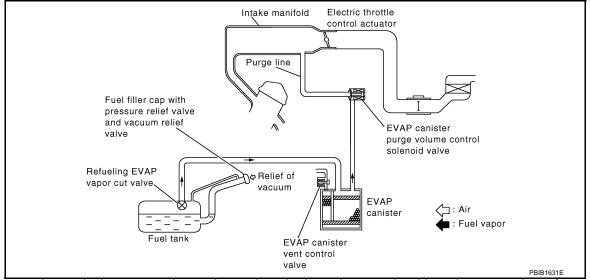
#### INPUT/OUTPUT SIGNAL CHART

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

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

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

#### SYSTEM DESCRIPTION



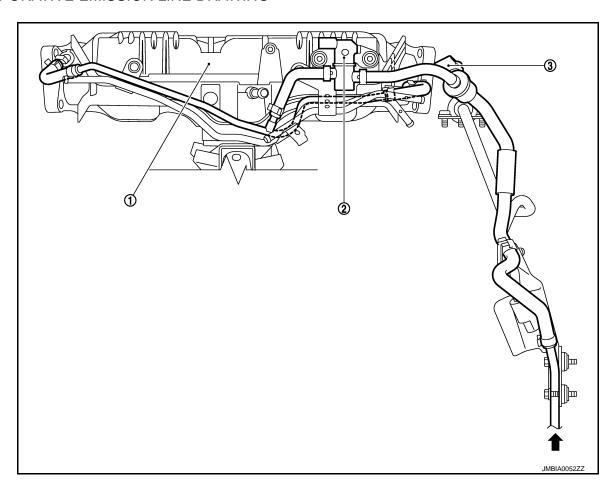
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

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.

#### **EVAPORATIVE EMISSION LINE DRAWING**



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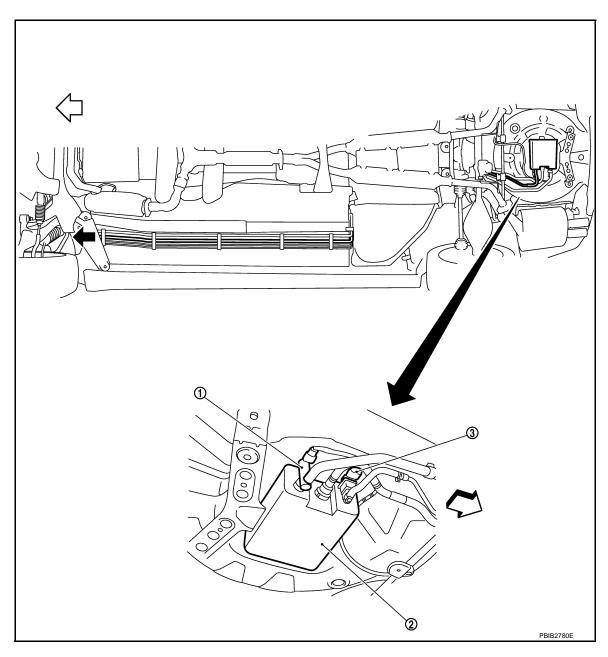
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- 1. Intake manifold collector
- EVAP canister purge volume control 3. EVAP service port solenoid valve
- From next figure



- 1. EVAP canister vent control valve
- 2. EVAP canister

3. EVAP control system pressure sensor

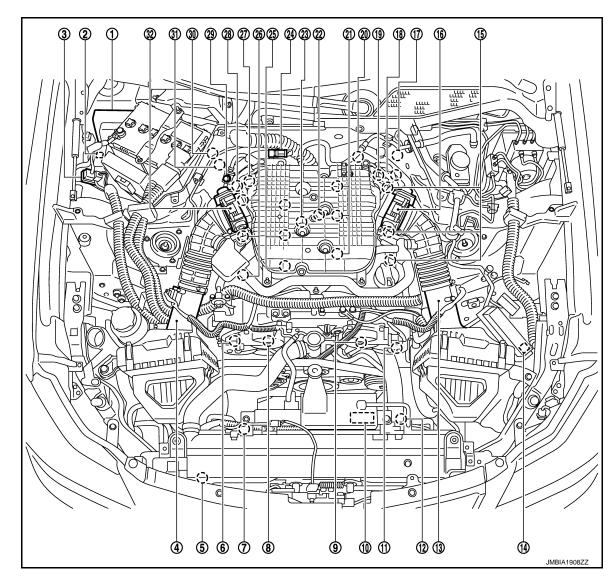
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   □: Vehicle front
- To previous figure

#### NOTE:

Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

### **Component Parts Location**

INFOID:0000000005353364



- IPDM E/R
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- 13. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. Electric throttle control actuator (bank 2)
- 19. Camshaft position sensor (bank 2)
- 22. Knock sensor (bank 2)
- 25. Fuel injector (bank 1)
- 28. Exhaust valve timing control position 29. EVAP service port sensor (bank 1)
- 31. Crankshaft position sensor

- ICC brake hold relay (ICC models)
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- 11. Exhaust valve timing control magnet 12. retarder (bank 2)
- Cooling fan relay 14.
- 17. A/F sensor 1 (bank 2)
- Engine coolant temperature sensor 20.
- 23. Knock sensor (bank 1)
- 26. Ignition coil (with power transistor) and spark plug (bank 1)
- 32. Electric throttle control actuator (bank 1)

- 3. Battery current sensor
- 6. Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- Cooling fan motor-1
- 15. Ignition coil (with power transistor) and spark plug (bank 2)
- 18. Exhaust valve timing control position sensor (bank 2)
- 21. Fuel injector (bank 2)
- 24. EVAP canister purge volume control solenoid valve
- 27. Camshaft position sensor (bank 1)

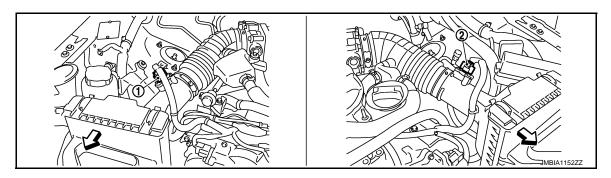
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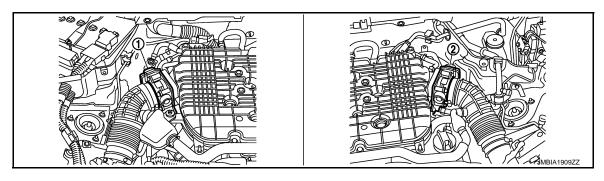
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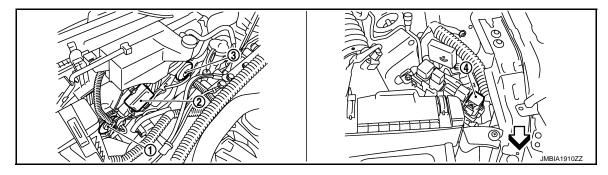


- Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)

 $\ \ \ \ \ \ \ \ \ \ \$  : Vehicle front

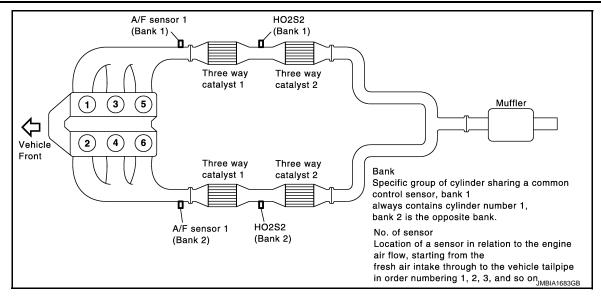


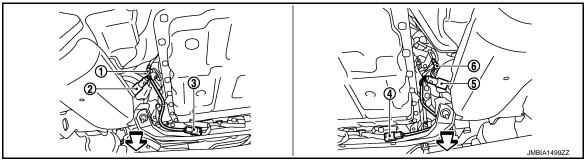
- Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



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

Cooling fan relay

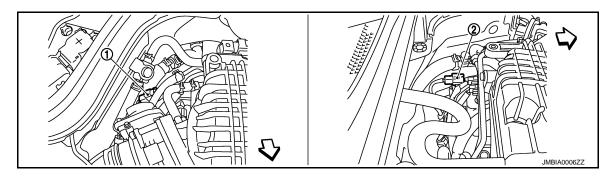




- 1. A/F sensor 1 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2)
- Heated oxygen sensor 2 (bank 2) harness connector

- 4. Heated oxygen sensor 2 (bank 1) harness connector
- 5. Heated oxygen sensor 2 (bank 1)
- 6. A/F sensor 1 (bank 1)

: Vehicle front



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

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⇒ : Vehicle front

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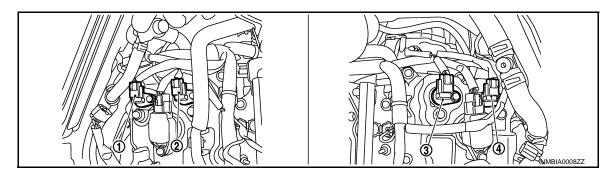
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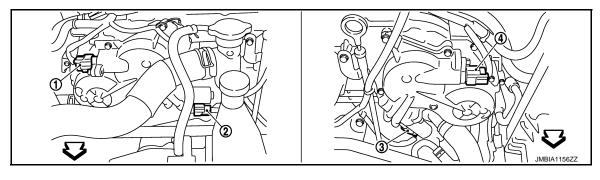
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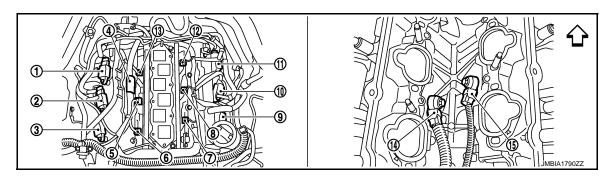


- Exhaust valve timing control position 2. sensor (bank 1)
- 4. Exhaust valve timing control position sensor (bank 2)
- 2. Camshaft position sensor (bank 1)
- 3. Camshaft position sensor (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- Exhaust valve timing control magnet retarder (bank 2) harness connector
- <□ : Vehicle front</li>

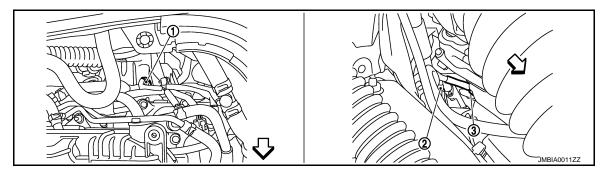
- . Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- 7. Fuel injector No. 2
- Ignition coil No. 4 (with power transistor)
- 13. Fuel injector No. 5

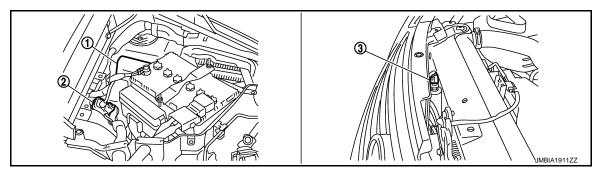
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- 14. Knock sensor (bank 2)

- Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6
- 15. Knock sensor (bank 1)



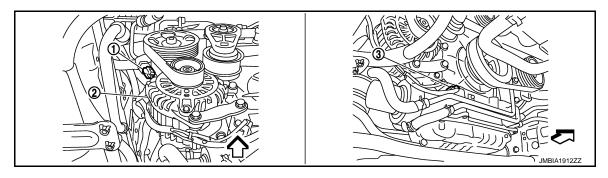
- Engine coolant temperature sensor 2.
  - A/F sensor 1 (bank 1)
- 3. Crankshaft position sensor





1. IPDM E/R

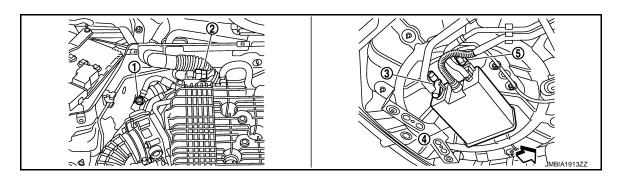
- 2. Battery current sensor
- 3. Refrigerant pressure sensor



- 1. Power steering pressure sensor
  - 2. Alternator

3. Engine oil temperature sensor





- 1. EVAP service port
- 2. EVAP canister purge volume control 3. EVAP canister vent control valve solenoid valve

Revision: 2009 June **EC-93** 2010 M35/M45

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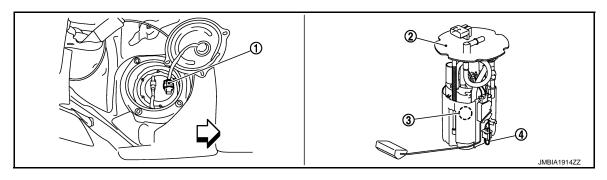
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4. EVAP canister

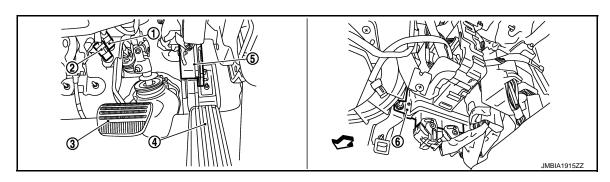
EVAP control system pressure sensor

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→ : Vehicle front



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

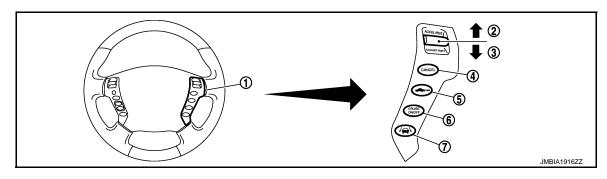
⟨
⇒ : Vehicle front



- 1. Stop lamp switch
- ASCD brake switch (ASCD models)
   Brake pedal ICC brake switch (ICC models)
- 4. Accelerator pedal

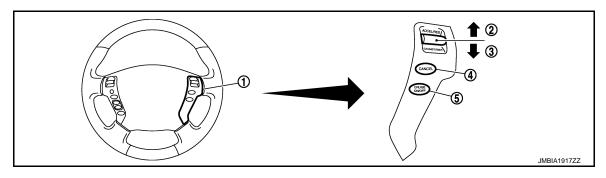
. Accelerator pedal position sensor 6. ECM

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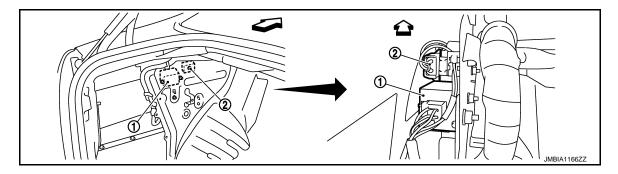
- ICC steering switch
- 4. CANCEL switch
- 7. LDP switch

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



- 1. ASCD steering switch
- 2. RESUME/ACCELERATE switch
- 3. SET/COAST switch

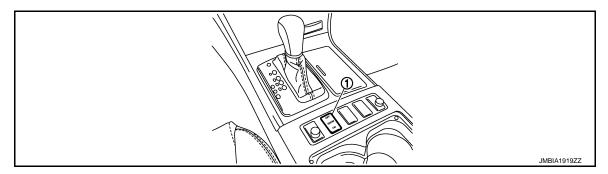
- 4. CANCEL switch
- 5. MAIN switch



1. FPCM

Dropping resistor

: Vehicle front



1. Snow mode switch

# Component Description

INFOID:0000000005353365

Component Reference A/F sensor 1 EC-237, "Description" Accelerator pedal position sensor EC-558, "Description" Camshaft position sensor EC-346, "Description" Crankshaft position sensor EC-340, "Description" Engine coolant temperature sensor EC-220, "Description" EVAP canister purge volume control solenoid valve EC-369, "Description" EVAP control system pressure sensor EC-391, "Description" Fuel tank temperature sensor EC-307, "Description"

Revision: 2009 June **EC-95** 2010 M35/M45

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### **EVAPORATIVE EMISSION SYSTEM**

< FUNCTION DIAGNOSIS >

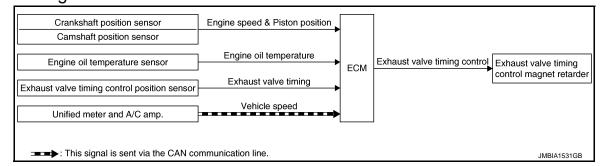
[VQ35HR]

Component	Reference
Mass air flow sensor	EC-195, "Description"
Throttle position sensor	EC-224, "Description"

## EXHAUST VALVE TIMING CONTROL

# System Diagram

INFOID:0000000005353366



# System Description

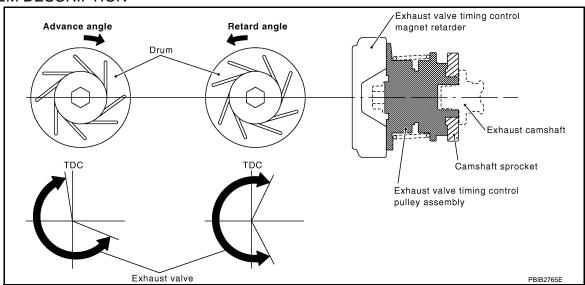
#### INFOID:0000000005353367

#### INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed & piston position	Exhaust valve timing control	Exhaust valve timing control magnet retarder
Camshaft position sensor	- Lingine speed & pistori position		
Engine oil temperature sensor	Engine oil temperature		
Exhaust valve timing control position sensor	Exhaust valve timing signal		g
Unified meter and A/C amp.	Vehicle speed		

<sup>\*:</sup> This signal is sent to the ECM via the CAN Communication line.

#### SYSTEM DESCRIPTION



This mechanism magnetically controls cam phases continuously with the fixed operating angle of the exhaust valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine oil temperature. Then, the ECM sends ON/OFF pulse duty signals to the exhaust valve timing control magnet retarder depending on driving status. This makes it possible to control the shut/open timing of the exhaust valve to increase engine torque and output in a range of high engine speed.

Revision: 2009 June **EC-97** 2010 M35/M45

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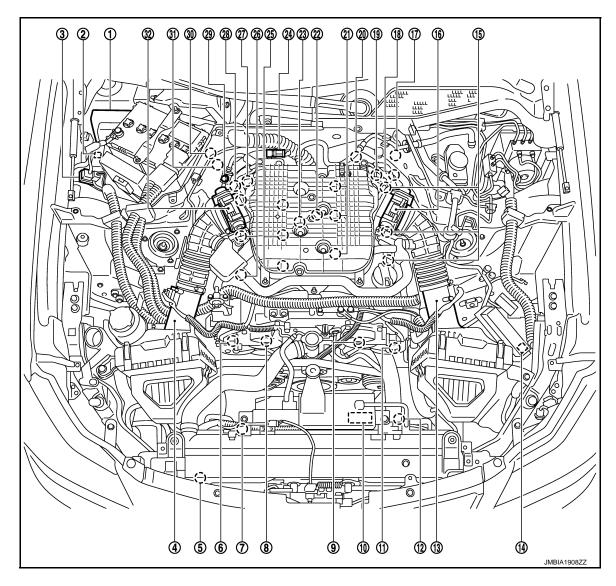
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### Component Parts Location

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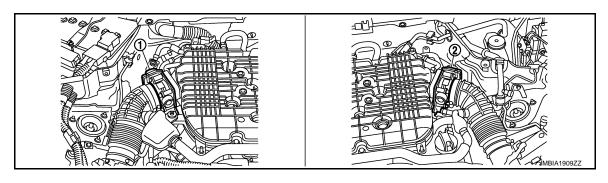
- IPDM E/R
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- Mass air flow sensor (with intake air 14. Cooling fan relay temperature sensor) (bank 2)
- 16. Electric throttle control actuator (bank 2)
- 19. Camshaft position sensor (bank 2)
- 22. Knock sensor (bank 2)
- 25. Fuel injector (bank 1)
- 28. Exhaust valve timing control position 29. EVAP service port sensor (bank 1)
- 31. Crankshaft position sensor

- ICC brake hold relay (ICC models)
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- 11. Exhaust valve timing control magnet 12. retarder (bank 2)
- 17. A/F sensor 1 (bank 2)
- Engine coolant temperature sensor 20.
- 23. Knock sensor (bank 1)
- 26. Ignition coil (with power transistor) and spark plug (bank 1)
- 32. Electric throttle control actuator (bank 1)

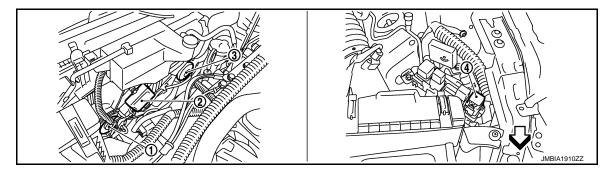
- 3. Battery current sensor
- 6. Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- Cooling fan motor-1
- 15. Ignition coil (with power transistor) and spark plug (bank 2)
- 18. Exhaust valve timing control position sensor (bank 2)
- 21. Fuel injector (bank 2)
- 24. EVAP canister purge volume control solenoid valve
- 27. Camshaft position sensor (bank 1)
- 30. A/F sensor 1 (bank 1)

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





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



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

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⇒ : Vehicle front

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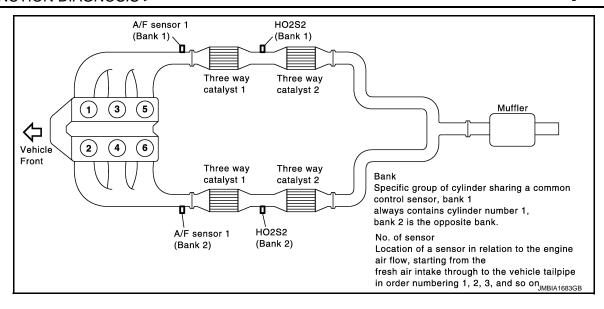
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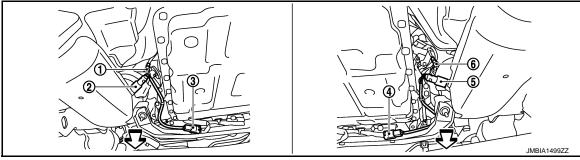
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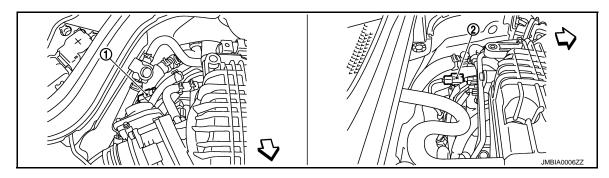
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- 1. A/F sensor 1 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2)
- Heated oxygen sensor 2 (bank 2) harness connector

- 4. Heated oxygen sensor 2 (bank 1) harness connector
- 5. Heated oxygen sensor 2 (bank 1)
- 6. A/F sensor 1 (bank 1)

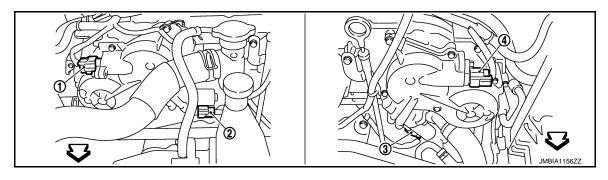


- 1. A/F sensor 1 (bank 1) harness con- 2. nector
- A/F sensor 1 (bank 2) harness connector

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⇒ : Vehicle front

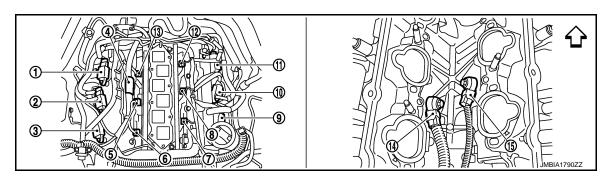
- Exhaust valve timing control position 2. sensor (bank 1)
  - Camshaft position sensor (bank 1)
- 3. Camshaft position sensor (bank 2)

4. Exhaust valve timing control position sensor (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- Exhaust valve timing control magnet retarder (bank 2) harness connector

- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- Fuel injector No. 2 7.
- 10. Ignition coil No. 4 (with power transistor)
- 13. Fuel injector No. 5
- : Vehicle front

- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- 14. Knock sensor (bank 2)

- 3. Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6
- 15. Knock sensor (bank 1)

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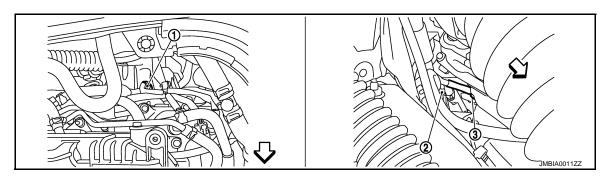
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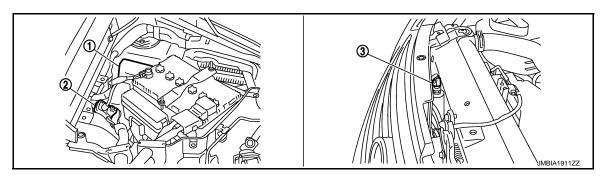
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**EC-101** Revision: 2009 June 2010 M35/M45



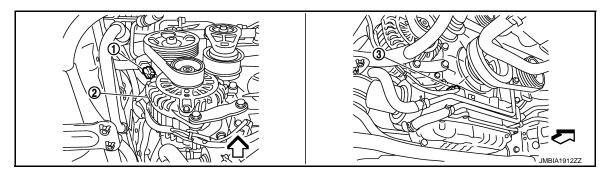
- Engine coolant temperature sensor 2. A/F sensor 1 (bank 1)
- 3. Crankshaft position sensor





IPDM E/R

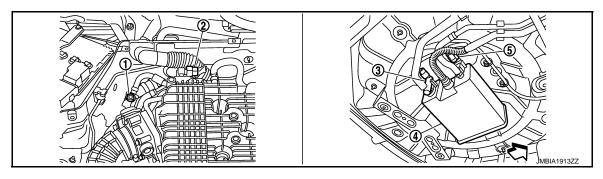
- Battery current sensor
- Refrigerant pressure sensor



- Power steering pressure sensor
- 2. Alternator

Engine oil temperature sensor





- 1. EVAP service port
- EVAP canister purge volume control 3. EVAP canister vent control valve solenoid valve

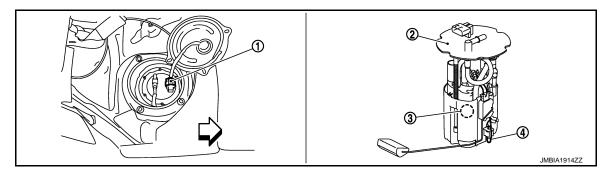
#### **EXHAUST VALVE TIMING CONTROL**

## < FUNCTION DIAGNOSIS > [VQ35HR]

4. EVAP canister

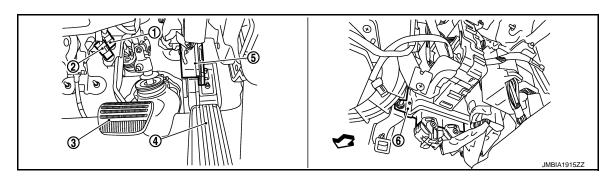
EVAP control system pressure sensor

⟨
→ : Vehicle front



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

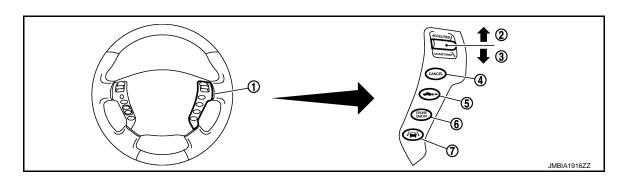
⟨
⇒ : Vehicle front



- 1. Stop lamp switch
- 2. ASCD brake switch (ASCD models) ICC brake switch (ICC models)
- Brake pedal

- 4. Accelerator pedal
- <□ : Vehicle front</li>

- 5. Accelerator pedal position sensor
- 6. ECM



- ICC steering switch
- 4. CANCEL switch
- 7. LDP switch

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

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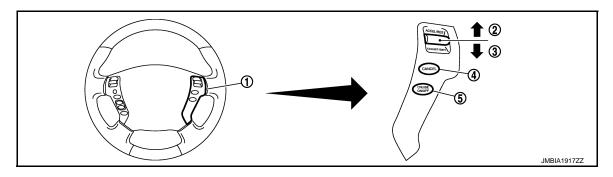
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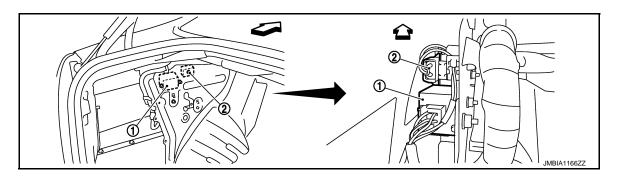
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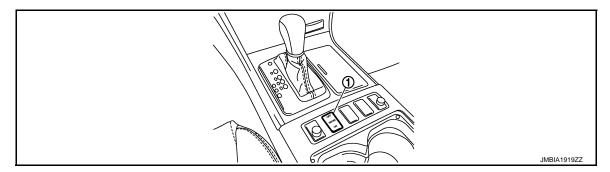
- ASCD steering switch
- 2. RESUME/ACCELERATE switch
- 3. SET/COAST switch

- 4. CANCEL switch
- 5. MAIN switch



1. FPCM

2. Dropping resistor



1. Snow mode switch

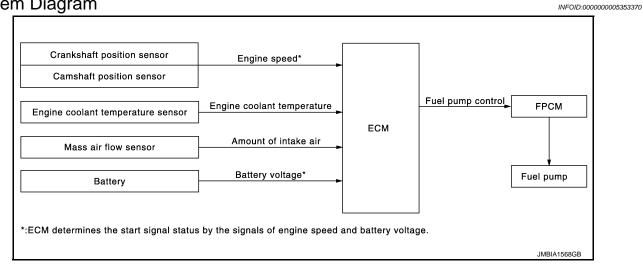
# Component Description

INFOID:0000000005353369

Component	Reference
Camshaft position sensor	EC-346, "Description"
Crankshaft position sensor	EC-340, "Description"
Engine oil temperature sensor	EC-316, "Description"
Exhaust valve timing control magnet retarder	EC-190, "Description"
Exhaust valve timing control position sensor	EC-453, "Description"

## **FUEL PUMP CONTROL MODULE**

# System Diagram



## System Description

#### INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor Camshaft position sensor	Engine speed*		FPCM ↓ Fuel pump	
Engine coolant temperature sensor	Engine coolant temperature	Fuel pump control		
Mass air flow sensor	Amount of intake air			
Battery	Battery voltage*			

<sup>\*:</sup> ECM determines the start signal status by the signals of engine speed and battery voltage.

#### SYSTEM DESCRIPTION

This system controls the fuel pump operation. The amount of fuel flow delivered from the fuel pump is altered between two flow rates by the FPCM operation. The FPCM determines the voltage supplied to the fuel pump (and therefore fuel flow) according to the following conditions.

Conditions	Amount of fuel flow	Supplied voltage
<ul> <li>Engine cranking</li> <li>Engine coolant temperature is below 10°C (50°F)</li> <li>Engine is running under high load and high speed conditions</li> </ul>	High	Battery voltage (11 - 14 V)
Except the above	Low	Approx. 8 V

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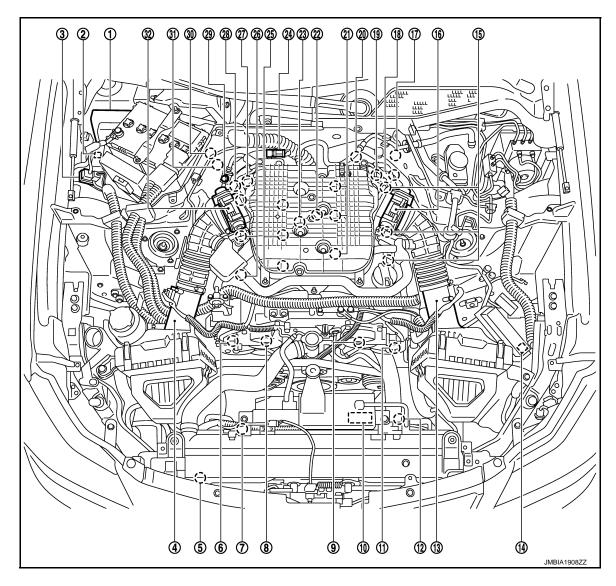
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#### Component Parts Location

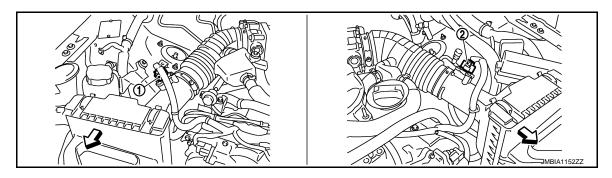
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- IPDM E/R
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- Mass air flow sensor (with intake air 14. Cooling fan relay temperature sensor) (bank 2)
- 16. Electric throttle control actuator (bank 2)
- 19. Camshaft position sensor (bank 2)
- 22. Knock sensor (bank 2)
- 25. Fuel injector (bank 1)
- 28. Exhaust valve timing control position 29. EVAP service port sensor (bank 1)
- 31. Crankshaft position sensor

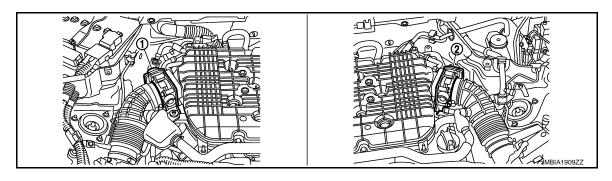
- ICC brake hold relay (ICC models)
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- 11. Exhaust valve timing control magnet 12. retarder (bank 2)
- 17. A/F sensor 1 (bank 2)
- Engine coolant temperature sensor 20.
- 23. Knock sensor (bank 1)
- 26. Ignition coil (with power transistor) and spark plug (bank 1)
- 32. Electric throttle control actuator (bank 1)

- 3. Battery current sensor
- 6. Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- Cooling fan motor-1
- 15. Ignition coil (with power transistor) and spark plug (bank 2)
- 18. Exhaust valve timing control position sensor (bank 2)
- 21. Fuel injector (bank 2)
- 24. EVAP canister purge volume control solenoid valve
- 27. Camshaft position sensor (bank 1)
- 30. A/F sensor 1 (bank 1)

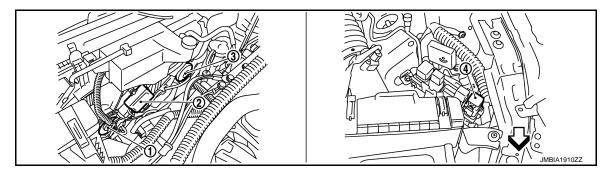


- Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)





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



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

: Vehicle front

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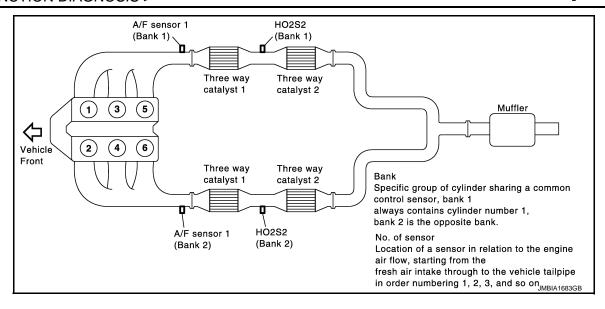
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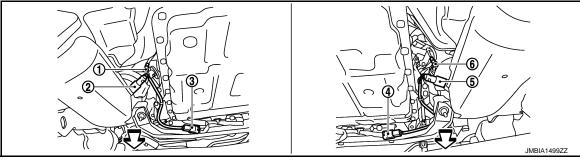
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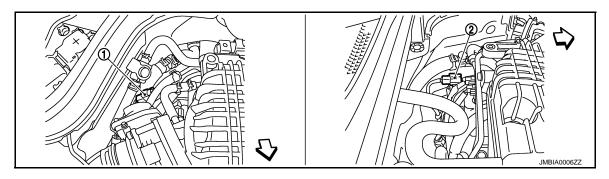
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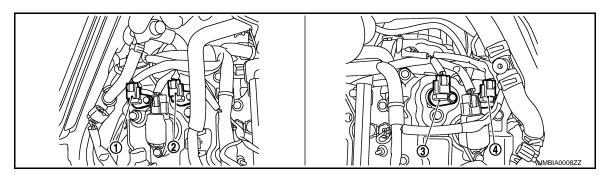
- 1. A/F sensor 1 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2)
- 3. Heated oxygen sensor 2 (bank 2) harness connector

- 4. Heated oxygen sensor 2 (bank 1) harness connector
- 5. Heated oxygen sensor 2 (bank 1)
- 6. A/F sensor 1 (bank 1)



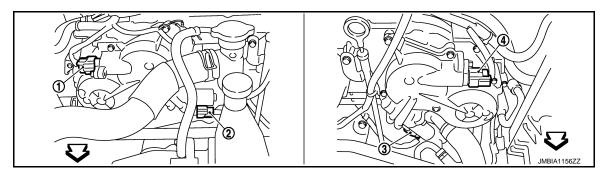
- 1. A/F sensor 1 (bank 1) harness con- 2. nector
  - A/F sensor 1 (bank 2) harness connector

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⇒ : Vehicle front



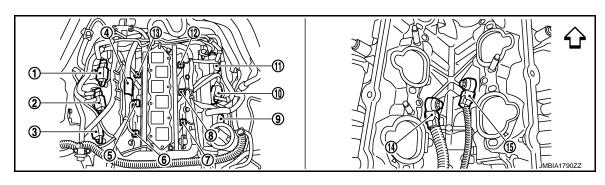
- Exhaust valve timing control position 2. sensor (bank 1)
  - 2. Camshaft position sensor (bank 1)
- 3. Camshaft position sensor (bank 2)

4. Exhaust valve timing control position sensor (bank 2)



- 1. Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- 4. Exhaust valve timing control magnet retarder (bank 2) harness connector
- <□ : Vehicle front</li>

- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- 7. Fuel injector No. 2
- 10. Ignition coil No. 4 (with power transistor)
- 13. Fuel injector No. 5
- : Vehicle front

- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- 14. Knock sensor (bank 2)

- Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6
- 15. Knock sensor (bank 1)

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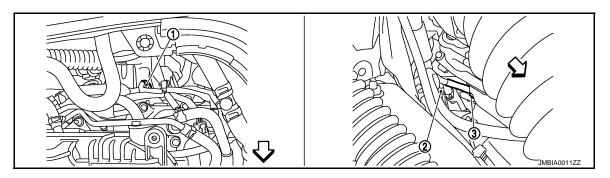
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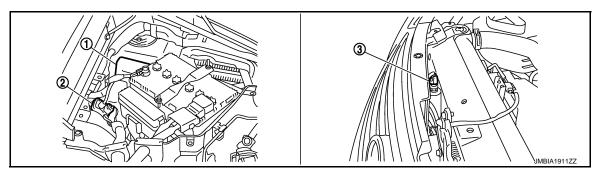
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Revision: 2009 June **EC-109** 2010 M35/M45



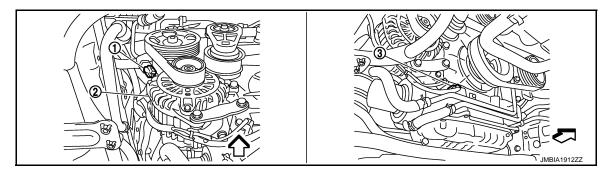
- Engine coolant temperature sensor 2. A/F sensor 1 (bank 1)
- 3. Crankshaft position sensor





IPDM E/R

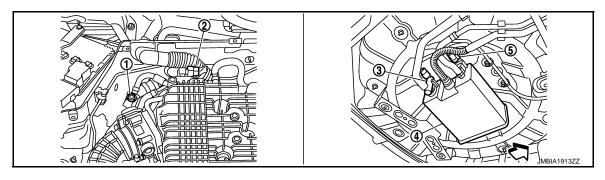
- Battery current sensor
- Refrigerant pressure sensor



- Power steering pressure sensor
- 2. Alternator

Engine oil temperature sensor





- 1. EVAP service port
- EVAP canister purge volume control 3. EVAP canister vent control valve solenoid valve

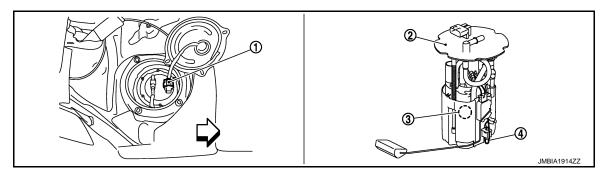
### **FUEL PUMP CONTROL MODULE**

< FUNCTION DIAGNOSIS > [VQ35HR]

4. EVAP canister

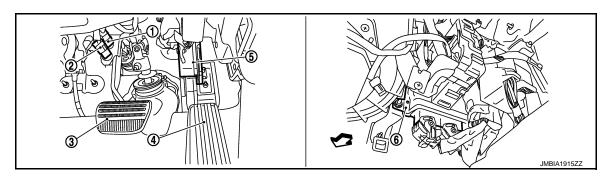
EVAP control system pressure sensor

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→ : Vehicle front



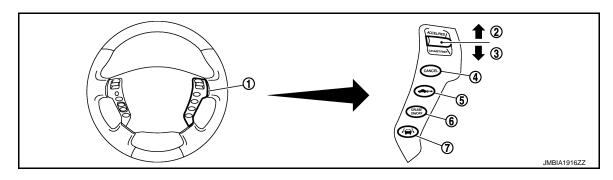
- Fuel level sensor unit and fuel pump 2. (main) harness connector
- Fuel level sensor unit and fuel pump 3. Fuel pressure regulator (main)
- 4. Fuel tank temperature sensor

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⇒ : Vehicle front



- 1. Stop lamp switch
- ASCD brake switch (ASCD models)
   ICC brake switch (ICC models)
- 4. Accelerator pedal
- 5. Accelerator pedal position sensor
- 6. ECM

Brake pedal



- 1. ICC steering switch
- 4. CANCEL switch
- 7. LDP switch

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

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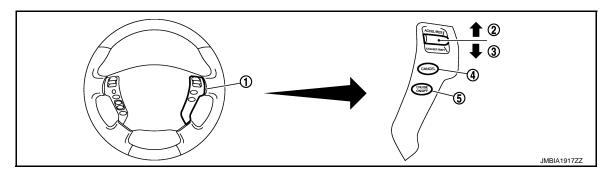
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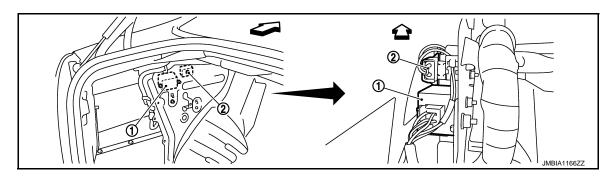
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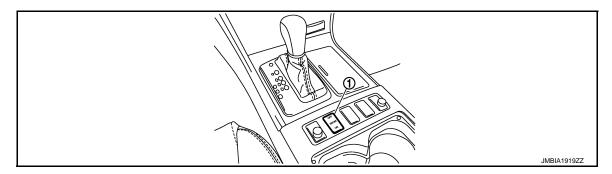
- ASCD steering switch
- 2. RESUME/ACCELERATE switch
- 3. SET/COAST switch

- 4. CANCEL switch
- 5. MAIN switch



1. FPCM

2. Dropping resistor



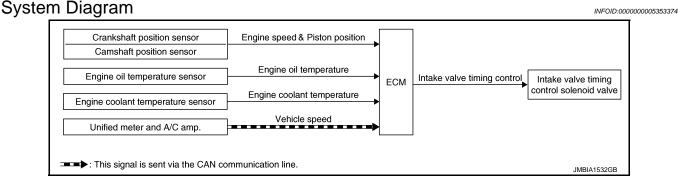
1. Snow mode switch

## Component Description

INFOID:0000000005353373

Component	Reference
Camshaft position sensor	EC-346, "Description"
Crankshaft position sensor	EC-340, "Description"
Engine coolant temperature sensor	EC-220, "Description"
Fuel pump control module (FPCM)	EC-608, "Description"
Mass air flow sensor	EC-195, "Description"

## INTAKE VALVE TIMING CONTROL



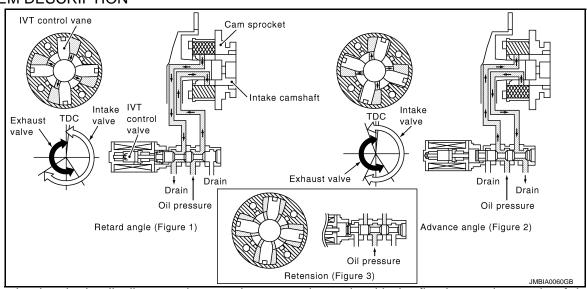
## System Description

#### INPUT/OUTPUT SIGNAL CHART

Sensor	Sensor Input signal to ECM		Actuator	
Crankshaft position sensor	Engine speed & piston position			
Camshaft position sensor	Engine speed & pistori position		Intake valve timing control solenoid valve	
Engine oil temperature sensor	Engine oil temperature	Intake valve timing control		
Engine coolant temperature sensor	Engine coolant temperature			
Unified meter and A/C amp.	Vehicle speed*			

<sup>\*:</sup> This signal is sent to the ECM via the CAN communication line.

### SYSTEM DESCRIPTION



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

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

**EC-113** Revision: 2009 June 2010 M35/M45

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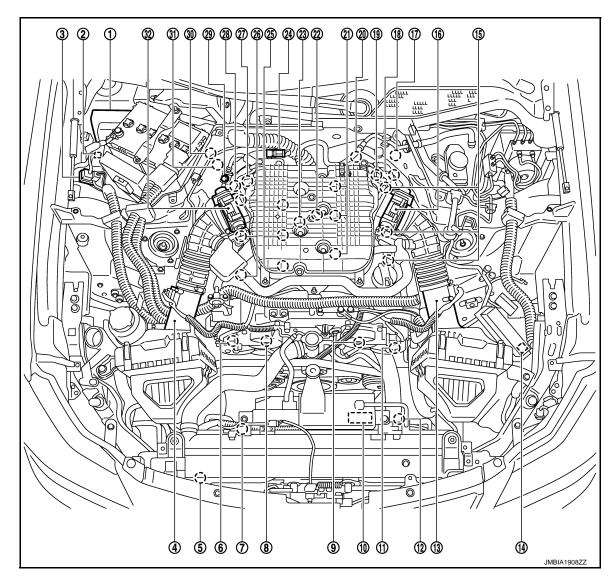
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### Component Parts Location

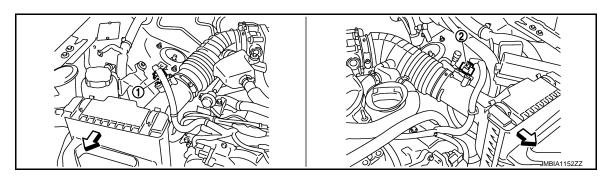
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- IPDM E/R
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- Mass air flow sensor (with intake air 14. Cooling fan relay temperature sensor) (bank 2)
- 16. Electric throttle control actuator (bank 2)
- 19. Camshaft position sensor (bank 2)
- 22. Knock sensor (bank 2)
- 25. Fuel injector (bank 1)
- 28. Exhaust valve timing control position 29. EVAP service port sensor (bank 1)
- 31. Crankshaft position sensor

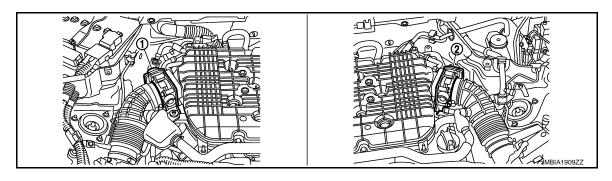
- ICC brake hold relay (ICC models)
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- 11. Exhaust valve timing control magnet 12. retarder (bank 2)
- 17. A/F sensor 1 (bank 2)
- Engine coolant temperature sensor 20.
- 23. Knock sensor (bank 1)
- 26. Ignition coil (with power transistor) and spark plug (bank 1)
- 32. Electric throttle control actuator (bank 1)

- 3. Battery current sensor
- 6. Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- Cooling fan motor-1
- 15. Ignition coil (with power transistor) and spark plug (bank 2)
- 18. Exhaust valve timing control position sensor (bank 2)
- 21. Fuel injector (bank 2)
- 24. EVAP canister purge volume control solenoid valve
- 27. Camshaft position sensor (bank 1)
- 30. A/F sensor 1 (bank 1)

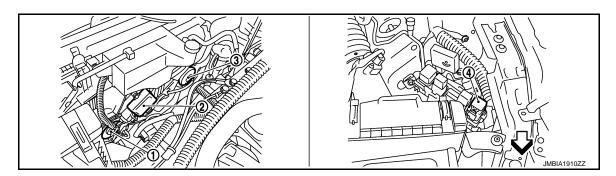


- Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)





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



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

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⇒ : Vehicle front

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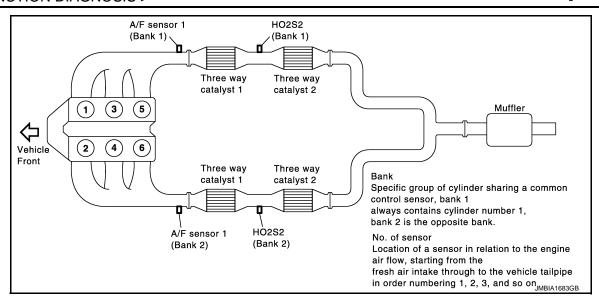
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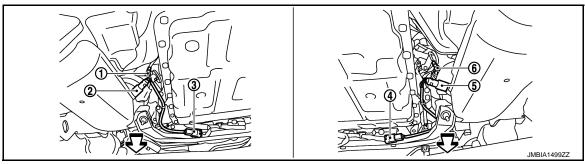
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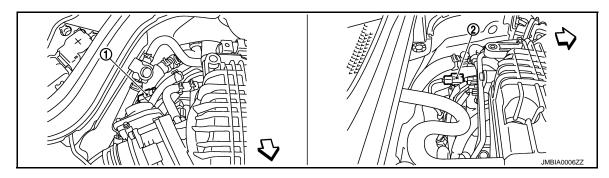
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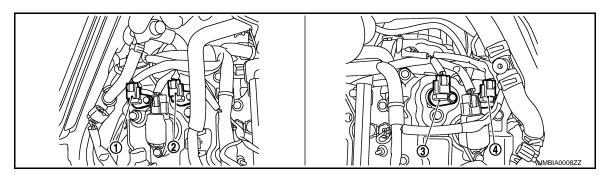
- 1. A/F sensor 1 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2)
- 3. Heated oxygen sensor 2 (bank 2) harness connector

- 4. Heated oxygen sensor 2 (bank 1) harness connector
- 5. Heated oxygen sensor 2 (bank 1)
- 6. A/F sensor 1 (bank 1)



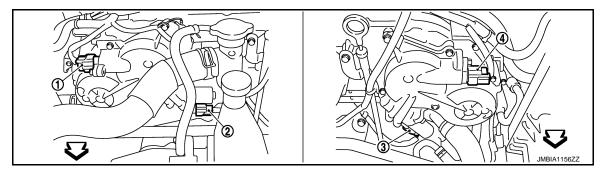
- 1. A/F sensor 1 (bank 1) harness con- 2. nector
- A/F sensor 1 (bank 2) harness connector

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⇒ : Vehicle front



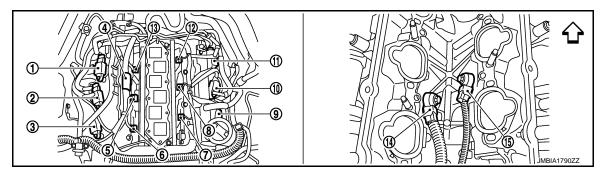
- Exhaust valve timing control position 2. sensor (bank 1)
  - 2. Camshaft position sensor (bank 1)
- 3. Camshaft position sensor (bank 2)

4. Exhaust valve timing control position sensor (bank 2)



- 1. Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- 4. Exhaust valve timing control magnet retarder (bank 2) harness connector

- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- 7. Fuel injector No. 2
- 10. Ignition coil No. 4 (with power transistor)
- 13. Fuel injector No. 5
- : Vehicle front

- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- 14. Knock sensor (bank 2)

- Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6
- 15. Knock sensor (bank 1)

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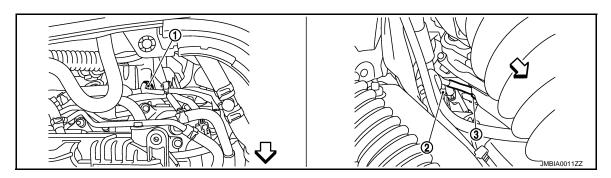
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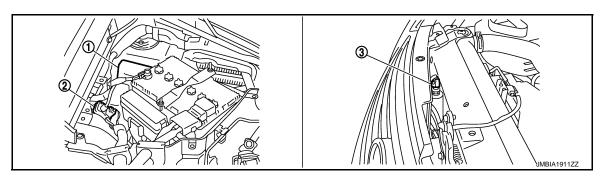
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Revision: 2009 June **EC-117** 2010 M35/M45



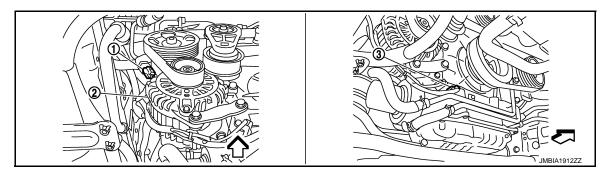
- Engine coolant temperature sensor 2. A/F sensor 1 (bank 1)
- 3. Crankshaft position sensor





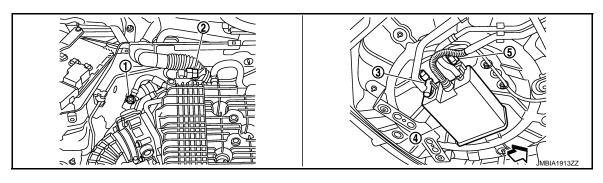
IPDM E/R

- Battery current sensor
- Refrigerant pressure sensor



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

Engine oil temperature sensor



- 1. EVAP service port
- EVAP canister purge volume control 3. EVAP canister vent control valve solenoid valve

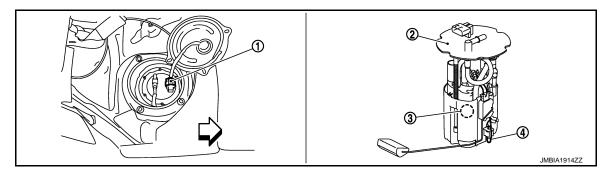
### INTAKE VALVE TIMING CONTROL

### < FUNCTION DIAGNOSIS > [VQ35HR]

4. EVAP canister

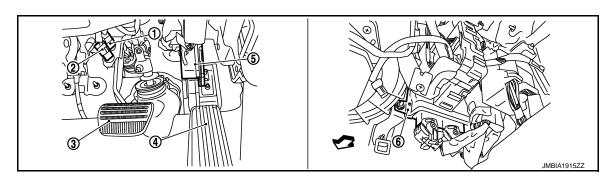
EVAP control system pressure sensor

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→ : Vehicle front



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

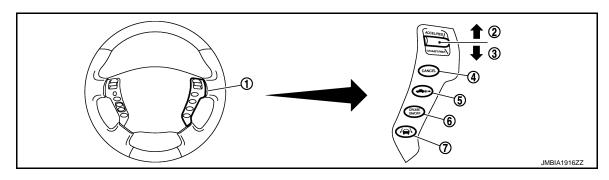
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- 1. Stop lamp switch
- 2. ASCD brake switch (ASCD models) 3. ICC brake switch (ICC models)
- 4. Accelerator pedal
- 5. Accelerator pedal position sensor
- 6. ECM

Brake pedal

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- 1. ICC steering switch
- 4. CANCEL switch
- 7. LDP switch

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

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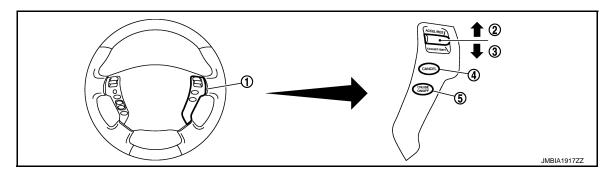
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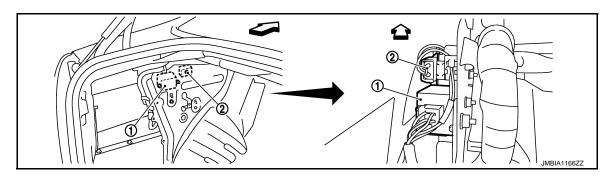
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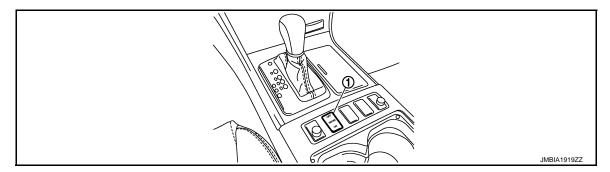
- ASCD steering switch
- 041051 %1
- 2. RESUME/ACCELERATE switch
- 3. SET/COAST switch

- 4. CANCEL switch
- 5. MAIN switch



1. FPCM

2. Dropping resistor



1. Snow mode switch

## Component Description

INFOID:0000000005353377

Component	Reference
Camshaft position sensor	EC-346, "Description"
Crankshaft position sensor	EC-340, "Description"
Engine coolant temperature sensor	EC-220, "Description"
Intake valve timing control solenoid valve	EC-185, "Description"

< FUNCTION DIAGNOSIS >

[VQ35HR]

## ON BOARD DIAGNOSTIC (OBD) SYSTEM

### **Diagnosis Description**

INFOID:0000000005353378

#### INTRODUCTION

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

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

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

 $\times$ : Applicable —: Not applicable

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

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

The malfunction indicator lamp (MIL) on the instrument panel illuminates when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-663, "Fail-safe".)

#### TWO TRIP DETECTION LOGIC

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

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

×: Applicable —: Not applicable

	MIL				DTC		1st trip DTC	
Items	1st trip		2nd trip		1st trip	2nd trip	1st trip	2nd trip
	Blinking	Illuminate	Blinking	Illuminate	displaying	displaying	displaying	display- ing
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	×	_	_	_	_	_	×	_
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	_	_	×	_	_	×	_	_
One trip detection diagnoses (Refer to EC-667, "DTC Index".)	_	×	_	_	×	_	_	_
Except above	_	_	_	×	_	×	×	_

DTC AND FREEZE FRAME DATA

DTC and 1st Trip DTC

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#### < FUNCTION DIAGNOSIS >

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

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

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "How to Erase DTC and 1st Trip DTC".

For malfunctions in which 1st trip DTCs are displayed, refer to <u>EC-667</u>, "<u>DTC Index</u>". These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-III.

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

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to <u>EC-18</u>, "Work Flow". Then perform DTC Confirmation Procedure or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

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

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

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen, not on the GST.

Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

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

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

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "How to Erase DTC and 1st Trip DTC".

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

#### (P)With CONSULT-III

CONSULT-III displays the DTC in "SELF DIAGNOSTIC RESULT" mode. Examples: P0340, P0850, P1148, etc.

ON BOARD DIAGNOSTIC (OBD) SYSTEM [VQ35HR] < FUNCTION DIAGNOSIS > These DTCs are prescribed by SAE J2012. (CONSULT-III also displays the malfunctioning component or system.) Α 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]. GST (Generic Scan Tool) displays the DTC in Diagnostic Service \$03. Examples: P0340, P0850, P1148, etc. These DTCs are prescribed by SAE J2012. 1st trip DTC is displayed in Diagnostic Service \$07. The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0340, 0850, 1148, etc. D These DTCs are controlled by NISSAN. 1st trip DTC No. is the same as DTC No. Output of a DTC indicates a malfunction. However, GST and the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-III can identify malfunction status as shown below. Therefore, using CONSULT-III (if

available) is recommended. 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

#### (P) With CONSULT-III

#### NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
- If the DTC is not for A/T related items (see <u>EC-667, "DTC Index"</u>), skip step 1.
- Erase DTC in TCM. Refer to AT-47, "OBD-II Diagnostic Trouble Code (DTC)".
- Select "ENGINE" with CONSULT-III. 2.
- Select "SELF-DIAG RESULTS".
- Touch "ERASE". (DTC in ECM will be erased.)

#### With GST

#### NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
- 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.
- Erase DTC in ECM. Refer to HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
- If the battery is disconnected, the emission-related diagnostic information will be cleared within 24
- 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.

**EC-123** Revision: 2009 June 2010 M35/M45

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#### < FUNCTION DIAGNOSIS >

[VQ35HR]

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

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

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

#### NOTE:

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

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

#### NOTE:

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

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

#### SRT Set Timing

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

	Self-diagnosis result		Example					
Self-diagr			$\leftarrow$ ON $\rightarrow$	$\begin{array}{ccc} & & & \text{Ignition} \\ \text{OFF} & \leftarrow & \text{ON} \rightarrow & \text{C} \end{array}$	on cycle $OFF \leftarrow ON \rightarrow OF$	FF ← ON →		
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)		
		P0402	OK (1)	— (1)	— (1)	OK (2)		
		P1402	OK (1)	OK (2)	— (2)	— (2)		
		SRT of EGR	"CMPLT"	"CMPLT"	"CMPLT"	"CMPLT"		
	Case 2	P0400	OK (1)	— (1)	—(1)	— (1)		
		P0402	— (0)	— (0)	OK (1)	— (1)		
		P1402	OK (1)	OK (2)	— (2)	— (2)		
		SRT of EGR	"INCMP"	"INCMP"	"CMPLT"	"CMPLT"		

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Self-diagnosis result				Example		
		Diagnosis	← ON → (	$\begin{array}{ccc} & & & \text{Ignitio} \\ \text{OFF} & \leftarrow & \text{ON} \rightarrow & \text{O} \end{array}$	n cycle $FF \ \leftarrow ON  o OF$	$FF \leftarrow ON \rightarrow$
NG exists	Case 3	P0400	OK	ОК	_	_
		P0402	_	_	_	_
		P1402	NG	_	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	_	1st trip DTC	DTC (= MIL ON)
		SRT of EGR	"INCMP"	"INCMP"	"INCMP"	"CMPLT"

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

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

—: Self-diagnosis is not carried out.

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

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

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

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

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

#### NOTE:

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

#### 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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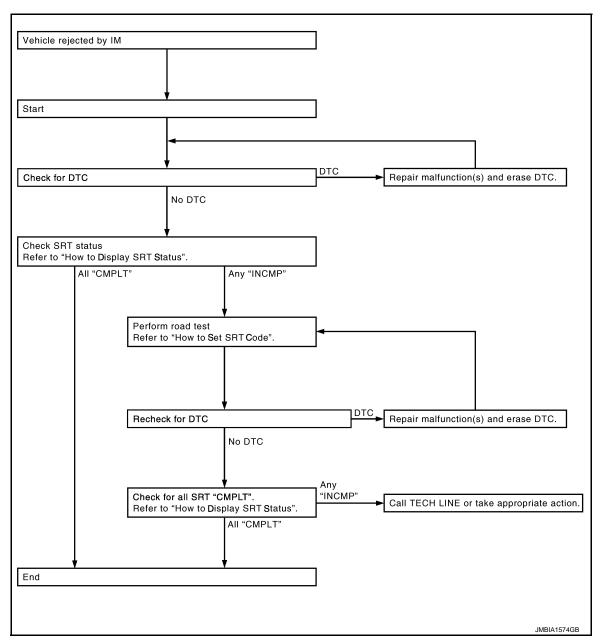
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How to Display SRT Status

### **WITH CONSULT-III**

Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-III.

For items whose SRT codes are set, "CMPLT" is displayed on the CONSULT-III screen; for items whose SRT codes are not set, "INCMP" is displayed.

#### NOTE:

Though displayed on the CONSULT-III screen, "HO2S HTR" is not SRT item.

### **WITH GST**

Selecting Service \$01 with GST (Generic Scan Tool)

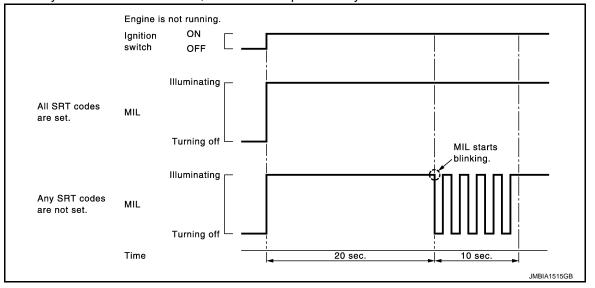
#### NO TOOLS

A SRT code itself cannot be displayed, however SRT status can.

- 1. Turn ignition switch ON and wait 20 seconds.
- 2. SRT status is indicated as shown below.
  - When all SRT codes are set, MIL illuminates continuously.

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



### MALFUNCTION INDICATOR LAMP (MIL)

#### Description

The MIL is located on the combination meter.

- The MIL will illuminate when the ignition switch is turned ON without the engine running. This is a bulb check. If the MIL does not illuminate, check MIL circuit. Refer to EC-626, "Component Function Check".
- When the engine is started, the MIL should turn 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.

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Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.).  If the MIL does not come on, check MIL circuit.
	Engine running	MALFUNCTION WARNING	When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will illuminated to inform the driver that a malfunction has been detected.  The following malfunctions will illuminated or blink the MIL in the 1st trip.  • Misfire (Possible three way catalyst damage)  • One trip detection diagnoses
Mode II	Ignition switch in ON position  Engine stopped	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 MIL circuit. Refer to EC-626, "Component Function Check".

Diagnostic Test Mode I — Malfunction Warning

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

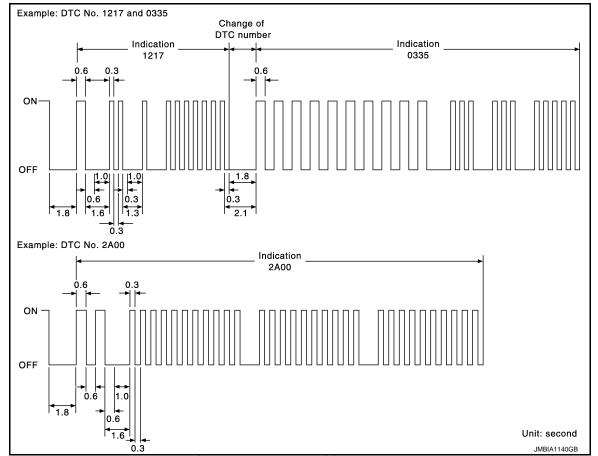
This DTC number is clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

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 uniden-

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



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

Number	0	1	2	3	4	5	6	7	8	9	Α	В	С	D	Е	F
Blinks	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 blinks 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-seconds ON and 0.3-seconds OFF cycle.

A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.

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

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See EC-667, "DTC Index")

How to Switch Diagnostic Test Mode

#### NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- ECM always returns to Diagnostic Test Mode I after the ignition switch is turned OFF.

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

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

#### NOTE:

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

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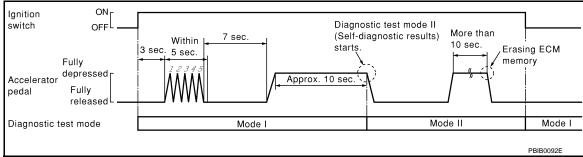
< FUNCTION DIAGNOSIS > [VQ35HR]

4. Fully release the accelerator pedal.

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

#### NOTE

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



#### 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)".
- Fully depress the accelerator pedal and keep it depressed 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.
- If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.
- Do not erase the stored memory before starting trouble diagnoses.

#### **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 turn off after the vehicle is driven 3 times (driving pattern B) with no malfunction. A drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The "TIME" in "SELF-DIAGNOSTIC RESULTS" mode of CONSULT-III will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

#### **Summary Chart**

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

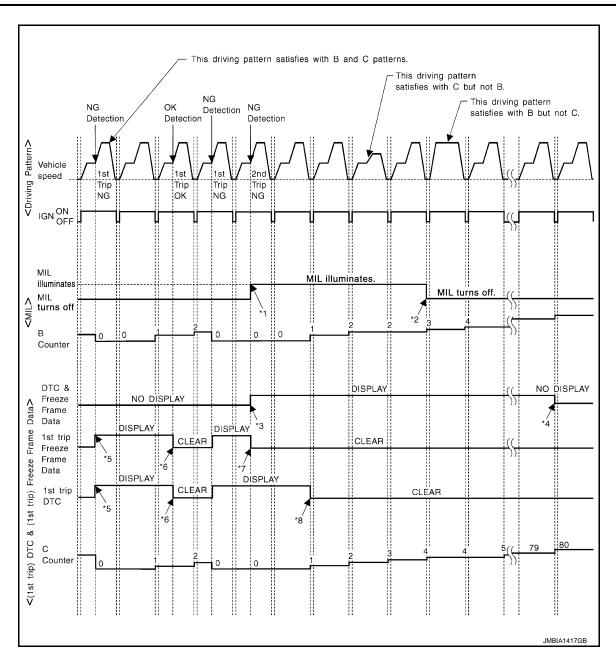
For details about patterns B and C under "Fuel Injection System" and "Misfire", see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM".

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

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

<sup>\*1:</sup> Clear timing is at the moment OK is detected.

<sup>\*2:</sup> Clear timing is when the same malfunction is detected in the 2nd trip.



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

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

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

Driving pattern B means the vehicle operation as per the following:

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

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- 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 turn off when the B counter reaches 3. (\*2 in "OBD SYSTEM OPERATION CHART")

<Driving Pattern C>

Driving pattern C means operating vehicle as per the following:

The following conditions should be satisfied at the same time:

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

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 per the following:

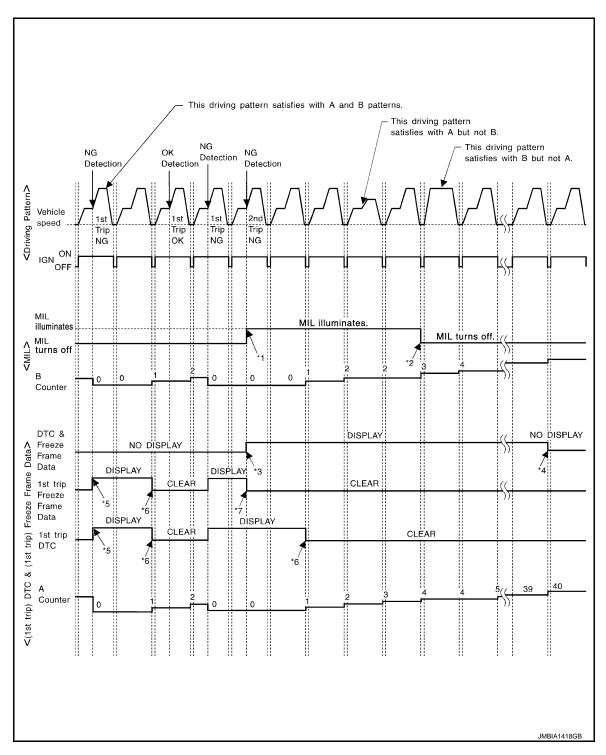
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)

To be satisfied with driving pattern C, the vehicle should run under the following conditions:

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

- 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 are 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"



- \*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.
- \*2: MIL will turn off after vehicle is driven 3 times (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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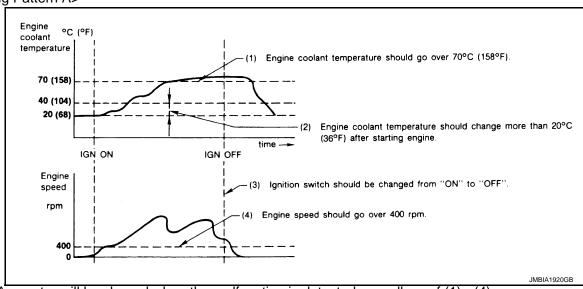
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- \*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- \*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.
- \*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- \*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

Explanation for Driving Patterns Except for "Misfire <Exhaust Quality Deterioration>", "Fuel Injection System" <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 operating vehicle as per following:

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

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

#### CONSULT-III Function

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#### **FUNCTION**

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-III unit.
Self-Diagnostic 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/results can be confirmed.
Function Test	This mode is used to inform customers when the vehicle requires periodic maintenance.
ECU Identification	ECM part number can be read.

- \*: The following emission-related diagnostic information is cleared when the ECM memory is erased.
- · Diagnostic trouble codes
- · 1st trip diagnostic trouble codes
- · Freeze frame data

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

#### ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

**DIAGNOSTIC TEST MODE SELF-DIAGNOSTIC DTC & SRT RESULTS CONFIRMATION DATA** Item WORK **ACTIVE** DTC MONI-**FREEZE** SUPPORT **TEST SRT STA-WORK** TOR DTC\*1 **FRAME** TUS SUP-D DATA\*2 **PORT** Crankshaft position sensor X × × Е Camshaft position sensor × ×  $\times$ Mass air flow sensor × × Engine coolant temperature sensor × X X X Engine oil temperature sensor × × Air fuel ratio (A/F) sensor 1 X × × Heated oxygen sensor 2 X × Vehicle speed signal Accelerator pedal position sensor X Throttle position sensor × X X **ENGINE CONTROL COMPONENT PARTS** Fuel tank temperature sensor X X EVAP control system pressure sensor × × Intake air temperature sensor × × × Knock sensor × INPUT Refrigerant pressure sensor  $\times$ Air conditioner switch × Park/neutral position (PNP) signal ×  $\times$ Stop lamp switch ×  $\times$ Power steering pressure sensor × × Battery voltage × Load signal × Exhaust valve timing control position M X sensor Fuel level sensor Battery current sensor × × Ν ICC steering switch × × ASCD steering switch × X ICC brake switch × × ASCD brake switch × × Snow mode switch

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					DIAGNOS	STIC TEST	MODE		
	ltem			SELF-DIAGNOSTIC RESULTS		DATA		DTC & SRT CONFIRMATION	
		Item	WORK SUPPORT	DTC*1	FREEZE FRAME DATA*2	MONI- TOR	ACTIVE TEST	SRT STA- TUS	DTC WORK SUP- PORT
		Fuel injector				×	×		
	Power transistor (Ignition timing)  Throttle control motor relay					×	×		
		Throttle control motor relay		×		×			
		Throttle control motor		×					
ENGINE CONTROL COMPONENT PARTS	-	EVAP canister purge volume control solenoid valve		×		×	×		×
7		FPCM		×		×	×		
Ä		Air conditioner relay				×			
PO	_	Fuel pump relay	×			×	×		
Š	P	Power transistor (Ignition timing) Throttle control motor relay Throttle control motor  EVAP canister purge volume control solenoid valve  FPCM Air conditioner relay Fuel pump relay Fuel pump control module (FPCM) Cooling fan relay Air fuel ratio (A/F) sensor 1 heater Heated oxygen sensor 2 heater EVAP canister vent control valve Intake valve timing control solenoid valve Alternator Exhaust valve timing control magnet				×			
2	DO T			×		×	×		
Ę				×		×		×* <sup>3</sup>	
Ö		Heated oxygen sensor 2 heater		×		×		×* <sup>3</sup>	
Ä		EVAP canister vent control valve	×	×		×	×		
ENC				×		×	×		
		Alternator				×	×		
		Exhaust valve timing control magnet retarder	×	×		×	×		
		Calculated load value			×	×			

x: Applicable

#### **WORK SUPPORT MODE**

#### Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	Fuel pump will stop by touching "START" during idling. Crank a few times after engine stalls.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	The idle air volume that keeps the engine within the specified range is memorized in ECM.	When learning the idle air volume
SELF-LEARNING CONT	The coefficient of self-learning control mixture ration returns to the original coefficient.	When clearing mixture ratio self- learning value

<sup>\*1:</sup> This item includes 1st trip DTCs.

<sup>\*2:</sup> 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 <a href="EC-121">EC-121</a>, "Diagnosis Description".

<sup>\*3:</sup> Always "CMPLT" is displayed.

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WORK ITEM	CONDITION	USAGE
EVAP SYSTEM CLOSE	Close the EVAP canister vent control valve in order to make EVAP system close under the following conditions.  • Ignition switch ON  • Engine not running  • Ambient temperature is above 0°C (32°F).  • No vacuum and no high pressure in EVAP system  • Fuel tank temperature. Is more than 0°C (32°F).  • Within 10 minutes after starting "EVAP SYSTEM CLOSE"  • When trying to execute "EVAP SYSTEM CLOSE" under the condition except above, CONSULT-III will discontinue it and display appropriate instruction.  NOTE:  When starting engine, CONSULT-III may display "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", even when using a charged battery.	When detecting EVAP vapor leak in the EVAP system
VIN REGISTRATION	In this mode, VIN is registered in ECM.	When registering VIN in ECM
EXH V/T CONTROL LEARN	In this mode, operation to learn exhaust valve timing control magnet retarder characteristic.	When learning the exhaust valve timing control
TARGET IDLE RPM ADJ*	Idle condition	When setting target idle speed
TARGET IGN TIM ADJ*	Idle condition	When adjusting target ignition timing

<sup>\*:</sup> 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 EC-667, "DTC Index".

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DTC	The engine control component part/control system has a trouble code that is displayed as DTC. (Refer to EC-667, "DTC_Index".)
FUEL SYS-B1	"Fuel injection system status" at the moment a malfunction is detected is displayed.
FUEL SYS-B2	One of the following mode is displayed.     Mode2: Open loop due to detected system malfunction     Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment)     Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control     Mode5: Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	"Long-term fuel trim" at the moment a malfunction is detected is displayed.
L-FUEL TRM-B2 [%]	The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRM-B1 [%]	"Short-term fuel trim" at the moment a malfunction is detected is displayed.
S-FUEL TRM-B2 [%]	<ul> <li>The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel sched- ule.</li> </ul>
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH.P/S [%]	The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.

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Freeze frame data item*	Description
INT MANI PRES [kPa]	
COMBUST CONDI- TION	These items are displayed but are not applicable to this model.

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

### DATA MONITOR MODE

#### Monitored Item

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	Indicates the engine speed computed from the signal of the crankshaft position sensor and camshaft position sensor.	<ul> <li>Accuracy becomes poor if engine speed drops below the idle rpm.</li> <li>If the signal is interrupted while the engine is running, an abnormal value may be indicated.</li> </ul>
MAS A/F SE-B1			When the engine is stopped, a certain
MAS A/F SE-B2	V	The signal voltage of the mass air flow sensor is displayed.	<ul><li>value is indicated.</li><li>When engine is running, specification range is indicated in "SPEC".</li></ul>
B/FUEL SCHDL	msec	"Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	When engine is running, specification range is indicated in "SPEC".
A/F ALPHA-B1			When the engine is stopped, a certain
A/F ALPHA-B2	%	The mean value of the air-fuel ratio feedback cor- rection factor per cycle is indicated.	<ul> <li>value is indicated.</li> <li>This data also includes the data for the air-fuel ratio learning control.</li> <li>When engine is running, specification range is indicated in "SPEC".</li> </ul>
COOLAN TEMP/S	°C or °F	The engine coolant temperature (determined by the signal voltage of the engine coolant tempera- ture sensor) is displayed.	When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The en- gine coolant temperature determined by the ECM is displayed.
A/F SEN1 (B1)	V	The A/F signal computed from the input signal of	
A/F SEN1 (B2)	V	the air fuel ratio (A/F) sensor 1 is displayed.	
HO2S2 (B1)	V	The signal voltage of the heated oxygen sensor 2	
HO2S2 (B2)		is displayed.	
HO2S2 MNTR (B1)		Display of heated oxygen sensor 2 signal:	
HO2S2 MNTR (B2)	RICH/LEAN	RICH: means the amount of oxygen after three way catalyst is relatively small.  LEAN: means the amount of oxygen after three way catalyst is relatively large.	When the engine is stopped, a certain value is indicated.
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from unifed meter and A/C amp. is displayed.	
BATTERY VOLT	V	The power supply voltage of ECM is displayed.	
ACCEL SEN 1	.,	The accelerator pedal position sensor signal volt-	ACCEL SEN 2 signal is converted by
ACCEL SEN 2	V	age is displayed.	ECM internally. Thus, they differs from ECM terminal voltage signal.
TP SEN 1-B1		The throttle position sensor signal voltage is dis-	TP SEN 2-B1 signal is converted by
TP SEN 2-B1	V	played.	ECM internally. Thus, they differs from ECM terminal voltage signal.
FUEL T/TMP SE	°C or °F	The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.	

< FUNCTION DIAGNOSIS > [VQ35HR]

Monitored item	Unit	Description	Remarks
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 pressure sensor is displayed.	
FUEL LEVEL SE	V	The signal voltage of the fuel level sensor is displayed.	
START SIGNAL	ON/OFF	Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	<ul> <li>After starting the engine, [OFF] is dis- played regardless of the starter sig- nal.</li> </ul>
CLSD THL POS	ON/OFF	Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG	ON/OFF	Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW	ON/OFF	Indicates [ON/OFF] condition from the park/neutral position (PNP) signal.	
PW/ST SIGNAL	ON/OFF	[ON/OFF] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor signal) is indicated.	
LOAD SIGNAL	ON/OFF	Indicates [ON/OFF] condition from the electrical load signal.     ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position.     OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW	ON/OFF	Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW	ON/OFF	Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW	ON/OFF	Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1		Indicates the actual fuel injection pulse width	When the engine is stopped, a certain
INJ PULSE-B2	msec	compensated by ECM according to the input signals.	computed value is indicated.
IGN TIMING	BTDC	Indicates the ignition timing computed by ECM according to the input signals.	When the engine is stopped, a certain value is indicated.
CAL/LD VALUE	%	"Calculated load value" indicates the value of the current air flow divided by peak air flow.	
MASS AIRFLOW	g·m/s	Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow 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)	004	Indicates [°CA] of intake camshaft advance an-	
INT/V TIM (B2)	°CA	gle.	
EXH/V TIM B1	004	Indicates [OOA] of substituting [Section 1]	
EXH/V TIM B2	°CA	Indicates [°CA] of exhaust camshaft retard angle.	

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< FUNCTION DIAGNOSIS >

[VQ35HR]

Monitored item	Unit	Description	Remarks
INT/V SOL (B1) INT/V SOL (B2)	%	<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>	
VTC DTY EX B1  VTC DTY EX B2	%	<ul> <li>The control value of the exhaust valve timing control magnet retarder (determined by ECM according to the input signals) is indicated.</li> <li>The retard angle becomes larger as the value increases.</li> </ul>	
TP SEN 1-B2	.,	The throttle position sensor signal voltage is dis-	TP SEN 2-B2 signal is converted by
TP SEN 2-B2	V	played.	ECM internally. Thus, they differs from ECM terminal voltage signal.
AIR COND RLY	ON/OFF	The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY	ON/OFF	<ul> <li>Indicates the fuel pump relay control condition determined by ECM according to the input sig- nals.</li> </ul>	
FPCM	HI/LOW	The control condition of the fuel pump control module (FPCM) (determined by the ECM according to the input signals) is indicated.	
VENT CONT/V	ON/OFF	The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated.     ON: Closed OFF: Open	
THRTL RELAY	ON/OFF	Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
HO2S2 HTR (B1) HO2S2 HTR (B2)	ON/OFF	Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
I/P PULLY SPD	rpm	Indicates the engine speed computed from the Input speed sensor signal.	
VEHICLE SPEED	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
IDL A/V LEARN	YET/CMPLT	Displays the condition of Idle Air Volume Learning     YET: Idle air volume learning has not been performed yet.     CMPLT: Idle air volume learning has already been performed successfully.	
SNOW MODE SW	ON/OFF	Indicates [ON/OFF] condition from the snow mode switch signal.	
ENG OIL TEMP	°C or °F	The engine oil temperature (determined by the signal voltage of the engine oil temperature sen- sor) is displayed.	
TRVL AFTER MIL	km or mile	Distance traveled while MIL is activated.	
A/F S1 HTR (B1)		Air fuel ratio (A/F) sensor 1 heater control value	
A/F S1 HTR (B2)	%	<ul> <li>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.	

< FUNCTION DIAGNOSIS >

[VQ35HR]

Monitored item	Unit	Description	Remarks	
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from unifed meter and A/C amp. is displayed.		
SET VHCL SPD	km/h or mph	The preset vehicle speed is displayed.		E
MAIN SW	ON/OFF	Indicates [ON/OFF] condition from MAIN switch signal.		
CANCEL SW	ON/OFF	<ul> <li>Indicates [ON/OFF] condition from CANCEL switch signal.</li> </ul>		(
RESUME/ACC SW	ON/OFF	Indicates [ON/OFF] condition from RESUME/AC- CELERATE switch signal.		[
SET SW	ON/OFF	<ul> <li>Indicates [ON/OFF] condition from SET/COAST switch signal.</li> </ul>		
BRAKE SW1	ON/OFF	Indicates [ON/OFF] condition from ASCD brake switch signal.		
BRAKE SW2	ON/OFF	Indicates [ON/OFF] condition of stop lamp switch signal.		
DIST SW	ON/OFF	Indicates [ON/OFF] condition from DISTANCE switch signal.		
VHCL SPD CUT	NON/CUT	Indicates the vehicle cruise condition.     NON: Vehicle speed is maintained at the ASCD set speed.     CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.		(
LO SPEED CUT	NON/CUT	Indicates the vehicle cruise condition.     NON: Vehicle speed is maintained at the ASCD set speed.     CUT: Vehicle speed decreased to excessively low, and ASCD operation is cut off.		
AT OD MONITOR	ON/OFF	Indicates [ON/OFF] condition of A/T O/D according to the input signal from the TCM.		
AT OD CANCEL	ON/OFF	Indicates [ON/OFF] condition of A/T O/D cancel request signal.		
CRUISE LAMP	ON/OFF	Indicates [ON/OFF] condition of CRUISE indicator determined by the ECM according to the input signals.		
SET LAMP	ON/OFF	<ul> <li>Indicates [ON/OFF] condition of SET indicator determined by the ECM according to the input signals.</li> </ul>		
EXH V/T LEARN	YET/CMPLT	Display the condition of Exhaust Valve Timing Control Learning YET: Exhaust Valve Timing Control Learning has not been performed yet. CMPLT: Exhaust Valve Timing Control Learning has already been performed successfully.		
BAT CUR SEN	mV	The signal voltage of battery current sensor is displayed.		
ALT DUTY SIG	ON/OFF	The control condition of the power generation voltage variable control (determined by ECM according to the input signals) is indicated.     ON: Power generation voltage variable control is active.     OFF: Power generation voltage variable control is inactive.		

### < FUNCTION DIAGNOSIS >

[VQ35HR]

Monitored item	Unit	Description	Remarks
A/F ADJ-B1		Indicates the correction of factor stored in ECM.	
A/F ADJ-B2	_	The factor is calculated from the difference be- tween the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 sig- nal.	
FAN DUTY	%	Indicates a command value for cooling fan. The value is calculated by ECM based on input signals.	
AC EVA TEMP	°C or °F	Indicates A/C evaporator temperature sent from "unified meter and A/C amp.".	
AC EVA TARGET	°C or °F	Indicates target A/C evaporator temperature sent from "unified meter and A/C amp.".	
ALT DUTY	%	Indicates the duty ratio of the power generation command value. The ratio is calculated by ECM based on the battery current sensor signal.	
FPCM DR VOLT	V	The voltage between fuel pump and FPCM is dis- played	

#### NOTE:

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

#### **ACTIVE TEST MODE**

#### Test Item

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
FUEL INJEC- TION	Engine: Return to the original non-standard condition     Change the amount of fuel injection using CONSULT-III.	If malfunctioning 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 TIM- ING	Engine: Return to the original non-standard condition     Timing light: Set     Retard the ignition timing using CONSULT-III.	If malfunctioning symptom disappears, see CHECK ITEM.	Perform Idle Air Volume Learning.
POWER BAL- ANCE	<ul> <li>Engine: After warming up, idle the engine.</li> <li>A/C switch OFF</li> <li>Selector lever: P or N</li> <li>Cut off each injector signal one at a time using CONSULT-III.</li> </ul>	Engine runs rough or stops.	<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 TEMP	Engine: Return to the original non-standard condition     Change the engine coolant temperature using CONSULT-III.	If malfunctioning symptom disappears, see CHECK ITEM.	Harness and connectors     Engine coolant temperature sensor     Fuel injector
FUEL PUMP RE- LAY	Ignition switch: ON (Engine stopped)     Turn the fuel pump relay ON and OFF using CONSULT-III and listen to operating sound.	Fuel pump relay makes the operating sound.	Harness and connectors     Fuel pump relay
PURG VOL CONT/V	Engine: After warming up, run engine at 1,500 rpm.     Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-III.	Engine speed changes according to the opening percent.	Harness and connectors     Solenoid valve
FUEL/T TEMP SEN	Change the fuel tank temperature using CONSULT-III.		

< FUNCTION DIAGNOSIS >

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TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
VENT CON- TROL/V	Ignition switch: ON (Engine stopped)     Turn solenoid valve ON and OFF with the CONSULT-III and listen to operating sound.	Solenoid valve makes an operating sound.	Harness and connectors     Solenoid valve
FPCM	Engine: Returns to the original trouble condition     Select "LOW" and "HI" with CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	Harness and connectors     FPCM
INT V/T ASSIGN ANGLE	Engine: Return to the original non-standard condition     Change intake valve timing using CONSULT-III.	If malfunctioning symptom disappears, see CHECK ITEM.	Harness and connectors     Intake valve timing control solenoid valve
EXH V/T ASSIGN ANGLE	Engine: Return to the original non-standard condition     Change exhaust valve timing using CONSULT-III.	If malfunctioning symptom disappears, see CHECK ITEM.	Harness and connectors     Exhaust valve timing control magnet retarder
FAN DUTY CONTROL*	Ignition switch: ON     Change duty ratio using CON-SULT-III.	Cooling fan speed changes.	Harness and connectors     Cooling fan motor     Cooling fan relay     Cooling fan control module     IPDM E/R
ALTERNATOR DUTY	Engine: Idle     Change duty ratio using CON- SULT-III.	Battery voltage changes.	Harness and connectors     IPDM E/R     Alternator

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

#### DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to EC-121, "Diagnosis Description".

SRT WORK SUPPORT Mode

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

#### DTC WORK SUPPORT Mode

Test mode	Test item	Corresponding DTC No.	Reference page
	EVP SML LEAK P0442/P1442*	P0442	EC-363
	EVP SIVIL LEAK P0442/P1442	P0455	EC-410
EVAPORATIVE SYSTEM	EVP V/S LEAK P0456/P1456*	P0456	EC-416
	PURG VOL CN/V P1444	P0443	EC-369
	PURG FLOW P0441	P0441	EC-358
	A/F SEN1 (B1) P1278/P1279	P0133	EC-256
A/F SEN1	A/F SEN1 (B1) P1276	P0130	EC-237
A/F SEINT	A/F SEN1 (B2) P1288/P1289	P0153	EC-256
	A/F SEN1 (B2) P1286	P0150	EC-237
	HO2S2 (B1) P1146	P0138	EC-273
	HO2S2 (B1) P1147	P0137	EC-264
110000	HO2S2 (B1) P0139	P0139	EC-285
HO2S2	HO2S2 (B2) P1166	P0158	EC-273
	HO2S2 (B2) P1167	P0157	EC-264
	HO2S2 (B2) P0159	P0159	EC-285

<sup>\*:</sup> DTC P1442 and P1456 does not apply to S51 models but appears in DTC Work Support Mode screens.

< FUNCTION DIAGNOSIS >

[VQ35HR]

## Diagnosis Tool Function

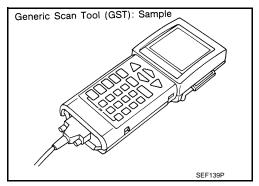
INFOID:0000000005353380

#### **DESCRIPTION**

Generic Scan Tool (OBD II scan tool) complying with SAE J1978 has 8 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 analog 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 that were stored by ECM during the freeze frame. For details, refer to EC-667, "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	This diagnostic service can clear all emission-related diagnostic information. This includes:  Clear number of diagnostic trouble codes (Service \$01)  Clear diagnostic trouble codes (Service \$03)  Clear trouble code for freeze frame data (Service \$01)  Clear freeze frame data (Service \$02)  Reset status of system monitoring test (Service \$01)  Clear on board monitoring test results (Service \$06 and \$07)	
Service \$06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.	
Service \$07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.	
Service \$08	_	This diagnostic service can close EVAP system in ignition switch ON position (Engine stopped). When this diagnostic service is performed, EVAP canister vent control valve can be closed.  In the following conditions, this diagnostic service cannot function.  Low ambient temperature  Low battery voltage  Engine running  Ignition switch OFF  Low fuel temperature  Too much pressure is applied to EVAP system	
Service \$09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.	

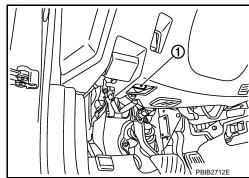
#### INSPECTION PROCEDURE

1. Turn ignition switch OFF.

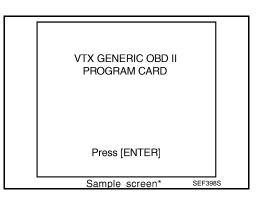
## ON BOARD DIAGNOSTIC (OBD) SYSTEM

< FUNCTION DIAGNOSIS > [VQ35HR]

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



- 3. Turn ignition switch ON.
- 4. 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.

#### **OBD II FUNCTIONS**

F0: DATA LIST F1: FREEZE DATA

F2: DTCs

F3: SNAPSHOT F4: CLEAR DIAG INFO

F5: O2 TEST RESULTS

#### **F6: READINESS TESTS**

F7: ON BOARD TESTS F8: EXPAND DIAG PROT

F9: UNIT CONVERSION

Sample screen\* SEF416S

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< COMPONENT DIAGNOSIS >

[VQ35HR]

# COMPONENT DIAGNOSIS

## TROUBLE DIAGNOSIS - SPECIFICATION VALUE

**Description** 

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

The SP value is used to detect malfunctions that may affect the Engine Control System, but will not illuminate the MIL.

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

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

## Component Function Check

INFOID:0000000005353382

## 1.PRECONDITIONING

Check that all of the following conditions are satisfied.

#### **TESTING CONDITION**

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 104.3 kPa (1.003 1.064 kg/cm<sup>2</sup>, 14.25 15.12 psi)
- Atmospheric temperature: 20 30°C (68 86°F)
- Engine coolant temperature: 75 95°C (167 203°F)
- Transmission: Warmed-up
- After the engine is warmed up to normal operating temperature, drive vehicle until "ATF TEMP SE 1" (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
- Electrical load: Not applied
- Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.
- · Engine speed: Idle

>> GO TO 2.

## 2. PERFORM SPEC IN DATA MONITOR MODE

## (P)With CONSULT-III

#### NOTE:

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

- 1. Perform EC-22, "BASIC INSPECTION: Special Repair Requirement".
- Select "B/FUEL SCHDL", "A/F ALPHA-B1", "A/F ALPHA-B2", "MAS A/F SE-B1" and "MAS A/F SE-B2" in "SPEC" of "DATA MONITOR" mode with CONSULT-III.
- Check that monitor items are within the SP value.

## Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Go to EC-147, "Diagnosis Procedure".

< COMPONENT DIAGNOSIS >

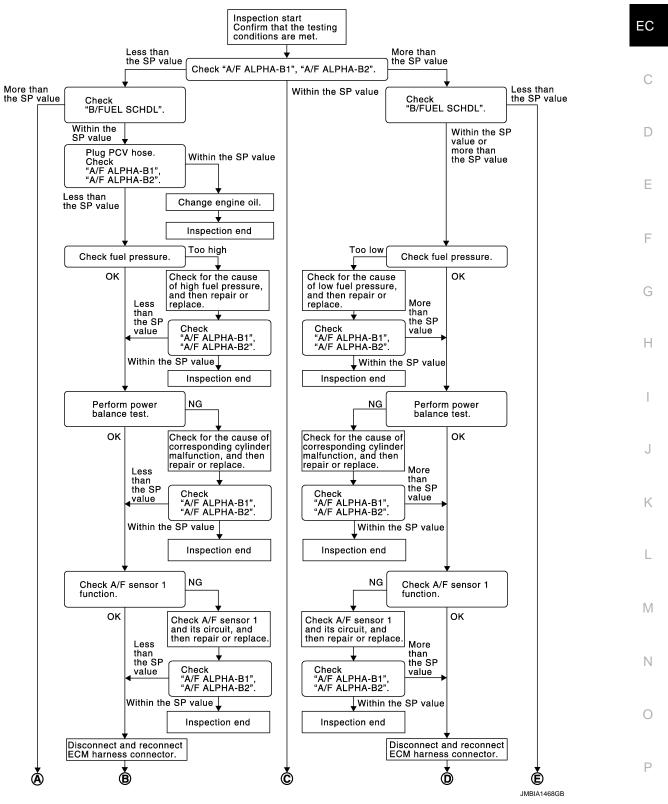
[VQ35HR]

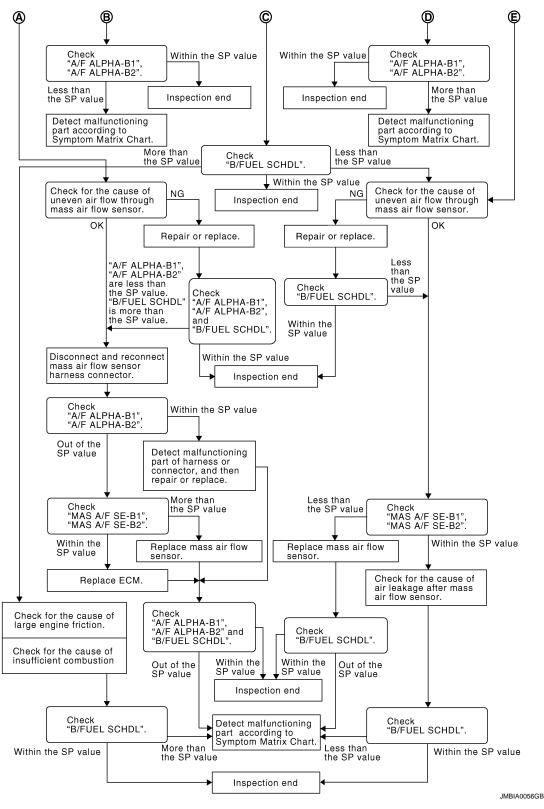
Diagnosis Procedure

INFOID:0000000005353383

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## **OVERALL SEQUENCE**





#### **DETAILED PROCEDURE**

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

## (E)With CONSULT-III

- Start engine.
- Confirm that the testing conditions are met. Refer to <u>EC-146, "Component Function Check"</u>.
- Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and check that each indication is within the SP value.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE < COMPONENT DIAGNOSIS > [VQ35HR]	
NOTE: Check "A/F ALPHA-B1", "A/F ALPHA-B2" for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.	А
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.	EC
2.CHECK "B/FUEL SCHDL"	С
Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and check that the indication is within the SP value.	
Is the measurement value within the SP value?  YES >> GO TO 4.  NO >> More than the SP value: GO TO 19.	D
3.CHECK "B/FUEL SCHDL"	Е
Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and check that the indication is within the SP value.  Is the measurement value within the SP value?	F
YES >> GO TO 6.  NO-1 >> More than the SP value: GO TO 6.  NO-2 >> Less than the SP value: GO TO 25.	G
4.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"	
<ol> <li>Stop the engine.</li> <li>Disconnect PCV hose, and then plug it.</li> <li>Start engine.</li> <li>Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and check that each indication is within the SP value.</li> </ol>	Н
Is the measurement value within the SP value? YES >> GO TO 5. NO >> GO TO 6.	J
<ul> <li>5.CHANGE ENGINE OIL</li> <li>1. Stop the engine.</li> <li>2. Change engine oil.</li> </ul>	K
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 con-	L
ditions.	M
>> INSPECTION END  6.CHECK FUEL PRESSURE	Ν
Check fuel pressure. (Refer to EC-692, "Inspection".)	
Is the inspection result normal?	0
YES >> GO TO 9.  NO-1 >> Fuel pressure is too high: Replace "fuel filter and fuel pump assembly" and then GO TO 8.  NO-2 >> Fuel pressure is too low: GO TO 7.	Р
7. DETECT MALFUNCTIONING PART	

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>> Replace "fuel filter and fuel pump assembly" and then GO TO 8. >> Repair or replace and then GO TO 8.

Check fuel hoses and fuel tubes for clogging.

 $8.\mathsf{CHECK}$  "A/F ALPHA-B1", "A/F ALPHA-B2"

Is the inspection result normal?

YES NO

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

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

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

YES >> INSPECTION END

NO >> GO TO 9.

## 9.PERFORM POWER BALANCE TEST

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

#### Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 10.

# 10.detect malfunctioning part

#### Check the following below.

- Ignition coil and its circuit (Refer to <u>EC-617, "Component Function Check"</u>.)
- Fuel injector and its circuit (Refer to EC-598, "Component Function Check".)
- Intake air leakage
- Low compression pressure (Refer to EM-96, "On-Vehicle Service".)

#### Is the inspection result normal?

YES >> Replace fuel injector and then GO TO 11.

NO >> Repair or replace malfunctioning part and then GO TO 11.

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

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

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

YES >> INSPECTION END

NO >> GO TO 12.

# 12.CHECK A/F SENSOR 1 FUNCTION

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

- For DTC P0130, P0150, refer to <u>EC-237, "DTC Logic"</u>.
  For DTC P0131, P0151, refer to <u>EC-244, "DTC Logic"</u>.
- For DTC P0132, P0152, refer to <u>EC-250, "DTC Logic"</u>.
- For DTC P0133, P0153, refer to EC-256, "DTC Logic".
- For DTC P2A00, P2A03, refer to <u>EC-575, "DTC Logic"</u>.

#### Are any DTCs detected?

YES >> GO TO 13.

>> GO TO 15. NO

# 13. CHECK A/F SENSOR 1 CIRCUIT

Perform Diagnosis Procedure according to corresponding DTC.

>> GO TO 14.

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

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

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

YES >> INSPECTION END

>> GO TO 15. NO

# 15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

Stop the engine.

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

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

>> GO TO 16.

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

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Start engine.

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to <a href="EC-680">EC-680</a>, "Symptom Table".

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17. CHECK "B/FUEL SCHDL"

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

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Is the measurement value within the SP value?

YES >> INSPECTION END

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

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

18. DETECT MALFUNCTIONING PART

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Check for the cause of large engine friction. Refer to the following.

Engine oil level is too high

Engine oil viscosity

Belt tension of power steering, alternator, A/C compressor, etc. is excessive

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Noise from engine

Noise from transmission, etc.

2. Check for the cause of insufficient combustion. Refer to the following.

Valve clearance malfunction

Intake valve timing control function malfunction

- Camshaft sprocket installation malfunction, etc.

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

# 19. CHECK INTAKE SYSTEM

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

Crushed air ducts

· Malfunctioning seal of air cleaner element

Uneven dirt of air cleaner element

Improper specification of intake air system

Is the inspection result normal?

YES >> GO TO 21.

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

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

N

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

Is the measurement value within the SP value?

YES >> INSPECTION END

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

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.

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

>> GO TO 22.

< COMPONENT DIAGNOSIS >

[VQ35HR]

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

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

## Is the measurement value within the SP value?

YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to <u>EC-208</u>, "<u>Diagnosis Procedure</u>". Then GO TO 29.

NO >> GO TO 23.

23. CHECK "MAS A/F SE-B1", "MAS A/F SE-B2"

Select "MAS A/F SE-B1", "MAS A/F SE-B2" in "SPEC" of "DATA MONITOR" mode, and check that the indication is within the SP value.

## Is the measurement value within the SP value?

YES >> GO TO 24.

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

## 24.REPLACE ECM

- 1. Replace ECM.
- Go to EC-25, "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 in air cleaner element
- · Uneven dirt in air cleaner element
- Improper specification in intake air system

#### Is the inspection result normal?

YES >> GO TO 27.

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

## 26.CHECK "B/FUEL SCHDL"

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

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

YES >> INSPECTION END

NO >> Less than the SP value: GO TO 27.

## 27.CHECK "MAS A/F SE-B1", "MAS A/F SE-B2"

Select "MAS A/F SE-B1", "MAS A/F SE-B2" in "SPEC" of "DATA MONITOR" mode, and check that the indication is within the SP value.

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

YES >> GO TO 28

NO >> Less than the SP value: Replace malfunctioning mass air flow sensor, and then GO TO 30.

## 28. CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.

- · Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- · Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks in PCV valve
- Disconnection or cracks in EVAP purge hose, stuck open EVAP canister purge volume control solenoid valve
- · Malfunctioning seal in rocker cover gasket
- · Disconnection, looseness, or cracks in hoses, such as a vacuum hose, connecting to intake air system parts

## < COMPONENT DIAGNOSIS >

[VQ35HR]

• Malfunctioning seal in intake air system, etc.

>> GO TO 30.

 $29.\mathtt{CHECK}$  "A/F ALPHA-B1", "A/F ALPHA-B2", AND "B/FUEL SCHDL"

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to <a href="EC-680">EC-680</a>, "Symptom Table".

30. CHECK "B/FUEL SCHDL"

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to <a href="EC-680">EC-680</a>, "Symptom Table".

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## TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

< COMPONENT DIAGNOSIS >

[VQ35HR]

## TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

**Description** 

Intermittent incidents may occur. In many cases, the malfunction resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of intermittent incidents occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

Common Intermittent Incidents Report Situations

STEP in Work Flow	Situation		
2	The CONSULT-III is used. The SELF-DIAG RESULTS screen shows time data other than [0] or [1t].		
3 or 4	The symptom described by the customer does not recur.		
5	5 (1st trip) DTC does not appear during the DTC Confirmation Procedure.		
10	The Diagnostic Procedure for PXXXX does not indicate the malfunctioning area.		

## Diagnosis Procedure

INFOID:0000000005353385

## 1.INSPECTION START

Erase (1st trip) DTCs. Refer to EC-667, "DTC Index".

>> GO TO 2.

## 2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.

Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

## 3. SEARCH FOR ELECTRICAL INCIDENT

Perform GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident", "INCIDENT SIMULATION TESTS".

## Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace.

## 4. CHECK CONNECTOR TERMINALS

Refer to <u>GI-23</u>, "How to Check Terminal", "HOW TO PROBE CONNECTORS", "How to Check Enlarged Contact Spring of Terminal".

#### Is the inspection result normal?

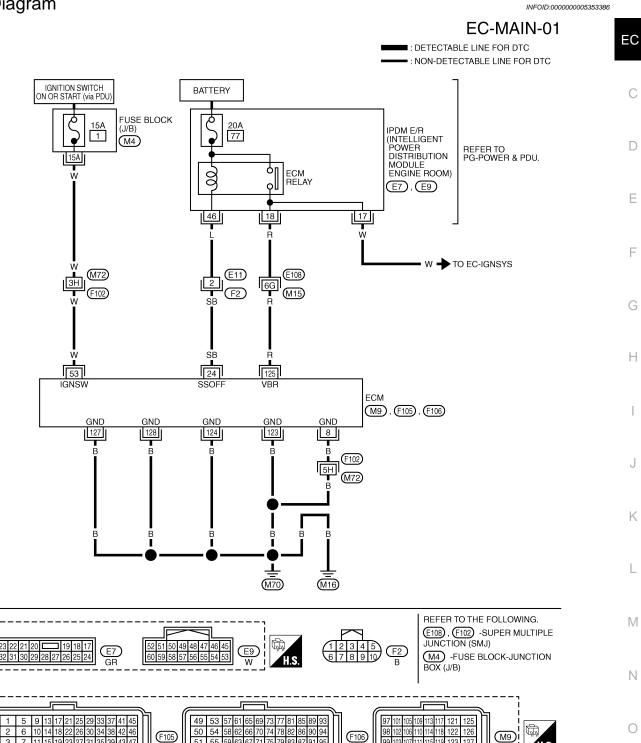
YES >> INSPECTION END

NO >> Repair or replace connector.

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## POWER SUPPLY AND GROUND CIRCUIT

Wiring Diagram



# Diagnosis Procedure

## 1. CHECK GROUND CONNECTION

Turn ignition switch OFF.

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## < COMPONENT DIAGNOSIS >

[VQ35HR]

2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connections.

# 2.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

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

ECM		Ground	Continuity	
Connector	Terminal	Giodila	Continuity	
F105	8			
M9	123	Ground	Existed	
	124			
	127			
	128			

3. Also check harness for short to power.

## Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

## 3. DETECT MALFUNCTIONING PART

## Check the following.

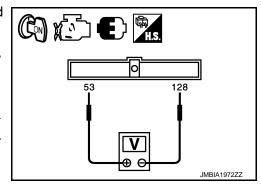
- Harness connectors F102, M72
- Harness for open or short between ECM and ground

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

# 4. CHECK ECM POWER SUPPLY CIRCUIT-I

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

	E			
	+	_		Voltage
Connector	Terminal	Connector	Terminal	
F106	53	M9	128	Battery voltage



## Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

## 5. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors M72, F102
- Fuse block (J/B) connector M4
- 15 A fuse (No. 1)
- Harness for open or short between ECM and fuse

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

## 6. CHECK ECM POWER SUPPLY CIRCUIT-II

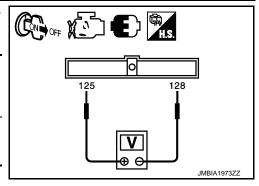
1. Turn ignition switch OFF and wait at least 10 seconds.

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

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

ECM			
Connector	+	-	Voltage
Connector	Terminal	Terminal	
M9	125	128	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0 V.



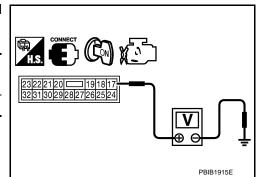
#### Is the inspection result normal?

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

## 7. CHECK ECM POWER SUPPLY CIRCUIT-III

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

IPDN	I E/R	Ground	Voltage	
Connector	Terminal	Ground	voltage	
E7	17	Ground	Battery voltage	



#### Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace IPDM E/R.

# 8. CHECK INTERMITTENT INCIDENT

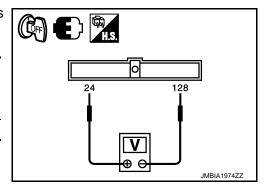
Refer to EC-154, "Description".

#### >> INSPECTION END

# 9. CHECK ECM POWER SUPPLY CIRCUIT-IV

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

ECM				
-	+	_		Voltage
Connector	Terminal	Connector	Terminal	
F105	24	M9	128	Battery voltage



## Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 10.

## 10.CHECK ECM POWER SUPPLY CIRCUIT-V

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

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F105	24	E9	46	Existed

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

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#### < COMPONENT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 11.

# 11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E11, F2
- Harness for open or short between ECM and IPDM E/R

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

# 12.CHECK 20 A FUSE

- 1. Disconnect 20 A fuse (No. 77) from IPDM E/R.
- 2. Check 20 A fuse.

## Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace 20 A fuse.

# 13. CHECK ECM POWER SUPPLY CIRCUIT-V

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

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	Continuity
M9	125	E7	18	Existed

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

#### Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 14.

# 14. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and IPDM E/R

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

# 15. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

## Is the inspection result normal?

YES >> Replace IPDM E/R.

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

## **Ground Inspection**

INFOID:0000000005353388

[VQ35HR]

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.

Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.

When inspecting a ground connection follow these rules:

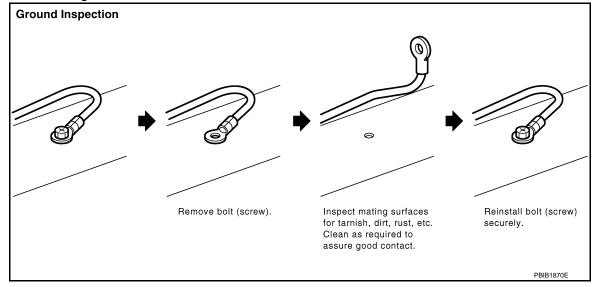
- · Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.

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# < COMPONENT DIAGNOSIS >

[VQ35HR]

- Inspect for "add-on" accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.



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## **U0101 CAN COMM CIRCUIT**

**Description** 

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

DTC Logic

#### DTC DETECTION LOGIC

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

#### DTC CONFIRMATION PROCEDURE

# 1. PERFORM DTC CONFIRMATION PROCEDURE

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

#### Is DTC detected?

YES >> EC-161, "Diagnosis Procedure".

NO >> INSPECTION END

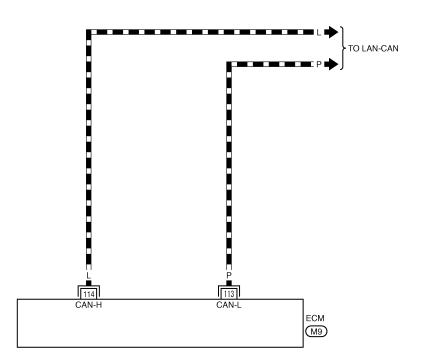
Wiring Diagram INFOID:0000000005353391

## EC-CAN-01

: DETECTABLE LINE FOR DTC : NON-DETECTABLE LINE FOR DTC : DATA LINE

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INFOID:0000000005353392

# Diagnosis Procedure

Go to LAN-29, "CAN System Specification Chart".

**EC-161** Revision: 2009 June 2010 M35/M45

## U0164 CAN COMM CIRCUIT

**Description** 

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

DTC Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0164	Lost communication with Unified meter and A/C amp.	When ECM is not transmitting or receiving CAN communication signal of OBD (emission-related diagnosis) with Unified meter and A/C amp. for 2 seconds or more.	CAN communication line between Unified meter and A/C amp. and ECM CAN communication line open or shorted

#### DTC CONFIRMATION PROCEDURE

# 1. PERFORM DTC CONFIRMATION PROCEDURE

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

#### Is DTC detected?

YES >> EC-163, "Diagnosis Procedure".

NO >> INSPECTION END

Wiring Diagram

EC-CAN-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
: DATA LINE

TO LAN-CAN

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Diagnosis Procedure

Go to LAN-29, "CAN System Specification Chart".

Revision: 2009 June **EC-163** 2010 M35/M45

## U1001 CAN COMM CIRCUIT

**Description** 

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

DTC Logic

#### DTC DETECTION LOGIC

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

## DTC CONFIRMATION PROCEDURE

# 1. PERFORM DTC CONFIRMATION PROCEDURE

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

#### Is 1st trip DTC detected?

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

NO >> INSPECTION END

Wiring Diagram

## EC-CAN-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
: DATA LINE

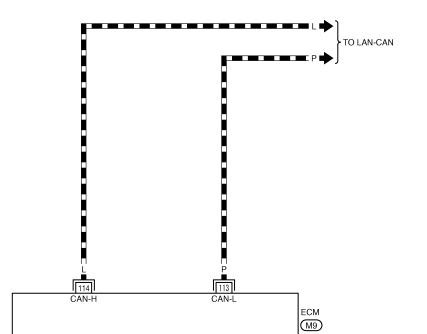
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TBWT2414E

# Diagnosis Procedure

Go to LAN-29, "CAN System Specification Chart".

## P0011, P0021 IVT CONTROL

DTC Logic

#### DTC DETECTION LOGIC

#### NOTE:

If DTC P0011 or P0021 is displayed with DTC P0075 or P0081, first perform the trouble diagnosis for DTC P0075, P0081. Refer to <u>EC-185</u>, "<u>DTC Logic"</u>.

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

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

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

>> GO TO 2.

## 2.PERFORM DTC CONFIRMATION PROCEDURE-I

#### (P)With CONSULT-III

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

ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained)		
COOLAN TEMP/S	More than 60°C (140°F)		
Selector lever	P or N position		

- Let engine idle for 10 seconds.
- Check 1st trip DTC.

#### With GST

Follow the procedure "With CONSULT-III" above.

## Is 1st trip DTC detected?

YES >> Go to EC-167, "Diagnosis Procedure"

NO >> GO TO 3.

## 3.PERFORM DTC CONFIRMATION PROCEDURE-II

## (E)With CONSULT-III

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

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

Always drive vehicle at a safe speed.

3. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

YES >> Go to EC-167, "Diagnosis Procedure"

NO >> INSPECTION END

## Diagnosis Procedure

INFOID:0000000005353402

# 1. CHECK OIL PRESSURE WARNING LAMP

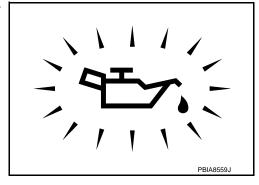
Start engine.

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

Is oil pressure warning lamp illuminated?

YES >> Go to <u>LU-5</u>, "Inspection".

NO >> GO TO 2.



# 2.check intake valve timing control solenoid valve

Refer to EC-168, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

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

3.CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-345, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace crankshaft position sensor.

4. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-352, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning camshaft position sensor.

**5.**CHECK CAMSHAFT (INTAKE)

Check the following.

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## **P0011, P0021 IVT CONTROL**

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

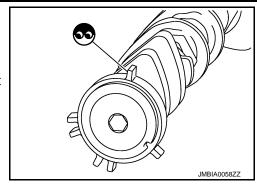
- Accumulation of debris on the signal plate of camshaft rear end
- · Chipping signal plate of camshaft rear end

#### Is the inspection result normal?

YES >> GO TO 6.

NO

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



## 6. CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misalignment.

Are there any service records that may cause timing chain misalignment?

YES >> Check timing chain installation. Refer to EM-60, "Removal and Installation".

NO >> GO TO 7.

## 7. CHECK LUBRICATION CIRCUIT

Perform "Inspection of Camshaft Sprocket (INT) Oil Groove". Refer to <u>EM-79</u>, "Removal and Installation". Is the inspection result normal?

YES >> GO TO 8.

NO >> Clean lubrication line.

## 8. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

## Component Inspection

INFOID:0000000005353403

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

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

Terminals	Resistance		
1 and 2	7.0 - 7.7 Ω [at 20°C (68°F)]		
1 or 2 and ground	${}^{\infty}\!\Omega$ (Continuity should not exist)		

# PEIBO193E

#### Is the inspection result normal?

YES >> GO TO 2.

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

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

1. Remove intake valve timing control solenoid valve.

## **P0011, P0021 IVT CONTROL**

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

 Apply 12 V between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.

#### **CAUTION:**

Never apply 12 V continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

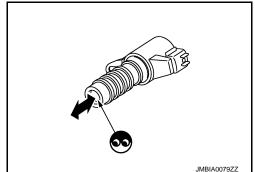
## NOTE:

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

#### Is the inspection result normal?

YES >> INSPECTION END

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



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## P0014, P0024 EVT CONTROL

DTC Logic

#### DTC DETECTION LOGIC

#### NOTE:

- If DTC P0014 or P0024 is displayed with DTC P0078, P0084 first perform trouble diagnosis for DTC P0078, P0084. Refer to <u>EC-190</u>, "<u>DTC Logic"</u>.
- If DTC P0014 or P0024 is displayed with DTC P1078, P1084 first perform trouble diagnosis for DTC P1078, P1084. Refer to <u>EC-453</u>, "<u>DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0014	Exhaust valve timing (EVT) control performance (bank 1)		<ul> <li>Crankshaft position sensor</li> <li>Camshaft position sensor</li> <li>EVT control position sensor</li> </ul>
P0024	Exhaust valve timing (EVT) control performance (bank 2)	There is a gap between angle of target and phase-control angle degree.	<ul> <li>EVT control magnet retarder</li> <li>Accumulation of debris to the signal pick-up portion of the camshaft</li> <li>Timing chain installation</li> <li>EVT control pulley assembly</li> </ul>

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

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

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

## **TESTING CONDITION:**

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

>> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE-I

#### (P)With CONSULT-III

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

ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained.)		
COOLAN TEMP/S	More than 60°C (140°F)		
Selector lever	P or N position		

- 4. Let engine idle for 10 seconds.
- Check 1st trip DTC.

## **With GST**

Follow the procedure "With CONSULT-III" above.

#### Is 1st trip DTC detected?

YES >> Go to EC-171, "Diagnosis Procedure"

NO >> GO TO 3.

# 3.perform dtc confirmation procedure-ii

#### (P)With CONSULT-III

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

## < COMPONENT DIAGNOSIS >

ENG SPEED	1,700 - 2,950 rpm (A constant rotation is maintained.)		
COOLAN TEMP/S	More than 70°C (158°F)		
Selector lever	1st or 2nd position		
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)		

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#### **CAUTION:**

#### Always drive vehicle at a safe speed.

3. Check 1st trip DTC.

#### With GST

Follow the procedure "With CONSULT-III" above.

## Is 1st trip DTC detected?

YES >> Go to EC-171, "Diagnosis Procedure"

NO >> INSPECTION END

## Diagnosis Procedure

INFOID:0000000005353405

# 1. CHECK FUNCTION OF EXHAUST VALVE TIMING (EVT) CONTROL

## (I) With CONSULT-III

- Turn ignition switch ON.
- Select "EXH V/T ASSIGN ANGLE" in "ACTIVE TEST" mode with CONSULT-III.
- Start engine and keep the engine speed at 2,500 rpm, then touch "START".
- 4. Check that the values of "EXH/V TIM B1" and "EXH/V TIM B2" change when touching "UP" or "DOWN".

#### (R) Without CONSULT-III

- 1. Start engine and rev engine up above 1,500 rpm.
- Read the voltage signal between ECM harness connector terminals as per the following with an oscilloscope.

ECM				Voltage signal	
+ -					
Connector Terminal		Connector	Terminal		
F105	6 [EVT control magnet retarder (bank 1) signal]  7 [EVT control magnet retarder (bank 2) signal]	M9	128	5V/div JMBIA0034GB	

#### Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 2.

## 2.CHECK EVT CONTROL MAGNET RETARDER

Refer to EC-172, "Component Inspection".

#### Is the inspection result normal?

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

# 3. REPLACE EVT CONTROL MAGNET RETARDER

- 1. Replace malfunctioning EVT control magnet retarder.
- 2. Perform EC-29, "EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement".

#### >> INSPECTION END

Revision: 2009 June **EC-171** 2010 M35/M45

#### < COMPONENT DIAGNOSIS >

## 4. CHECK EVT CONTROL POSITION SENSOR

Refer to EC-459, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning EVT control position sensor.

## ${f 5.}$ CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-345, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace crankshaft position sensor.

## $oldsymbol{6}.$ CHECK CAMSHAFT POSITION SENSOR

Refer to EC-352, "Component Inspection".

## Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning camshaft position sensor.

## 7. CHECK CAMSHAFT (EXH)

#### Check the following.

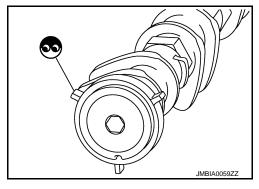
- · Accumulation of debris to the signal plate of camshaft rear end
- · Chipping signal plate of camshaft rear end

## Is the inspection result normal?

YES >> GO TO 8.

NO >>

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



## 8. CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

#### Are there any service records that may cause timing chain misaligned?

YES >> Check timing chain installation. Refer to EM-60, "Removal and Installation".

NO >> GO TO 9.

## 9. REPLACE EVT CONTROL PULLEY ASSEMBLY

- 1. Replace exhaust valve timing control pulley assembly and EVT control magnet retarder. Refer to <a href="Magnet-19">EM-49</a>, "Removal and Installation" and <a href="EM-79">EM-79</a>, "Removal and Installation".
- Perform EC-29, "EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement".

#### >> INSPECTION END

## 10. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

>> INSPECTION END

## Component Inspection

INFOID:0000000005353406

## 1. CHECK EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

- Turn ignition switch OFF.
- Disconnect exhaust valve timing control magnet retarder harness connector.

Revision: 2009 June **EC-172** 2010 M35/M45

## **P0014, P0024 EVT CONTROL**

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

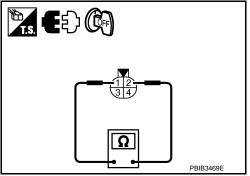
3. Check resistance between exhaust valve timing control magnet retarder terminals as per the following.

Terminals	Resistance
1 and 2	9.0 - 11.0 Ω [at 20°C (68°F)]

## Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.



# $2. {\tt REPLACE} \ {\tt EXHAUST} \ {\tt VALVE} \ {\tt TIMING} \ {\tt CONTROL} \ {\tt MAGNET} \ {\tt RETARDER}$

- 1. Replace malfunctioning exhaust valve timing control magnet retarder.
- 2. Perform EC-29, "EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement".

>> INSPECTION END

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

< COMPONENT DIAGNOSIS >

[VQ35HR]

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

Description INFOID:000000005353407

#### SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator	
Camshaft position sensor Crankshaft position sensor	Engine speed	Air fuel ratio (A/F) sensor 1 Air fuel ratio (A		
Mass air flow sensor	Amount of intake air	TICALOT COTILION	liedici	

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 within the specified range.

DTC Logic

## DTC DETECTION LOGIC

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

## DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is between 10.5 V and 16 V at idle.

>> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

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

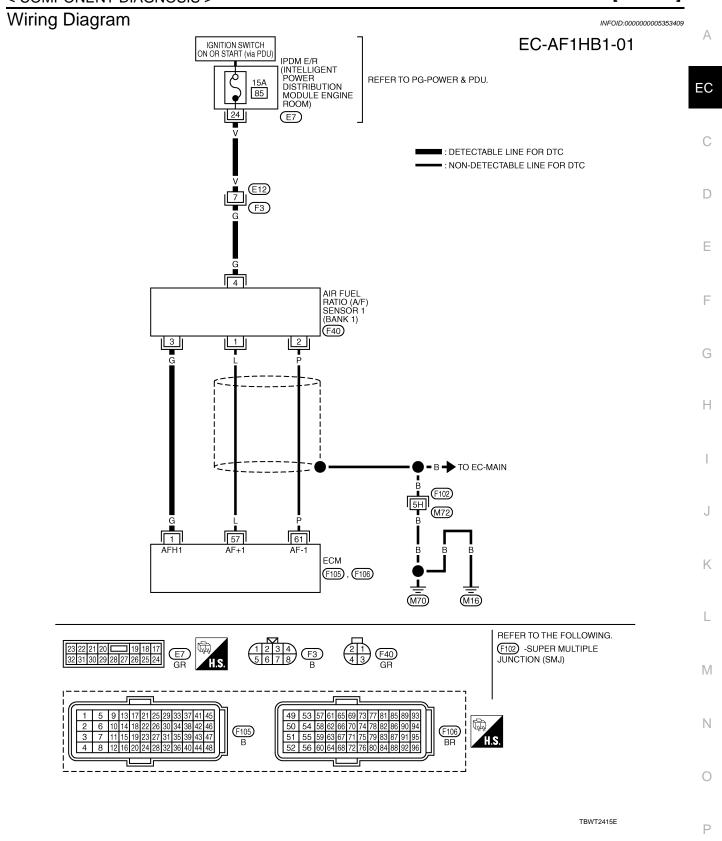
## Is 1st trip DTC detected?

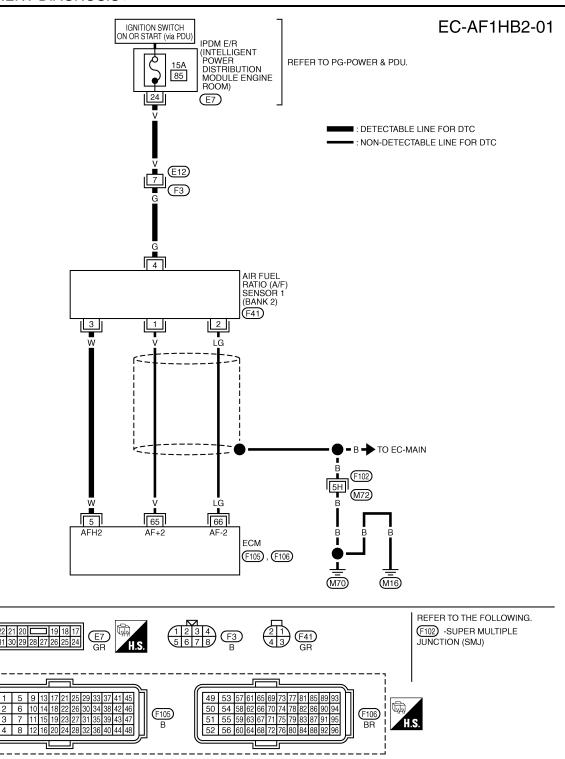
YES >> Go to EC-176, "Diagnosis Procedure".

NG >> INSPECTION END

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

[VQ35HR]





## Diagnosis Procedure

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TBWT2416E

INFOID:0000000005353410

# 1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

YES >> GO TO 2.

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

## < COMPONENT DIAGNOSIS >

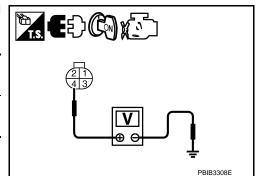
[VQ35HR]

NO >> Repair or replace ground connections.

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

- 1. Disconnect A/F sensor 1 harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between A/F sensor 1 harness connector and ground.

DTC	A/F sensor 1			Ground	Voltage
ыс	Bank	Connector	Terminal	Giodila	voltage
P0031, P0032	1	F40	4	Ground	Battery voltage
P0051, P0052	2	F41	4	Giodila	Battery voltage



#### Is the inspection result normal?

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

## 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- IPDM E/R harness connector E7
- 15 A fuse (No. 85)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

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

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

DTC	A/F sensor 1		ECM		Continuity	
ы	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0031, P0032	1	F40	3	F105	1	Existed
P0051, P0052	2	F41	3	1 103	5	LXISIEU

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

#### Is the inspection result normal?

YES >> GO TO 5.

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

## 5.CHECK A/F SENSOR 1 HEATER

Refer to EC-178, "Component Inspection".

## Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

## 6.REPLACE A/F SENSOR 1

Replace malfunctioning A/F sensor 1.

#### **CAUTION:**

Revision: 2009 June

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

>> INSPECTION END

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# 7.CHECK INTERMITTENT INCIDENT

Perform EC-154, "Description".

>> Repair or replace malfunctioning part.

## Component Inspection

INFOID:0000000005353411

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

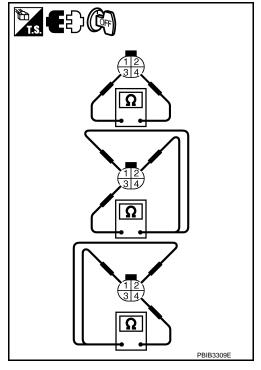
- 1. Turn ignition switch OFF.
- 2. Disconnect A/F sensor 1 harness connector.
- 3. Check resistance between A/F sensor 1 terminals as per the following.

Terminal	Resistance
3 and 4	1.98 - 2.66 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 A/F SENSOR 1

Replace malfunctioning A/F sensor 1.

#### CAUTION:

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

>> INSPECTION END

## P0037, P0038, P0057, P0058 HO2S2 HEATER

< COMPONENT DIAGNOSIS >

[VQ35HR]

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# P0037, P0038, P0057, P0058 HO2S2 HEATER

Description INFOID:0000000005353412

#### SYSTEM DESCRIPTION

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

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

#### **OPERATION**

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

DTC Logic

#### DTC DETECTION LOGIC

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

## DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

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

>> GO TO 2.

## P0037, P0038, P0057, P0058 HO2S2 HEATER

## < COMPONENT DIAGNOSIS >

[VQ35HR]

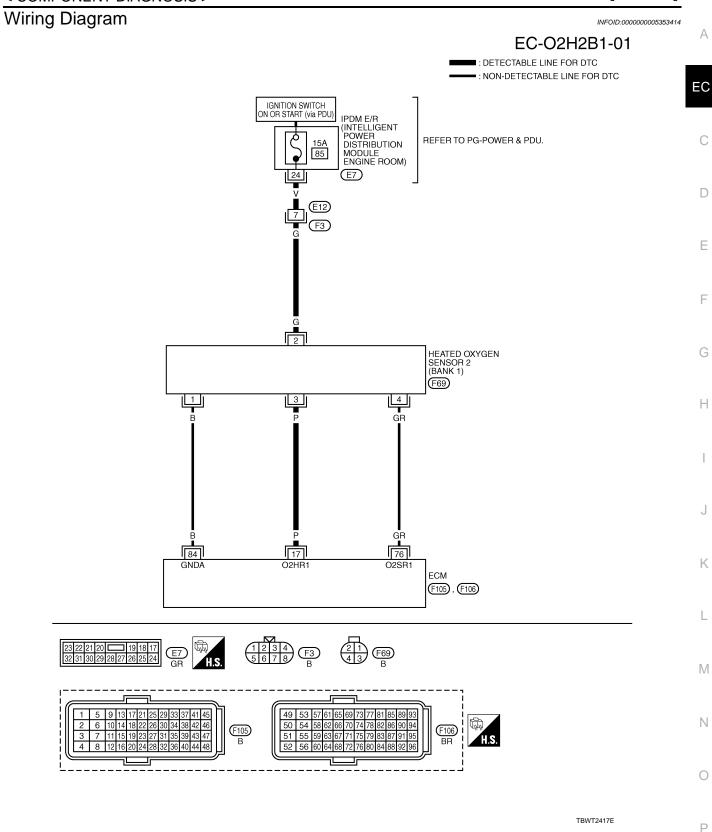
# 2. PERFORM DTC CONFIRMATION PROCEDURE

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

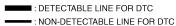
## Is 1st trip DTC detected?

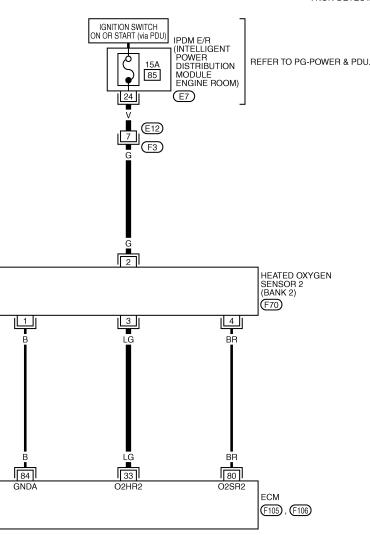
YES >> Go to EC-182, "Diagnosis Procedure".

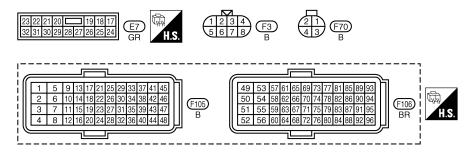
NO >> INSPECTION END











TBWT2418E

# Diagnosis Procedure

#### INFOID:0000000005353415

# 1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connections M16, M70. Refer to <u>EC-158, "Ground Inspection"</u>.

#### Is the inspection result normal?

YES >> GO TO 2.

### P0037, P0038, P0057, P0058 HO2S2 HEATER

### < COMPONENT DIAGNOSIS >

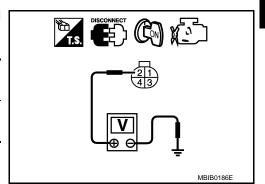
[VQ35HR]

NO >> Repair or replace ground connections.

# 2.CHECK HEATED OXYGEN SENSOR 2 (HO2S2) POWER SUPPLY CIRCUIT

- 1. Disconnect HO2S2 harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between HO2S2 harness connector and ground.

DTC		HO2S2		Ground	Voltage
ыс	Bank	Connector	Terminal	Giodila	voltage
P0037, P0038	1	F69	2	Ground	Battery voltage
P0057, P0058	2	F70	2	Giodila	Dattery Voltage



#### Is the inspection result normal?

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

### 3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- IPDM E/R harness connector E7
- 15 A fuse (No. 85)
- Harness for open or short between HO2S2 and fuse

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

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

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

DTC		HO2S2		E	CM	Continuity
ы	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0037, P0038	1	F69	3	F105	17	Existed
P0057, P0058	2	F70	3	1 103	33	LXISIEU

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

#### Is the inspection result normal?

YES >> GO TO 5.

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

### 5. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-184, "Component Inspection".

### Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

#### 6. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

#### **CAUTION:**

Revision: 2009 June

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

>> INSPECTION END

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# 7.CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

### Component Inspection

INFOID:0000000005353416

### 1. CHECK HEATED OXYGEN SENSOR 2 (HO2S2) HEATER

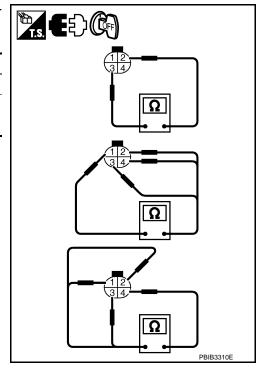
- 1. Turn ignition switch OFF.
- 2. Disconnect HO2S2 harness connector.
- Check resistance between HO2S2 terminals as per the following.

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

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.



### 2. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

#### **CAUTION:**

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

>> INSPECTION END

### P0075, P0081 IVT CONTROL SOLENOID VALVE

Description INFOID:0000000005353417

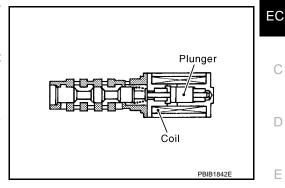
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

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 timing.

The shorter pulse width retards valve timing.

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



**DTC Logic** 

INFOID:0000000005353418

#### DTC DETECTION LOGIC

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

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

>> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for 5 seconds.
- Check 1st trip DTC. 2.

#### Is 1st trip DTC detected?

YES >> Go to EC-187, "Diagnosis Procedure".

>> INSPECTION END NO

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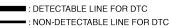
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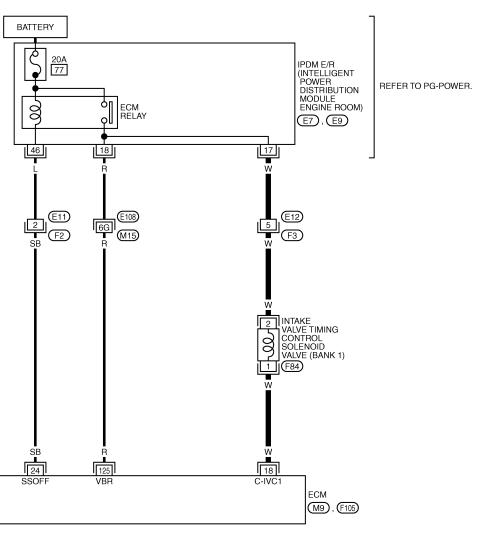
**EC-185** Revision: 2009 June 2010 M35/M45

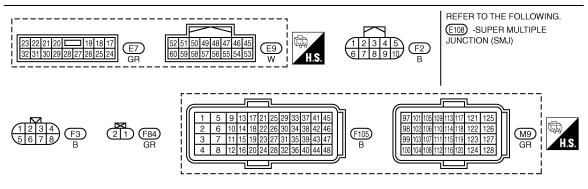
Wiring Diagram

INFOID:0000000005353419





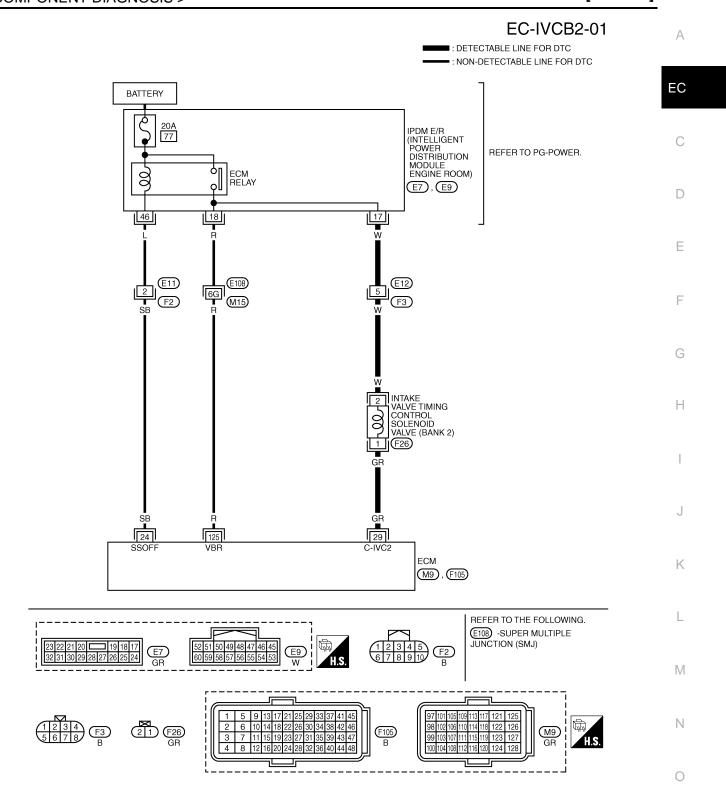




TBWT2419E

TBWT2420F

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# Diagnosis Procedure

# ${\bf 1.} {\tt CHECK\ INTAKE\ VALVE\ TIMING\ (IVT)\ CONTROL\ SOLENOID\ VALVE\ POWER\ SUPPLY\ CIRCUIT$

- Turn ignition switch OFF.
- 2. Disconnect IVT control solenoid valve harness connector.
- Turn ignition switch ON.

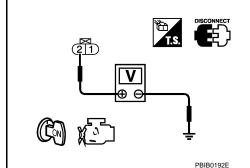
### P0075, P0081 IVT CONTROL SOLENOID VALVE

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

 Check the voltage between IVT control solenoid valve harness connector and ground.

DTC	IVT	control soleno	oid valve	Ground	Voltage
DIC	Bank	Connector	Terminal	Giodila	voltage
P0075	1	F84	2	Ground	Battery voltage
P0081	2	F26	2	Giouna	Dattery Voltage



#### Is the inspection result normal?

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

# 2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- Harness for open or short between IVT control solenoid valve and IPDM E/R

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

# ${\bf 3.}$ CHECK IVT 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 IVT control solenoid valve harness connector and ECM harness connector.

DTC	IVT	IVT control solenoid valve			ECM		
DIO	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0075	1	F84	1	F105	18	Existed	
P0081	2	F26	1	1 105	29	LAISIEU	

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

#### Is the inspection result normal?

YES >> GO TO 4.

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

### 4. CHECK IVT CONTROL SOLENOID VALVE

Refer to EC-188. "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning IVT control solenoid valve.

### 5. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

### Component Inspection

INFOID:0000000005353421

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

- Turn ignition switch OFF.
- 2. Disconnect intake valve timing control solenoid valve harness connector.

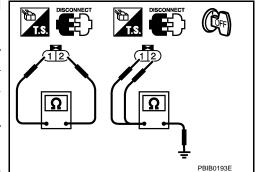
### P0075, P0081 IVT CONTROL SOLENOID VALVE

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

Check resistance between intake valve timing control solenoid valve terminals as per the following.

Terminals	Resistance
1 and 2	7.0 - 7.7 Ω [at 20°C (68°F)]
1 or 2 and ground	${}^{\infty}\Omega$ (Continuity should not exist)



#### Is the inspection result normal?

YES >> GO TO 2.

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

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

1. Remove intake valve timing control solenoid valve.

2. Apply 12 V between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.

#### **CAUTION:**

NOTE:

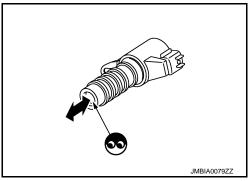
Never apply 12 V continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

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

#### Is the inspection result normal?

YES >> INSPECTION END

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



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### P0078, P0084 EVT CONTROL MAGNET RETARDER

< COMPONENT DIAGNOSIS >

[VQ35HR]

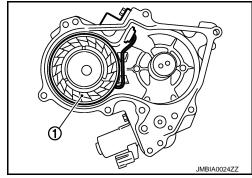
### P0078, P0084 EVT CONTROL MAGNET RETARDER

**Description** 

Exhaust valve timing control magnet retarder (1) controls the shut/ open timing of the exhaust valve by ON/OFF pulse duty signals sent from the ECM.

The longer pulse width retards valve timing.

The shorter pulse width advances valve timing.



DTC Logic

INFOID:0000000005353423

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0078	Exhaust valve timing control magnet retarder (bank 1) circuit	An improper voltage is sent to the ECM	Harness or connectors     (Exhaust valve timing control magnet)
P0084	Exhaust valve timing control magnet retarder (bank 2) circuit	through exhaust valve timing control magnet retarder.	retarder circuit is open or shorted.)  • Exhaust valve timing control magnet retarder

### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

>> GO TO 2.

### 2. PERFORM DTC CONFIRMATION PROCEDURE

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

#### Is 1st trip DTC detected?

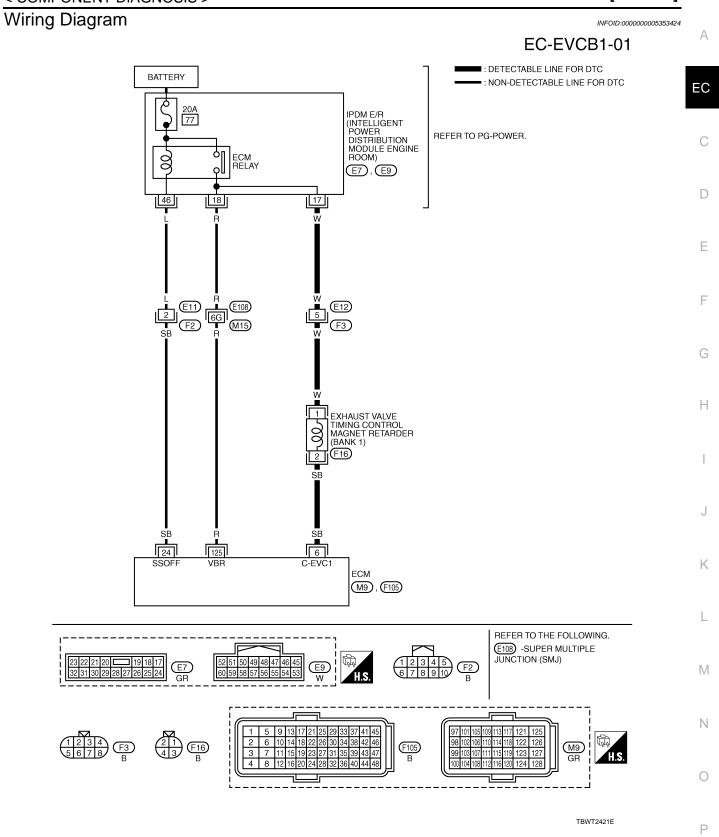
YES >> Go to EC-192, "Diagnosis Procedure".

NO >> INSPECTION END

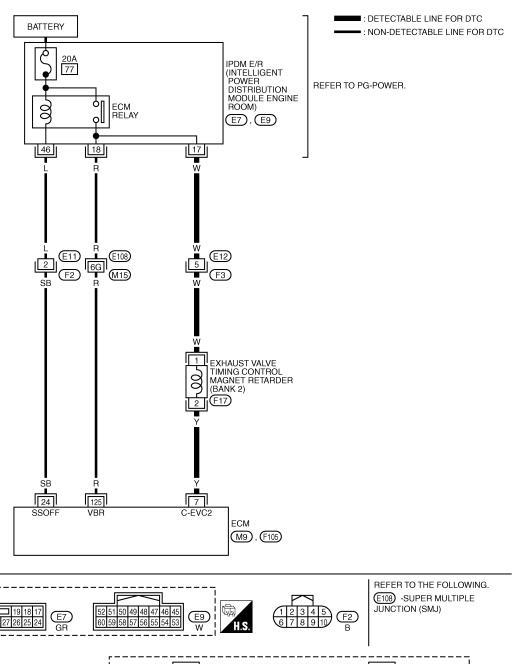
# P0078, P0084 EVT CONTROL MAGNET RETARDER

< COMPONENT DIAGNOSIS >

[VQ35HR]







### Diagnosis Procedure

INFOID:0000000005353425

(M9)

TBWT2422F

# 1. CHECK EXHAUST VALVE TIMING (EVT) CONTROL MAGNET RETARDER POWER SUPPLY CIRCUIT

(F105)

- Turn ignition switch OFF.
- 2. Disconnect EVT control magnet retarder harness connector.
- 3. Turn ignition switch ON.

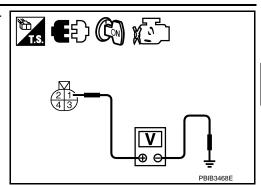
### P0078, P0084 EVT CONTROL MAGNET RETARDER

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

Check the voltage between EVT control magnet retarder harness connector and ground.

DTC	EVT	control magne	et retarder	Ground	Voltage
DIC	Bank	Connector	Terminal	Giodila	voltage
P0078	1	F16	1	Ground	Battery voltage
P0084	2	F17	1	Giodila	Dattery Voltage



#### Is the inspection result normal?

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

### 2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- Harness for open or short between EVT control magnet retarder and IPDM E/R

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

# 3.check evt control magnet retarder output signal circuit for open and short

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between EVT control magnet retarder harness connector and ECM harness connector.

DTC	EVT control magnet retarder			E	Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0078	1	F16	2	F105	6	Existed
P0084	2	F17	2	1 105	7	LAISIEU

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

#### Is the inspection result normal?

>> GO TO 4. YES

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

### f 4.CHECK EVT CONTROL MAGNET RETARDER

Refer to EC-193, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

### 5.REPLACE EVT CONTROL MAGNET RETARDER

- Replace malfunctioning EVT control magnet retarder.
- Perform EC-29, "EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement".

#### >> INSPECTION END

#### 6.CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

### Component Inspection

# 1. CHECK EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

Turn ignition switch OFF.

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# P0078, P0084 EVT CONTROL MAGNET RETARDER

< COMPONENT DIAGNOSIS >

[VQ35HR]

Disconnect exhaust valve timing control magnet retarder harness connector.

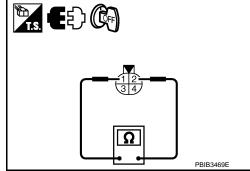
. Check resistance between exhaust valve timing control magnet retarder terminals as per the following.

Terminals	Resistance
1 and 2	9.0 - 11.0 Ω [at 20°C (68°F)]

### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.



# 2. REPLACE EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

- 1. Replace malfunctioning exhaust valve timing control magnet retarder.
- 2. Perform EC-29, "EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement".

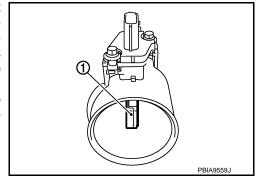
>> INSPECTION END

### P0101, P010B MAF SENSOR

Description INFOID:0000000005353427

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

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



**DTC Logic** INFOID:0000000005353428

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
	Mass air flow sensor	A)	A high voltage from the sensor is sent to ECM under light load driving condition.	Harness or connectors     (The sensor circuit is open or shorted.)     Mass air flow sensor     EVAP control system pressure sensor
P0101	(bank 1) circuit range/ performance	В)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	Harness or connectors     (The sensor circuit is open or shorted.)     Intake air leaks     Mass air flow sensor     EVAP control system pressure sensor     Intake air temperature sensor
	Mass air flow sensor	A)	A high voltage from the sensor is sent to ECM under light load driving condition.	Harness or connectors     (The sensor circuit is open or shorted.)     Mass air flow sensor     EVAP control system pressure sensor
P010B	(bank 2) circuit range/ performance	В)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	Harness or connectors     (The sensor circuit is open or shorted.)     Intake air leaks     Mass air flow sensor     EVAP control system pressure sensor     Intake air temperature sensor

### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

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

**EC-195** Revision: 2009 June 2010 M35/M45

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>> GO TO 2.

# 2.perform dtc confirmation procedure for malfunction a

- Start engine and warm it up to normal operating temperature.
- 2. Run engine for at least 10 seconds at idle speed.
- Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-199, "Diagnosis Procedure".

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

NO-2 >> With GST: GO TO 5.

# 3.CHECK MASS AIR FLOW SENSOR FUNCTION

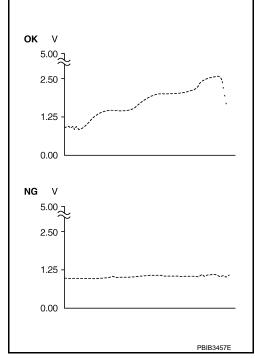
Start engine and warm it up to normal operating temperature.
 If engine cannot be started, go to <u>EC-199</u>, "<u>Diagnosis Procedure</u>".

- Select "MAS A/F SE-B1/B2" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check the voltage of "MAS A/F SE-B1/B2".
- 4. Increases engine speed to approximately 4,000 rpm.
- 5. Monitor the linear voltage rise in response to engine speed increases.

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Go to EC-199, "Diagnosis Procedure".



### 4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	More than 1,400 rpm
TP SEN 1-B1	More than 1 V
TP SEN 2-B1	More than 1 V
TP SEN 1-B2	More than 1 V
TP SEN 2-B2	More than 1 V
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

#### CAUTION

Always drive vehicle at a safe speed.

2. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-199, "Diagnosis Procedure".

NO >> INSPECTION END

### P0101, P010B MAF SENSOR

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

INFOID:0000000005353429

# 5.perform component function check for malfunction b

#### 

Perform component function check. Refer to EC-197, "Component Function Check".

#### NOTE:

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

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-199, "Diagnosis Procedure".

### Component Function Check

# 1. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

#### ■With GST

- 1. Start engine and warm it up to normal operating temperature.
- Select Service \$01 with GST.
- 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 approximately 4,000 rpm in engine speed.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-199, "Diagnosis Procedure".

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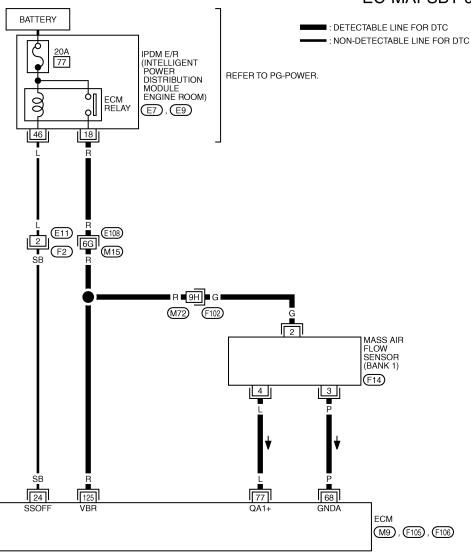
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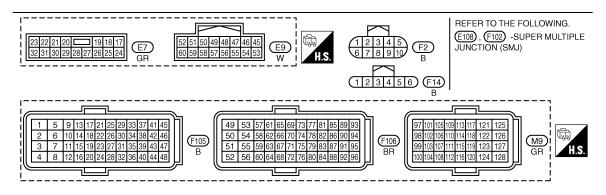
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Wiring Diagram

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# EC-MAFSB1-01



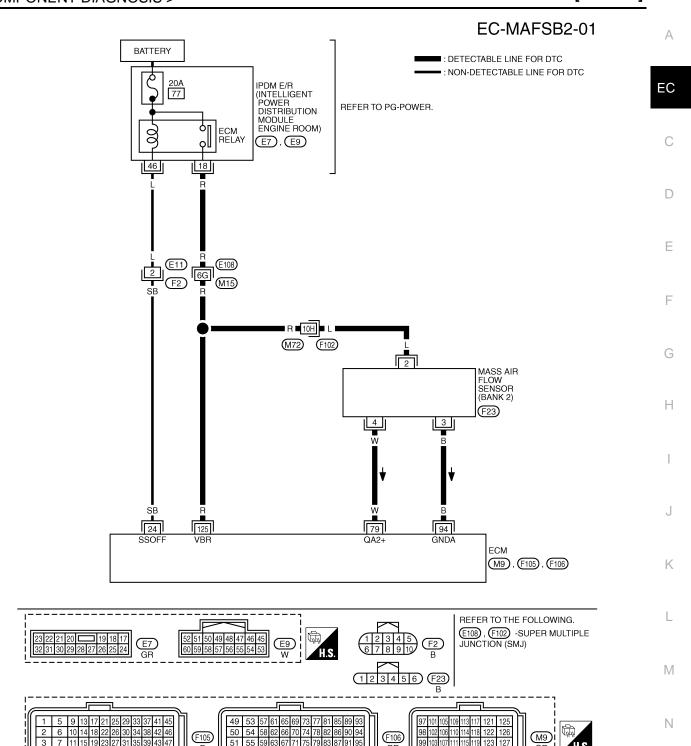


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# Diagnosis Procedure

### 1. INSPECTION START

Confirm the detected malfunction (A or B). Refer to <u>EC-195</u>, "<u>DTC Logic</u>". Which malfunction is detected?

A >> GO TO 3.

B >> GO TO 2.

Revision: 2009 June **EC-199** 2010 M35/M45

# 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.

# 3.check ground connection

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

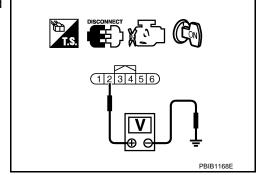
YES >> GO TO 4.

NO >> Repair or replace ground connections.

## 4. CHECK MASS AIR FLOW (MAF) SENSOR POWER SUPPLY CIRCUIT

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

DTC		MAF sens	or	Ground	Voltage	
DIC	Bank	Connector	Terminal	Glodila	voltage	
P0101	1	F14	2	Ground	Battery voltage	
P010B	2	F23	2	Giodila	Ballery Vollage	



#### Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

### 5. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E108, M15
- Harness connectors F102, M72
- Harness for open or short between MAF sensor and ECM
- Harness for open or short between MAF sensor and IPDM E/R

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

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

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

DTC		MAF sensor		ECM		Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0101	1	F14	3	F106	68	Existed
P010B	2	F23	3	1 100	94	LXISIEU

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

#### Is the inspection result normal?

YES >> GO TO 7.

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

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

### P0101, P010B MAF SENSOR

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

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

DTC		MAF senso	or	ECM		Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0101	1	F14	4	F106	77	Existed	
P010B	2	F23	4	1 100	79	LAISIEU	

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

#### Is the inspection result normal?

YES >> GO TO 8.

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

### $oldsymbol{8}.$ CHECK INTAKE AIR TEMPERATURE SENSOR

Check intake air temperature sensor (bank 1).

Refer to EC-216, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 9.

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

### 9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-394, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace EVAP control system pressure sensor.

### 10.CHECK MAF SENSOR

Refer to EC-201, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace malfunctioning MAF sensor.

# 11. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

### Component Inspection

### 1. CHECK MASS AIR FLOW (MAF) SENSOR-I

#### (P)With CONSULT-III

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

Monitor item	Condition	Indication (V)
MAS A/F SE-B1 MAS A/F SE-B2	Ignition switch ON (Engine stopped.)	Approx. 0.4
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9
	Idle to approx. 4,000 rpm	0.9 - 1.2 to approx. 2.4*

<sup>\*:</sup> Check for linear voltage rise in response to engine being increased to approximately 4,000 rpm.

#### Without CONSULT-III

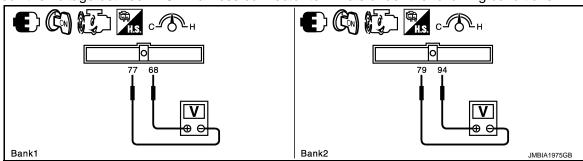
- Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.

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- Start engine and warm it up to normal operating temperature.
- Check the voltage between ECM harness connector terminals under the following conditions.



ECM					
Connector	+	_	Condition	Voltage (V)	
Connector	Terminal	Terminal			
			Ignition switch ON (Engine stopped.)	Approx. 0.4	
	77	68	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2	
[MAF sensor (bank 1) signal]	` '		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9	
F106			Idle to approx. 4,000 rpm	0.9 - 1.2 to approx. 2.4*	
F100			Ignition switch ON (Engine stopped.)	Approx. 0.4	
79 [MAF sensor (bank 2) signal]		MAF sensor (bank 2) 94	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2	
	` '		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9	
			Idle to approx. 4,000 rpm	0.9 - 1.2 to approx. 2.4*	

<sup>\*:</sup> Check for linear voltage rise in response to engine being increased to approximately 4,000 rpm.

#### Is the inspection result normal?

YES >> INSPECTION END.

NO >> GO TO 2.

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

- 1. Turn ignition switch OFF.
- Check for the cause of uneven air flow through MAF sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

# 3.CHECK MAF SENSOR-II

#### (I) With CONSULT-III

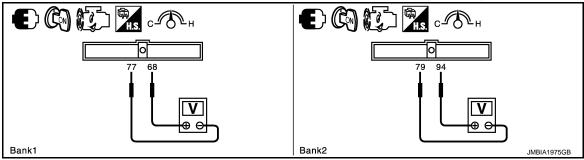
- 1. Repair or replace malfunctioning part.
- Start engine and warm it up to normal operating temperature.
- 3. Connect CONSULT-III and select "DATA MONITOR" mode.
- 4. Select "MAS A/F SE-B1" and "MAS A/F SE-B2", and check the indication.

Monitor item	Condition	Indication (V)
	Ignition switch ON (Engine stopped.)	Approx. 0.4
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
MAS A/F SE-B2	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9
	Idle to approx. 4,000 rpm	0.9 - 1.2 to approx. 2.4*

<sup>\*:</sup> Check for linear voltage rise in response to engine being increased to approximately 4,000 rpm.

#### Without CONSULT-III

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



ECM					
Connector	+	_	Condition	Voltage (V)	
Connector	Terminal	Terminal			
			Ignition switch ON (Engine stopped.)	Approx. 0.4	
	77 [MAF sensor (bank 1) signal]	68	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2	
		00	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9	
F106			Idle to approx. 4,000 rpm	0.9 - 1.2 to approx. 2.4*	
F100			Ignition switch ON (Engine stopped.)	Approx. 0.4	
	79		Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2	
[MAF sensor (bank 2) signal]	94	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9		
			Idle to approx. 4,000 rpm	0.9 - 1.2 to approx. 2.4*	

<sup>\*:</sup> Check for linear voltage rise in response to engine being increased to approximately 4,000 rpm.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

### 4. CHECK MAF SENSOR-III

#### (I) With CONSULT-III

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

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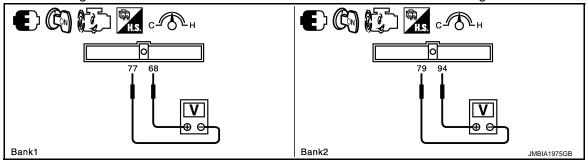
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Monitor item	Condition	Indication (V)
	Ignition switch ON (Engine stopped.)	Approx. 0.4
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
MAS A/F SE-B2	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9
	Idle to approx. 4,000 rpm	0.9 - 1.2 to approx. 2.4*

<sup>\*:</sup> Check for linear voltage rise in response to engine being increased to approximately 4,000 rpm.

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

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



ECM					
Connector	+	_	Condition	Voltage (V)	
Connector	Terminal	Terminal			
			Ignition switch ON (Engine stopped.)	Approx. 0.4	
	77 [MAF sensor (bank 1) signal]	nk 1) 68	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2	
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9	
F106			Idle to approx. 4,000 rpm	0.9 - 1.2 to approx. 2.4*	
F100			Ignition switch ON (Engine stopped.)	Approx. 0.4	
	79	94	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2	
	[MAF sensor (bank 2) signal]	. ()	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9	
			Idle to approx. 4,000 rpm	0.9 - 1.2 to approx. 2.4*	

<sup>\*:</sup> Check for linear voltage rise in response to engine being increased to approximately 4,000 rpm.

#### Is the inspection result normal?

YES >> INSPECTION END

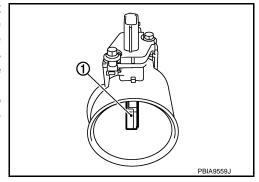
NO >> Clean or replace malfunctioning MAF sensor.

### P0102, P0103, P010C, P010D MAF SENSOR

Description

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

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



DTC Logic

#### DTC DETECTION LOGIC

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

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### Which DTC is detected?

P0102. P010C>>GO TO 2.

P0103, P010D>>GO TO 3.

# 2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102 AND P010C

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

#### Is DTC detected?

YES >> Go to EC-208, "Diagnosis Procedure".

NO >> INSPECTION END

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

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

Revision: 2009 June EC-205 2010 M35/M45

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#### < COMPONENT DIAGNOSIS >

[VQ35HR]

#### Is DTC detected?

YES >> Go to EC-208, "Diagnosis Procedure".

NO >> GO TO 4.

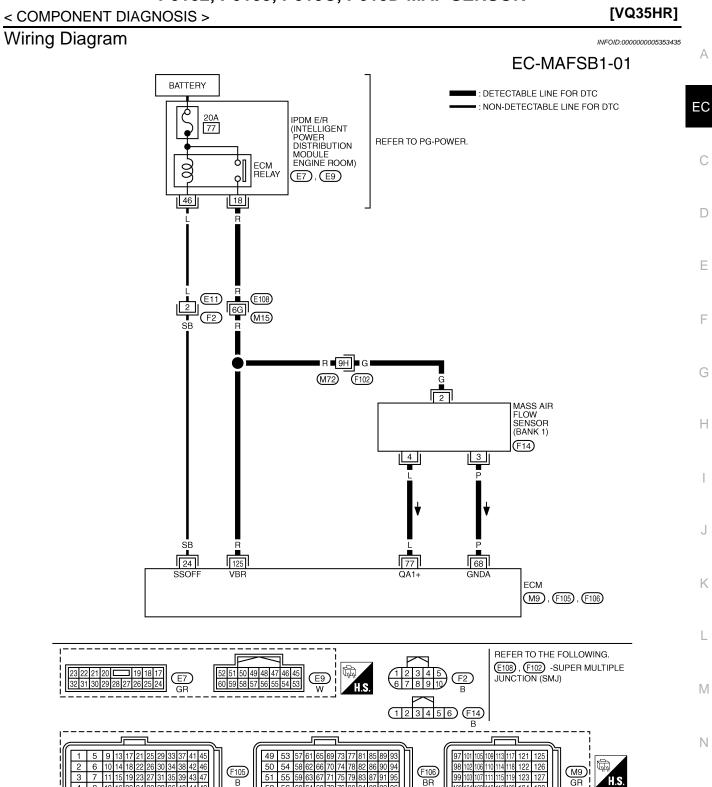
# 4. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103 AND P010D-II

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

#### Is DTC detected?

>> Go to <u>EC-208</u>, "<u>Diagnosis Procedure"</u>. >> INSPECTION END YES

NO

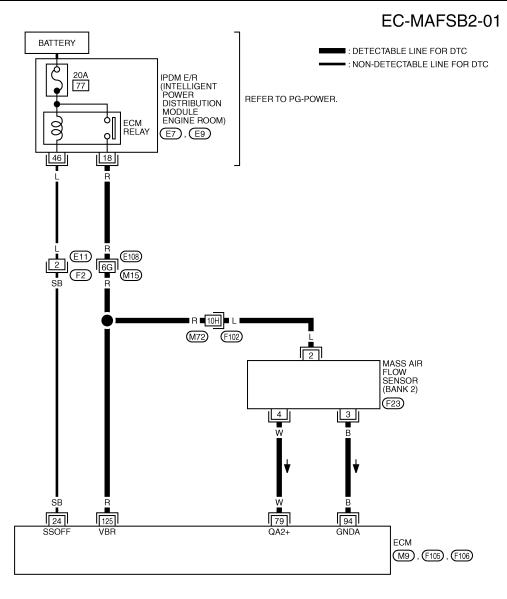


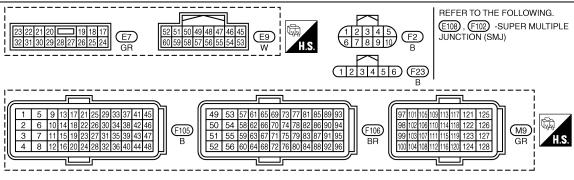
Revision: 2009 June **EC-207** 2010 M35/M45

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TBWT2423E





### Diagnosis Procedure

INFOID:0000000005353436

TBWT2424E

### 1. INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

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

#### < COMPONENT DIAGNOSIS >

#### [VQ35HR]

# 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 connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

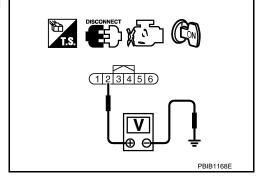
YES >> GO TO 4.

NO >> Repair or replace ground connections.

# 4.CHECK MASS AIR FLOW (MAF) SENSOR POWER SUPPLY CIRCUIT

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

DTC	MAF sensor			Ground	Voltage
ыс	Bank	Connector	Terminal	Giodila	vollage
P0102, P0103	1	F14	2	Ground	Battery voltage
P010C, P010D	2	F23	2	Giodila	Ballery Vollage



#### Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

### 5. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E108, M15
- Harness connectors F102, M72
- Harness for open or short between MAF sensor and ECM
- Harness for open or short between MAF sensor and IPDM E/R

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

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

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

DTC		MAF sensor		ECM		Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0102, P0103	1	F14	3	F106	68	Existed
P010C, P010D	2	F23	3	1 100	94	LXISIGU

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

#### Is the inspection result normal?

YES >> GO TO 7.

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

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

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#### < COMPONENT DIAGNOSIS >

[VQ35HR]

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

DTC		MAF sense	or	ECM		Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0102, P0103	1	F14	4	F106	77	Existed
P010C, P010D	2	F23	4	1 100	79	LAISIEU

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

#### Is the inspection result normal?

YES >> GO TO 8.

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

### 8.CHECK MAF SENSOR

Refer to EC-210, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace malfunctioning mass air flow sensor.

### 9. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

# Component Inspection

INFOID:0000000005353437

# 1. CHECK MASS AIR FLOW (MAF) SENSOR-I

#### (II) With CONSULT-III

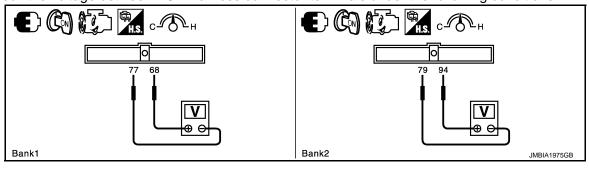
- 1. Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT-III and select "DATA MONITOR" mode.
- 5. Select "MAS A/F SE-B1" and "MAS A/F SE-B2", and check the indication.

Monitor item	Condition	Indication (V)
	Ignition switch ON (Engine stopped.)	Approx. 0.4
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
MAS A/F SE-B2	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9
	Idle to approx. 4,000 rpm	0.9 - 1.2 to approx. 2.4*

<sup>\*:</sup> Check for linear voltage rise in response to engine being increased to approximately 4,000 rpm.

#### **⋈**Without CONSULT-III

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



< COMPONENT DIAGNOSIS >

[VQ35HR]

	ECM				
Connector	+	+ – Condition		Voltage (V)	
Connector	Terminal	Terminal			
			Ignition switch ON (Engine stopped.)	Approx. 0.4	
	77	68	Idle (Engine is warmed-up to normal operating temperature.)		
	[MAF sensor (bank 1) signal]	( )	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9	
F106			Idle to approx. 4,000 rpm	0.9 - 1.2 to approx. 2.4*	
F100		79 MAF sensor (bank 2) 94 signal]	Ignition switch ON (Engine stopped.)	Approx. 0.4	
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2	
	• , ,		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9	
			Idle to approx. 4,000 rpm	0.9 - 1.2 to approx. 2.4*	

<sup>\*:</sup> Check for linear voltage rise in response to engine being increased to approximately 4,000 rpm.

#### Is the inspection result normal?

YES >> INSPECTION END.

NO >> GO TO 2.

# $2. \mathsf{CHECK}$ for the cause of uneven air flow through MAF sensor

- Turn ignition switch OFF.
- 2. Check for the cause of uneven air flow through MAF sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

#### Is the inspection result normal?

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

# 3.CHECK MAF SENSOR-II

#### With CONSULT-III

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

Monitor item	Condition	Indication (V)
	Ignition switch ON (Engine stopped.)	Approx. 0.4
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
MAS A/F SE-B2	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9
	Idle to approx. 4,000 rpm	0.9 - 1.2 to approx. 2.4*

<sup>\*:</sup> Check for linear voltage rise in response to engine being increased to approximately 4,000 rpm.

#### Without CONSULT-III

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

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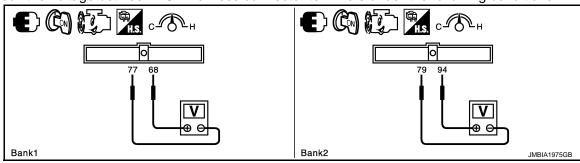
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Check the voltage between ECM harness connector terminals under the following conditions.



	ECM				
Connector	+	-	Condition	Voltage (V)	
Connector	Terminal	Terminal			
			Ignition switch ON (Engine stopped.)	Approx. 0.4	
	77	77 AF sensor (bank 1) 68 signal]	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2	
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9	
E400			Idle to approx. 4,000 rpm	0.9 - 1.2 to approx. 2.4*	
F106		79 IAF sensor (bank 2) 94 signal]	Ignition switch ON (Engine stopped.)	Approx. 0.4	
[M			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2	
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9	
			Idle to approx. 4,000 rpm	0.9 - 1.2 to approx. 2.4*	

<sup>\*:</sup> Check for linear voltage rise in response to engine being increased to approximately 4,000 rpm.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4. CHECK MAF SENSOR-III

#### (P)With CONSULT-III

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

Monitor item	Condition	Indication (V)
	Ignition switch ON (Engine stopped.)	Approx. 0.4
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
MAS A/F SE-B2	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9
	Idle to approx. 4,000 rpm	0.9 - 1.2 to approx. 2.4*

<sup>\*:</sup> Check for linear voltage rise in response to engine being increased to approximately 4,000 rpm.

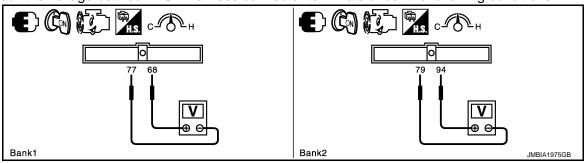
#### **®Without CONSULT-III**

- 1. Turn ignition switch OFF.
- 2. Disconnect MAF sensor harness connector and reconnect it again.
- Start engine and warm it up to normal operating temperature.

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

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



	ECM			
Connector	+	_	Condition	Voltage (V)
Connector	Terminal	Terminal		
			Ignition switch ON (Engine stopped.)	Approx. 0.4
	77	77 AF sensor (bank 1) 68 signal]	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9
F106	F400		Idle to approx. 4,000 rpm	0.9 - 1.2 to approx. 2.4*
F106		79	Ignition switch ON (Engine stopped.)	Approx. 0.4
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
•	[MAF sensor (bank 2) signal]	94	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9
			Idle to approx. 4,000 rpm	0.9 - 1.2 to approx. 2.4*

<sup>\*:</sup> Check for linear voltage rise in response to engine being increased to approximately 4,000 rpm.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Clean or replace malfunctioning MAF sensor.

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### P0112, P0113 IAT SENSOR

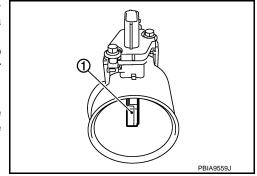
Description INFOID:000000005353438

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

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

#### NOTE:

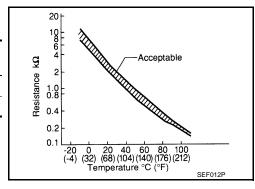
ECM uses only the intake air temperature sensor (bank 1) for engine control and self-diagnosis. It does not use the intake air temperature sensor (bank 2).



#### <Reference data>

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

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



### **DTC** Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112	Intake air temperature sensor (bank 1) circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors     (The sensor circuit is open or short-
P0113	Intake air temperature sensor (bank 1) circuit high input	An excessively high voltage from the sensor is sent to ECM.	ed.) • Intake air temperature sensor

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

### >> GO TO 2.

### 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 5 seconds.
- Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-215, "Diagnosis Procedure".

NO >> INSPECTION END

Wiring Diagram

[VQ35HR]

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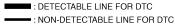
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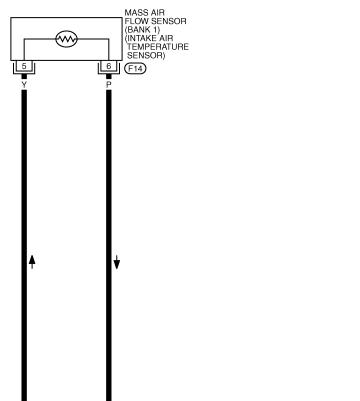
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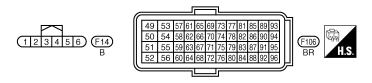
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### EC-IATSB1-01







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ECM

(F106)

TBWT2425E

# Diagnosis Procedure

# 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connections M16, M70. Refer to <u>EC-158, "Ground Inspection"</u>.

Is the inspection result normal?

Revision: 2009 June **EC-215** 2010 M35/M45

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#### < COMPONENT DIAGNOSIS >

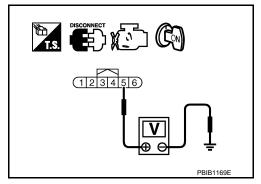
YES >> GO TO 2.

NO >> Repair or replace ground connections.

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

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

MAF sensor (bank 1)		Ground	Voltage (V)
Connector	Terminal	Oround	voltage (v)
F14	5	Ground	Approx. 5



#### Is the inspection result normal?

YES >> GO TO 3.

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

### 3.CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between MAF sensor (bank 1) harness connector and ECM harness connector.

MAF sensor (bank 1)		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F14	6	F106	68	Existed

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

#### Is the inspection result normal?

YES >> GO TO 4.

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

### 4. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-216, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 5.

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

### **5.**CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

# Component Inspection

INFOID:0000000005353442

# 1. CHECK INTAKE AIR TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- Disconnect mass air flow sensor (bank 1) harness connector.

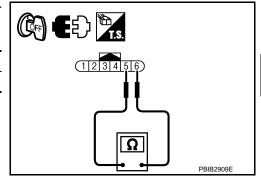
### **P0112, P0113 IAT SENSOR**

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

Check resistance between mass air flow sensor (bank 1) terminals as per the following.

Terminals	Condition	Resistance (kΩ)	
5 and 6	Temperature [°C (°F)]	25 (77)	1.800 - 2.200



#### Is the inspection result normal?

YES >> INSPECTION END

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

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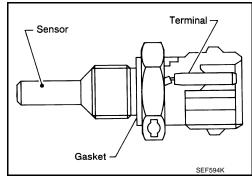
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### P0116 ECT SENSOR

Description INFOID.000000005353443

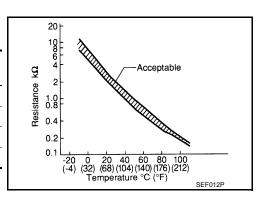
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



#### <Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

<sup>\*:</sup> These data are reference values and are measured between ECM terminals 71 (Engine coolant temperature sensor) and 84 (Sensor ground).



INFOID:0000000005353444

### **DTC** Logic

#### DTC DETECTION LOGIC

#### NOTE:

If DTC P0116 is displayed with DTC P0117 or P0118, first perform the trouble diagnosis for DTC P0117, P0118. Refer to <a href="EC-220">EC-220</a>, "DTC Logic".

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

#### DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

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

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

#### **TEST CONDITION:**

Before performing the following procedure, do not add fuel.

>> GO TO 2.

### 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and warm it up to normal operating temperature.
- 2. Rev engine up to 2,000 rpm for more than 10 minutes.
- 3. Move the vehicle to a cool place, then stop engine.

#### **P0116 ECT SENSOR**

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

4. Check resistance between "fuel level sensor unit and fuel pump (main)" terminals 4 and 5.

5. Soak the vehicle until the resistance between "fuel level sensor unit and fuel pump (main)" terminals 4 and 5 becomes 0.5 k $\Omega$  higher than the value measured before soaking.

**CAUTION:** 

Never turn ignition switch ON during soaking.

NOTE:

Soak time changes depending on ambient air temperature. It may take several hours.

- 6. Start engine and let it idle for 5 minutes.
- 7. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-219, "Diagnosis Procedure".

NO >> INSPECTION END

### Diagnosis Procedure

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

OK >> GO TO 2.

NG >> Repair or replace ground connections.

### 2.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-219, "Component Inspection".

#### Is the inspection result normal?

OK >> GO TO 3.

NG >> Replace engine coolant temperature sensor.

# 3. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

# Component Inspection

# 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

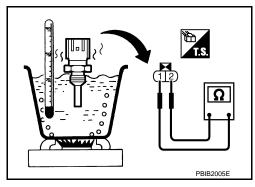
- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor.
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (k $\Omega$ )	
		20 (68)	2.1 - 2.9
1 and 2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor.



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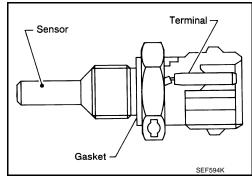
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### P0117, P0118 ECT SENSOR

**Description** 

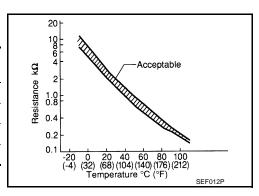
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



#### <Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

<sup>\*:</sup> These data are reference values and are measured between ECM terminals 71 (Engine coolant temperature sensor) and 84 (Sensor ground).



### **DTC** Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0117	Engine coolant tem- perature sensor cir- cuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors     (The sensor circuit is open or shorted.)
P0118	Engine coolant tem- perature sensor cir- cuit high input	An excessively high voltage from the sensor is sent to ECM.	Engine coolant temperature sensor

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### >> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

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

#### Is DTC detected?

YES >> Go to EC-221, "Diagnosis Procedure".

NO >> INSPECTION END

Revision: 2009 June **EC-220** 2010 M35/M45

[VQ35HR]

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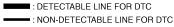
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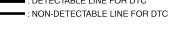
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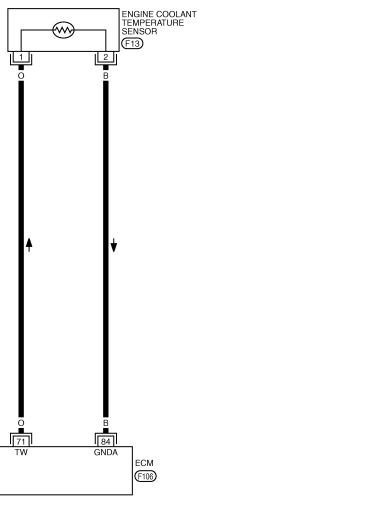
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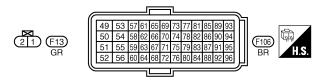


#### EC-ECTS-01









### Diagnosis Procedure

# 1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

Is the inspection result normal?

**EC-221** Revision: 2009 June 2010 M35/M45

TBWT2427E

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#### [VQ35HR]

#### < COMPONENT DIAGNOSIS >

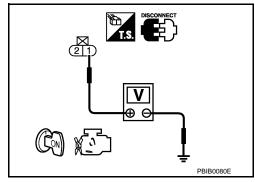
YES >> GO TO 2.

NO >> Repair or replace ground connections.

# 2.CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR POWER SUPPLY CIRCUIT

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

ECT :	sensor	Ground	Voltage (V)
Connector	Terminal	Oround	vollage (v)
F13	1	Ground	Approx. 5



#### Is the inspection result normal?

YES >> GO TO 3.

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

# ${f 3.}$ CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

ECT se	ensor	ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
F13	2	F106	84	Existed

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

#### Is the inspection result normal?

YES >> GO TO 4.

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

### 4. CHECK ECT SENSOR

Refer to EC-222, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace ECT sensor.

### 5. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

### Component Inspection

INFOID:0000000005353451

# 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.

### **P0117, P0118 ECT SENSOR**

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

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

Terminals	Condition	Resistance (kΩ)	
	Temperature [°C (°F)]	20 (68)	2.1 - 2.9
1 and 2		50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor.

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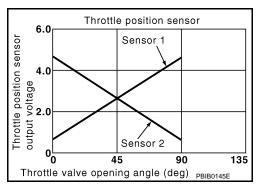
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### P0122, P0123, P0227, P0228 TP SENSOR

**Description** 

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

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



DTC Logic

INFOID:0000000005353453

#### DTC DETECTION LOGIC

#### NOTE:

If DTC P0122, P0123, P0227 or P0228 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <a href="EC-445">EC-445</a>, "DTC Logic".

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

#### DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

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

>> GO TO 2.

### 2.PERFORM DTC CONFIRMATION PROCEDURE

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

#### Is DTC detected?

YES >> Go to EC-226, "Diagnosis Procedure".

NO >> INSPECTION END

Wiring Diagram

INFOID:0000000005353454

### EC-TPS2B1-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

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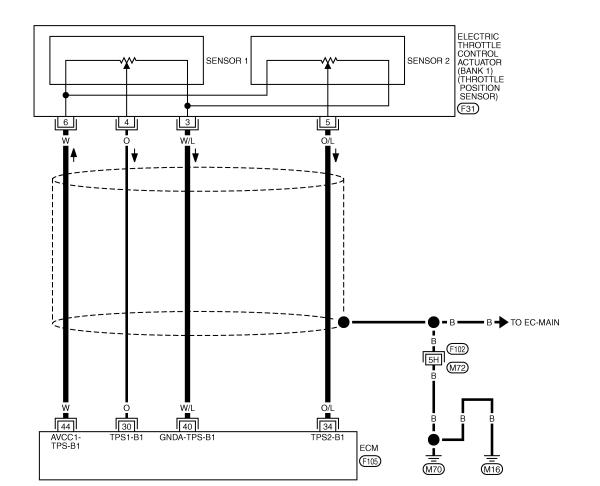
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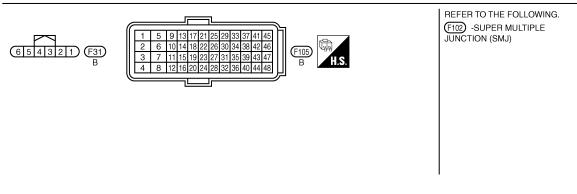
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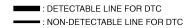
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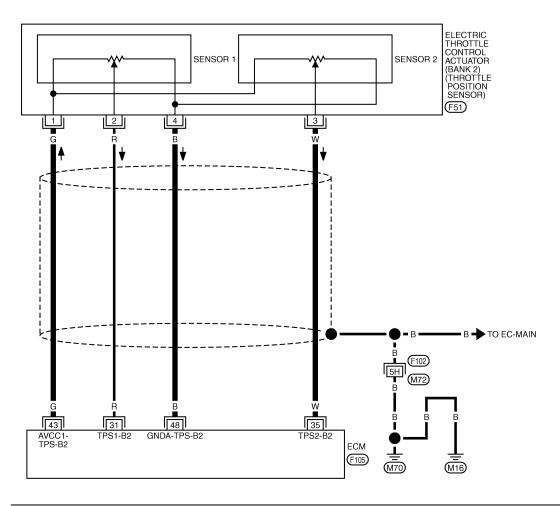


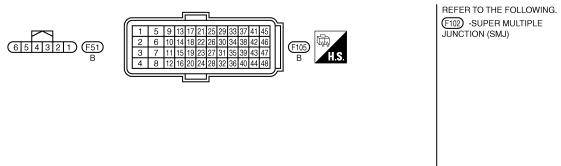


TBWT2428E

#### EC-TPS2B2-01







TBWT2429E

### Diagnosis Procedure

#### INFOID:0000000005353455

# 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

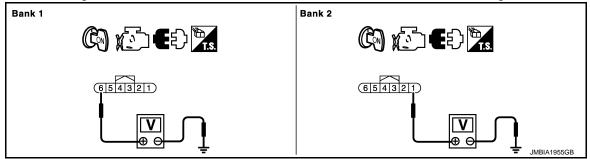
YES >> GO TO 2.

[VQ35HR]

NO >> Repair or replace ground connections.

# 2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

- Disconnect electric throttle control actuator harness connector.
- Turn ignition switch ON.
- Check the voltage between electric throttle control actuator harness connector and ground. 3.



DTC		Electric throttle control actuator			Voltage (V)
	Bank	Connector	Terminal	- Ground	Voltage (V)
P0122, P0123	1	F31	6	Ground	Approx. 5
P0227, P0228	2	F51	1	Ground	

#### Is the inspection result normal?

YES >> GO TO 3.

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

### 3.check throttle position sensor 2 ground circuit for open and short

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

DTC	Electric throttle control actuator		ECM		Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0122, P0123	1	F31	3	F105	40	Existed
P0227, P0228	2	F51	4	F 105	48	EXISTECT

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

#### Is the inspection result normal?

YES >> GO TO 4.

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

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

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

DTC	Electri	Electric throttle control actuator			ECM	
ы	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0122, P0123	1	F31	5	F105	34	Existed
P0227, P0228	2	F51	3	F105	35	Existed

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

#### Is the inspection result normal?

YES >> GO TO 5.

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

#### ${f 5.}$ CHECK THROTTLE POSITION SENSOR

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#### P0122, P0123, P0227, P0228 TP SENSOR

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

Refer to EC-228, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

### 6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace malfunctioning electric throttle control actuator.
- 2. Go to EC-229, "Special Repair Requirement".

#### >> INSPECTION END

### 7. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

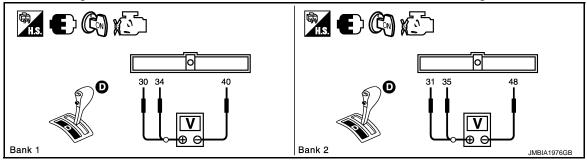
#### >> INSPECTION END

### Component Inspection

INFOID:0000000005353456

### 1. CHECK THROTTLE POSITION (TP) SENSOR

- 1. Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- 3. Perform EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set selector lever position to D.
- 6. Check the voltage between ECM harness connector terminals under the following conditions.



ECM				
Connector	+	_	Condition	Voltage (V)
Connector	Terminal	Terminal		
	30	40	Accelerator pedal: Fully released	More than 0.36
	[TP sensor 1 (bank 1)]	40	Accelerator pedal: Fully depressed	Less than 4.75
	31 [TP sensor 1 (bank 2)]	48	Accelerator pedal: Fully released	More than 0.36
F105			Accelerator pedal: Fully depressed	Less than 4.75
F105	34	40	Accelerator pedal: Fully released	Less than 4.75
	[TP sensor 2 (bank 1)]	40	Accelerator pedal: Fully depressed	More than 0.36
	35	40	Accelerator pedal: Fully released	Less than 4.75
	[TP sensor 2 (bank 2)] 48		Accelerator pedal: Fully depressed	More than 0.36

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

## 2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace malfunctioning electric throttle control actuator.
- 2. Go to EC-229, "Special Repair Requirement".

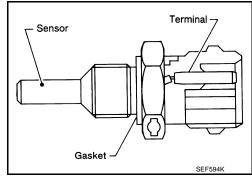
### P0122, P0123, P0227, P0228 TP SENSOR

[VQ35HR] < COMPONENT DIAGNOSIS > Α >> INSPECTION END Special Repair Requirement INFOID:0000000005353457 EC 1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING Refer to EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement" C >> GO TO 2. 2. PERFORM IDLE AIR VOLUME LEARNING D Refer to EC-27, "IDLE AIR VOLUME LEARNING: Special Repair Requirement" >> END Е F Н K L M Ν

#### P0125 ECT SENSOR

Description INFOID.000000005353458

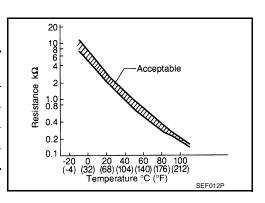
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



#### <Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

<sup>\*:</sup> These data are reference values and are measured between ECM terminals 71 (Engine coolant temperature sensor) and 84 (Sensor ground).



INFOID:0000000005353459

### DTC Logic

#### DTC DETECTION LOGIC

#### NOTE:

- If DTC P0125 is displayed with DTC P0117 or P0118, first perform the trouble diagnosis for DTC P0117, P0118. Refer to <u>EC-220, "DTC Logic"</u>.
- If DTC P0125 is displayed with DTC P0116, first perform the trouble diagnosis for DTC P0116. Refer to EC-218, "DTC Logic".

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

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### >> GO TO 2.

### 2. CHECK ENGINE COOLANT TEMPERATURE SENSOR FUNCTION

#### (P)With CONSULT-III

1. Turn ignition switch ON.

#### P0125 ECT SENSOR

[VQ35HR] < COMPONENT DIAGNOSIS > Select "DATA MONITOR" mode with CONSULT-III. Check that "COOLAN TEMP/S" is above 10°C (50°F). Α **With GST** Follow the procedure "With CONSULT-III" above. Is the temperature above 10°C (50°F)? EC >> INSPECTION END YES NO >> GO TO 3. 3.PERFORM DTC CONFIRMATION PROCEDURE (P)With CONSULT-III Start engine and run it for 65 minutes at idle speed. D If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK. **CAUTION:** Never overheat engine. Е 2. Check 1st trip DTC. Follow the procedure "With CONSULT-III" above. F Is 1st trip DTC detected? >> <u>EC-231, "Diagnosis Procedure"</u> >> INSPECTION END YES NO Diagnosis Procedure INFOID:0000000005353460 CHECK GROUND CONNECTION Н Turn ignition switch OFF. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection". Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace ground connections. 2.CHECK ENGINE COOLANT TEMPERATURE SENSOR Refer to EC-231, "Component Inspection". Is the inspection result normal? YES >> GO TO 3. NO >> Replace engine coolant temperature sensor. 3.CHECK THERMOSTAT OPERATION When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm that the engine coolant does not flow. Is the inspection result normal? YES >> GO TO 4. NO >> Repair or replace thermostat. Refer to CO-26, "Removal and Installation". Ν 4. CHECK INTERMITTENT INCIDENT Refer to EC-154, "Description". >> INSPECTION END Component Inspection INFOID:0000000005353461 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR Turn ignition switch OFF. Disconnect engine coolant temperature sensor harness connector. 2.

Revision: 2009 June **EC-231** 2010 M35/M45

Remove engine coolant temperature sensor.

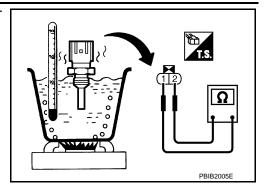
### **P0125 ECT SENSOR**

### < COMPONENT DIAGNOSIS >

[VQ35HR]

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

Terminals	Condition		Resistance (k $\Omega$ )
1 and 2		20 (68)	2.1 - 2.9
	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260



#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor.

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### P0127 IAT SENSOR

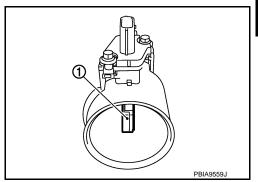
Description INFOID:000000005353462

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

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

#### NOTE:

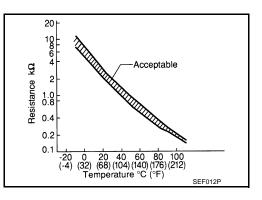
ECM uses only the intake air temperature sensor (bank 1) for engine control and self-diagnosis. It does not use the intake air temperature sensor (bank 2).



#### <Reference data>

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

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



DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0127	Intake air temperature too high	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	Harness or connectors     (The sensor circuit is open or shorted)     Intake air temperature sensor

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

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

>> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

### **With CONSULT-III**

- 1. Wait until engine coolant temperature is less than 96°C (205°F)
- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-III.
- Check the engine coolant temperature.

Revision: 2009 June **EC-233** 2010 M35/M45

#### < COMPONENT DIAGNOSIS >

 If the engine coolant temperature is not less than 96°C (205°F), turn ignition switch OFF and cool down engine.

#### NOTE:

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

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

#### **CAUTION:**

#### Always drive vehicle at a safe speed.

6. Check 1st trip DTC.

#### With GST

Follow the procedure "With CONSULT-III" above.

#### Is 1st trip DTC detected?

YES >> Go to EC-234, "Diagnosis Procedure".

NO >> INSPECTION END

### Diagnosis Procedure

INFOID:0000000005353464

### 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connections.

## 2.CHECK INTAKE AIR TEMPERATURE SENSOR

#### Refer to EC-234, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 3.

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

# 3. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

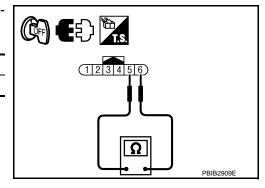
### Component Inspection

INFOID:0000000005353465

### 1. CHECK INTAKE AIR TEMPERATURE SENSOR

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

Terminals	Condition		Resistance (k $\Omega$ )
5 and 6	Temperature [°C (°F)]	25 (77)	1.800 - 2.200



#### Is the inspection result normal?

YES >> INSPECTION END

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

#### P0128 THERMOSTAT FUNCTION

< COMPONENT DIAGNOSIS >

[VQ35HR]

#### P0128 THERMOSTAT FUNCTION

DTC Logic INFOID:0000000005353466

#### DTC DETECTION LOGIC

If DTC P0128 is displayed with DTC P0300, P0301, P0302, P0303, P0304, P0305 or P0306, first perform the trouble diagnosis for DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306. Refer to EC-329. "DTC

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

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	<ul> <li>Thermostat</li> <li>Leakage from sealing portion of thermostat</li> <li>Engine coolant temperature sensor</li> </ul>

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

- For best results, perform at ambient temperature of -10°C (14°F) or higher.
- For best results, perform at engine coolant temperature of -10°C (14°F) to 56°C (133°F).
- Before performing the following procedure, do not add fuel.

>> GO TO 2.

### 2.PERFORM DTC CONFIRMATION PROCEDURE

#### (P)With CONSULT-III

- 1. Turn A/C switch OFF.
- Turn blower fan switch OFF.
- 3. Turn ignition switch ON.
- Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III.
- Check the indication of "COOLAN TEMP/S".

If it is below 56°C (133°F), go to the next step.

If it is above 56°C (133°F), cool engine down to less than 56°C (133°F). Then go to next step.

6. Start engine and drive vehicle for 10 consecutive minutes under the following conditions.

VHCL SPEED SE More than 56 km/h (35 MPH)

#### **CAUTION:**

Always drive vehicle at a safe speed.

#### NOTE:

If "COOLAN TEMP/S" increases to more than 75°C (167°F) with in 10 minutes, turn ignition switch OFF because the test result will be OK.

Check 1st trip DTC.

#### ■With GST

Follow the procedure "With CONSULT-III" above.

#### Is 1st trip DTC detected?

YES >> Go to EC-236, "Diagnosis Procedure".

NO >> INSPECTION END EC

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#### **P0128 THERMOSTAT FUNCTION**

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

### Diagnosis Procedure

INFOID:0000000005353467

## 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-236, "Component Inspection".

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor.

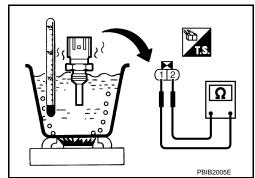
### Component Inspection

INFOID:0000000005353468

# 1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

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

Terminals	Condition	Resistance ( $k\Omega$ )	
1 and 2		20 (68)	2.1 - 2.9
	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260



#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor.

[VQ35HR]

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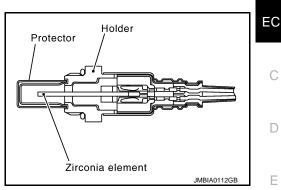
### P0130, P0150 A/F SENSOR 1

Description INFOID:0000000005353469

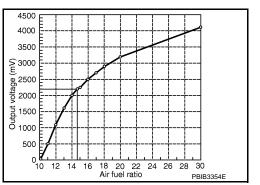
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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 approximately 800°C (1,472°F).



**DTC** Logic INFOID:0000000005353470

#### DTC DETECTION LOGIC

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

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible Cause
P0130 Air fuel ratio (A/F) sensor 1 (bank 1) circuit	A)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in a range other than approx. 2.2 V.		
	B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.	Harness or connectors     (The A/F sensor 1 circuit is open	
P0150 Air fuel ratio (A/F) sensor 1	A)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in a range other than approx. 2.2 V.	or shorted.) • A/F sensor 1	
(bank 2) circuit		B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.	

#### DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

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

>> GO TO 2.

#### < COMPONENT DIAGNOSIS >

# 2.perform dtc confirmation procedure for malfunction a

- 1. Start engine and warm it up to normal operating temperature.
- 2. Let it idle for 2 minutes.
- Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-241, "Diagnosis Procedure".

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

NO-2 >> With GST: GO TO 7.

### 3.CHECK A/F SENSOR 1 FUNCTION

#### (P)With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

#### Does the indication fluctuate around 2.2 V?

YES >> GO TO 4.

NO >> Go to EC-241, "Diagnosis Procedure".

### f 4 . PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-I

- Select "A/F SEN1 (B1) P1276" (for DTC P0130) or "A/F SEN1 (B2) P1286" (for DTC P0150) of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 2. Touch "START".
- 3. When the following conditions are met, "TESTING" will be displayed on the CONSULT-III screen.

ENG SPEED	1,100 - 3,200 rpm
VHCL SPEED SE	More than 64 km/h (40 mph)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	D position

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

#### CAUTION

Always drive vehicle at a safe speed.

#### Is "TESTING" displayed on CONSULT-III screen?

YES >> GO TO 5.

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

### ${f 5.}$ PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-II

Release accelerator pedal fully.

#### NOTE:

Never apply brake when releasing the accelerator pedal.

### Which does "TESTING" change to?

COMPLETED>>GO TO 6.

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

### 6.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-III

Touch "SELF-DIAG RESULT".

#### Which is displayed on CONSULT-III screen?

YES >> INSPECTION END

NO >> Go to EC-241, "Diagnosis Procedure".

### 7. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

#### **With GST**

Perform component function check. Refer to EC-239, "Component Function Check".

#### NOTE:

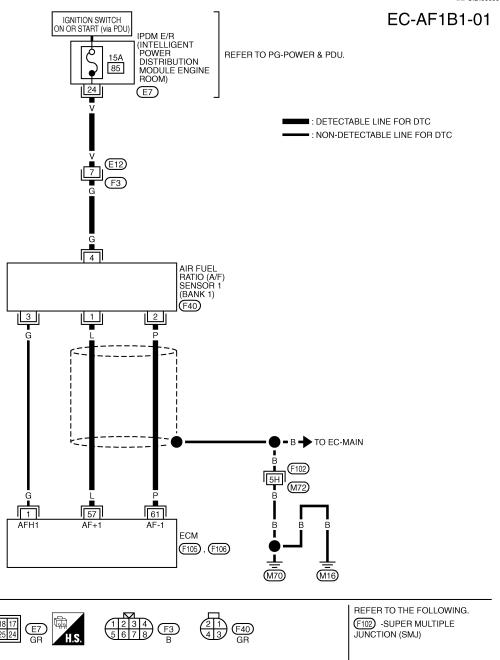
Use component function check to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

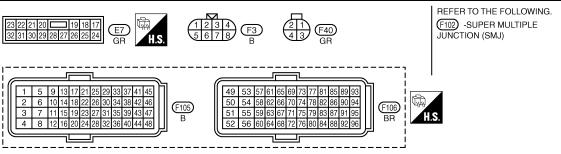
P0130, P0150 A/F SENSOR 1	
< COMPONENT DIAGNOSIS > [VQ35HR]	_
Is the inspection result normal?  YES >> INSPECTION END  NO >> Go to EC-241, "Diagnosis Procedure".	А
Component Function Check	EC
1.PERFORM COMPONENT FUNCTION CHECK	LO
With GST	_ C
<ol> <li>Start engine and warm it up to normal operating temperature.</li> <li>Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.</li> <li>Shift the selector lever position to D, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (31 MPH).</li> <li>CAUTION:         Always drive vehicle at a safe speed.     </li> </ol>	d D
NOTE:  Never apply brake when releasing the accelerator pedal.  4. Repeat steps 2 and 3 for 5 times.	Е
<ul> <li>5. Stop the vehicle and turn ignition switch OFF.</li> <li>6. Wait at least 10 seconds and restart engine.</li> <li>7. Repeat steps 2 and 3 for 5 times.</li> </ul>	F
<ul><li>8. Stop the vehicle and connect GST to the vehicle.</li><li>9. Check 1st trip DTC.</li><li>Is 1st trip DTC detected?</li></ul>	G
YES >> Go to EC-241, "Diagnosis Procedure". NO >> INSPECTION END	Н
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EC-239 Revision: 2009 June 2010 M35/M45

Wiring Diagram

INFOID:0000000005353472



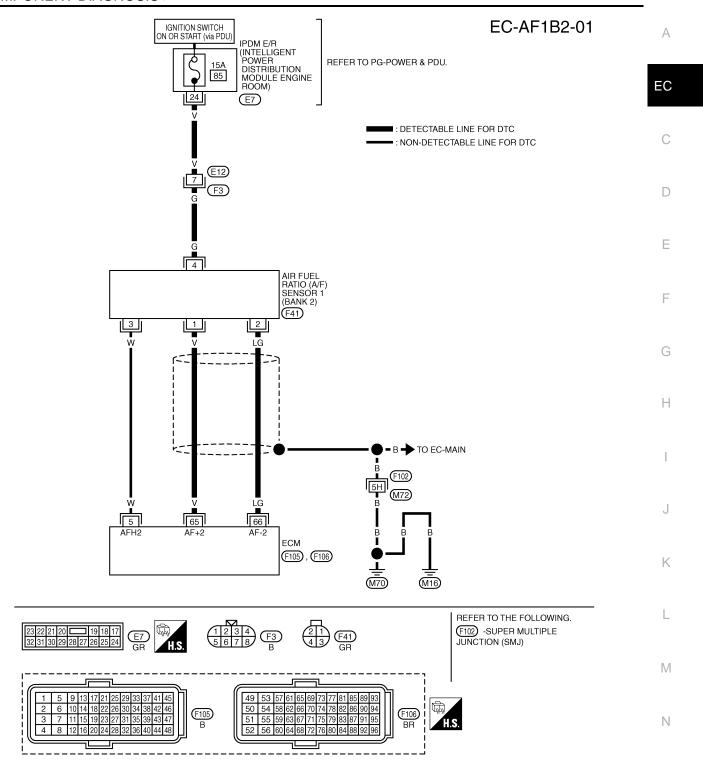


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INFOID:0000000005353473



# Diagnosis Procedure

# 1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

YES >> GO TO 2.

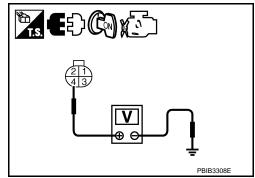
#### < COMPONENT DIAGNOSIS >

NO >> Repair or replace ground connections.

# $2. {\sf CHECK\ AIR\ FUEL\ RATIO\ (A/F)\ SENSOR\ 1\ POWER\ SUPPLY\ CIRCUIT}$

- 1. Disconnect A/F sensor 1 harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between A/F sensor 1 harness connector and ground.

DTC	A/F sensor 1			Ground	Voltage	
DIC	Bank	Connector	Terminal	Ground	voltage	
P0130	1	F40	4	Ground	Battery voltage	
P0150	2	F41	4	Giodila	Ballery Vollage	



#### Is the inspection result normal?

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

## 3. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E12, F3
- IPDM E/R harness connector E7
- 15 A fuse (No. 85)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

### 4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	A/F sensor 1			EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0130	1	F40	1		57	
F0130		1   F40	2	2 F106	61	Existed
P0150	2	F41	1	F100	65	Existed
	0 2 F41	2			66	

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

DTC	A/F sensor 1			Ground	Continuity
DIC	Bank	nk Connector Termina		Giouna	Continuity
P0130	1	F40	1		
F0130	'	1 40	2	Ground	Not existed
P0150	2	F41	1	Giouna	Not existed
F0150		F41	2		

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DTC	ECM		Ground	Continuity
DIC	Connector	Terminal	Giodila	Continuity
P0130		57		Not existed
F0130	F4.00	61	Ground	
D0450	F106	65		
P0150		66		
. Alco oboo	k harnoss for	ahart ta naus		

5. Also check harness for short to power.

#### Is the inspection result normal?

YES >> GO TO 5.

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

### 5. CHECK INTERMITTENT INCIDENT

Perform EC-154, "Description".

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

### 6. REPLACE A/F SENSOR 1

Replace malfunctioning A/F sensor 1.

#### **CAUTION:**

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

>> INSPECTION END

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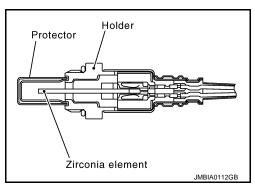
### P0131, P0151 A/F SENSOR 1

Description INFOID:000000005353474

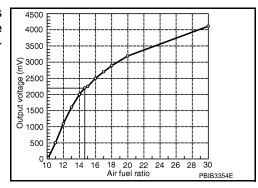
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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 approximately 800°C (1,472°F).



DTC Logic

#### DTC DETECTION LOGIC

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0131	Air fuel ratio (A/F) sensor 1 (bank 1) circuit low voltage	The A/F signal computed by ECM from the A/	Harness or connectors     (The A/F sensor 1 circuit is open or
P0151	Air fuel ratio (A/F) sensor 1 (bank 2) circuit low voltage	F sensor 1 signal is constantly approx. 0 V.	shorted.) • A/F sensor 1

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

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

>> GO TO 2.

### 2. CHECK A/F SENSOR FUNCTION

### (I) With CONSULT-III

- Start engine and warm it up to normal operating temperature.
- 2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT-III.
- Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

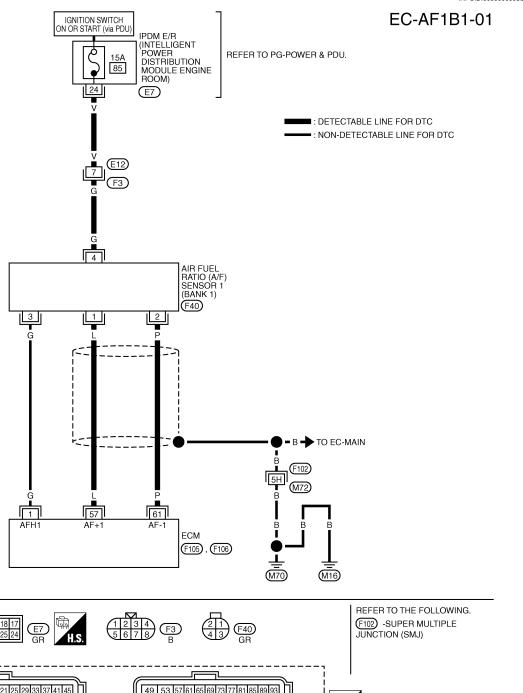
#### P0131, P0151 A/F SENSOR 1 [VQ35HR] < COMPONENT DIAGNOSIS > With GST Follow the procedure "With CONSULT-III" above. Α Is the indication constantly approx. 0 V? >> Go to EC-247, "Diagnosis Procedure". YES EC NO >> GO TO 3. 3. PERFORM DTC CONFIRMATION PROCEDURE (P)With CONSULT-III C Turn ignition switch OFF, wait at least 10 seconds and then restart engine. 2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine. CAUTION: D Always drive vehicle at a safe speed. 3. Maintain the following conditions for approximately 20 consecutive seconds. Е **ENG SPEED** 1,000 - 3,200 rpm VHCL SPEED SE More than 40 km/h (25 mph) B/FUEL SCHDL 1.5 - 9.0 msec F Selector lever Suitable position NOTE: Keep the accelerator pedal as steady as possible during cruising. If this procedure is not completed within 1 minute after restarting engine at step 1, return to step Check 1st trip DTC. Н With GST Follow the procedure "With CONSULT-III" above. Is 1st trip DTC detected? YES >> Go to EC-247, "Diagnosis Procedure". NO >> INSPECTION END

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Wiring Diagram

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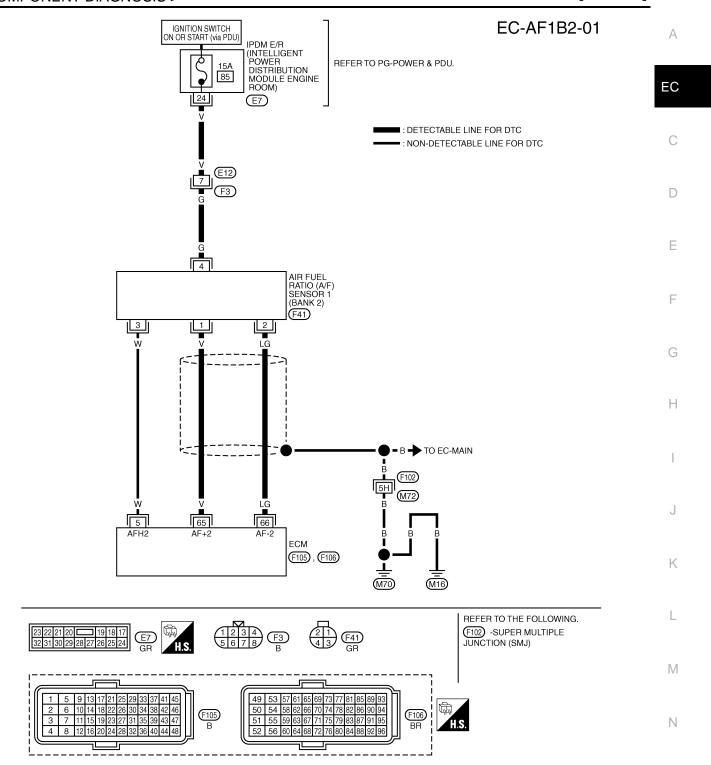
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TBWT2431E

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### Diagnosis Procedure

# 1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

YES >> GO TO 2.

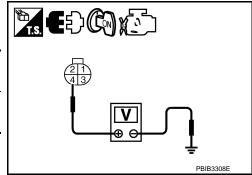
#### < COMPONENT DIAGNOSIS >

NO >> Repair or replace ground connections.

# $2.\mathsf{CHECK}$ AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect A/F sensor 1 harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between A/F sensor 1 harness connector and ground.

DTC	A/F sensor 1			Ground	Voltage
DIC	Bank	Connector	Terminal	Giodila	voltage
P0131	1	F40	4	Ground	Battery voltage
P0151	2	F41	4	Giodila	Battery voltage



#### Is the inspection result normal?

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

## 3. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E12, F3
- IPDM E/R harness connector E7
- 15 A fuse (No. 85)
- Harness for open or short between A/F sensor 1 and fuse

#### >> Repair or replace harness or connectors.

### 4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	A/F sensor 1			EC	Continuity		
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0131	1	F40	1		57		
F0131		F40	2	F106	61	Existed	
P0151	2	E/11	1	F100	65	Existed	
FUISI	2	F41	2   741	2		66	

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

DTC	A/F sensor 1			Ground	Continuity
DIC	Bank	nk Connector Terminal		Giodila	Continuity
P0131	1	F40	1		
F0131	'	1 40	2	Ground	Not existed
P0151	2	E41	1	Giouna	Not existed
	2 F41		2		

DTC	E	СМ	Ground	Continuity	
DIC	Connector	Terminal	Giodila		
P0131		57			
P0131	F4.00	61	Ground	Not existed	
P0151	F106	65			
PUISI		66			
Also shock harness for short to nower					

Also check harness for short to power.

#### Is the inspection result normal?

YES >> GO TO 5.

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

### 5. CHECK INTERMITTENT INCIDENT

Perform EC-154, "Description".

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

### 6. REPLACE A/F SENSOR 1

Replace malfunctioning A/F sensor 1.

#### **CAUTION:**

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

>> INSPECTION END

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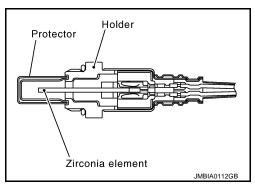
### P0132, P0152 A/F SENSOR 1

Description INFOID:0000000005353478

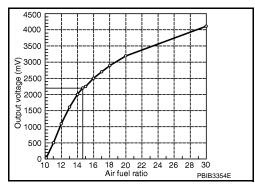
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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 approximately 800°C (1,472°F).



DTC Logic

#### DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the air fuel ratio (A/F) signal computed by ECM from the A/F sensor 1 signal is not inordinately high.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	Air fuel ratio (A/F) sensor 1 (bank 1) circuit high voltage	The A/F signal computed by ECM from the A/F	Harness or connectors (The A/F sensor 1 circuit is open or
P0152	Air fuel ratio (A/F) sensor 1 (bank 2) circuit high voltage	sensor 1 signal is constantly approx. 5 V.	shorted.) • A/F sensor 1

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

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

>> GO TO 2.

### 2.CHECK A/F SENSOR FUNCTION

### (I) With CONSULT-III

- Start engine and warm it up to normal operating temperature.
- 2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT-III.
- Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

#### P0132, P0152 A/F SENSOR 1 [VQ35HR] < COMPONENT DIAGNOSIS > With GST Follow the procedure "With CONSULT-III" above. Α Is the indication constantly approx. 5 V? >> Go to EC-253, "Diagnosis Procedure". YES EC NO >> GO TO 3. 3. PERFORM DTC CONFIRMATION PROCEDURE (P)With CONSULT-III C Turn ignition switch OFF, wait at least 10 seconds and then restart engine. 2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine. CAUTION: D Always drive vehicle at a safe speed. 3. Maintain the following conditions for approximately 20 consecutive seconds. Е **ENG SPEED** 1,000 - 3,200 rpm VHCL SPEED SE More than 40 km/h (25 mph) B/FUEL SCHDL 1.5 - 9.0 msec F Selector lever Suitable position NOTE: Keep the accelerator pedal as steady as possible during cruising. If this procedure is not completed within 1 minute after restarting engine at step 1, return to step Check 1st trip DTC. Н With GST Follow the procedure "With CONSULT-III" above. Is 1st trip DTC detected? YES >> Go to EC-253, "Diagnosis Procedure". NO >> INSPECTION END

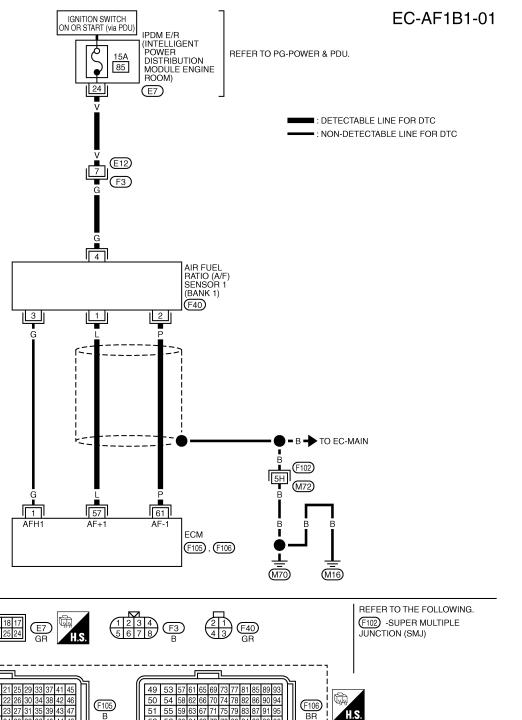
Revision: 2009 June **EC-251** 2010 M35/M45

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Wiring Diagram

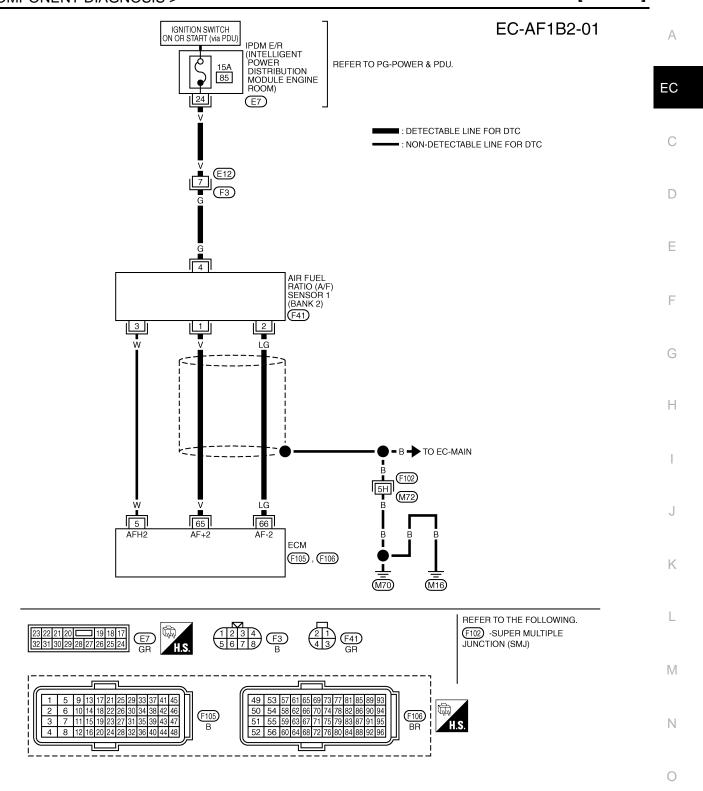
INFOID:0000000005353480



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TBWT2431E

INFOID:0000000005353481



### Diagnosis Procedure

# 1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connections M16, M70. Refer to <u>EC-158, "Ground Inspection"</u>.

#### Is the inspection result normal?

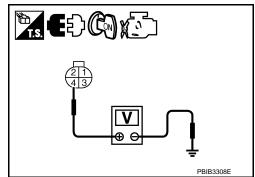
YES >> GO TO 2.

NO >> Repair or replace ground connections.

# $2.\mathsf{CHECK}$ AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect A/F sensor 1 harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between A/F sensor 1 harness connector and ground.

DTC	A/F sensor 1			Ground	Voltage	
DIC	Bank Connector Terminal		Giodila	Voltage		
P0132	1	F40	4	Ground	Battery voltage	
P0152	2	F41	4	Giodila	Ballery vollage	



#### Is the inspection result normal?

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

## 3. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E12, F3
- IPDM E/R harness connector E7
- 15 A fuse (No. 85)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

### 4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	A/F sensor 1			EC	Continuity		
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0132	1	F40	1	F106	57	Existed	
F0132	ı	F40	2		61		
P0152	2 544		52 2	1	F100	65	Existed
P0152	2 F41	2		66			

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

DTC		A/F sensor	Ground	Continuity		
DIC	Bank Conne		Terminal	Giouna	Continuity	
P0132	1	F40	1			
F0132	1 140	1 40	2	Ground	Not existed	
P0152	2	E41	1	Giouna	Not existed	
PU152	2 F41	2				

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DTC	E	СМ	Ground	Continuity		
DIC	Connector	Terminal	Ground			
P0132		57		Not existed		
F0132	F106	61	Ground			
P0152		65				
P0152		66				
5 Also chac	Also check harness for short to nower					

Also check harness for short to power.

#### Is the inspection result normal?

YES >> GO TO 5.

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

### 5. CHECK INTERMITTENT INCIDENT

Perform EC-154, "Description".

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

### 6. REPLACE A/F SENSOR 1

Replace malfunctioning A/F sensor 1.

#### **CAUTION:**

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

>> INSPECTION END

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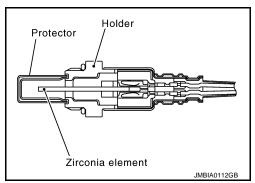
### P0133, P0153 A/F SENSOR 1

**Description** 

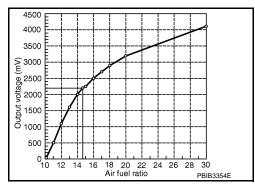
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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 approximately 800°C (1,472°F).



DTC Logic

#### DTC DETECTION LOGIC

To judge the malfunction of air fuel ratio (A/F) sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the A/F sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the A/F sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0133	Air fuel ratio (A/F) sensor 1 (bank 1) circuit slow response		Harness or connectors     (The A/F sensor 1 circuit is open or shorted.)
P0153	Air fuel ratio (A/F) sensor 1 (bank 2) circuit slow response	The response of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time.	<ul> <li>A/F sensor 1</li> <li>A/F sensor 1 heater</li> <li>Fuel pressure</li> <li>Fuel injector</li> <li>Intake air leaks</li> <li>Exhaust gas leaks</li> <li>PCV</li> <li>Mass air flow sensor</li> </ul>

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

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

Will CONSULT-III be used?

#### P0133, P0153 A/F SENSOR 1

[VQ35HR1 < COMPONENT DIAGNOSIS > YES >> GO TO 2. NO >> GO TO 5. Α 2.PERFORM DTC CONFIRMATION PROCEDURE-I With CONSULT-III EC 1. Start engine and warm it up to normal operating temperature. Turn ignition switch OFF and wait at least 10 seconds. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. Let engine idle for 1 minute. Select A/F SEN1(B1) P1278/P1279" (for DTC P0133) or A/F SEN1(B2) P1288/P1289" (for DTC P0153) of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III. Touch "START". D Is "COMPLETED" displayed on CONSULT-III screen? YES >> GO TO 3 NO >> GO TO 4. Е 3.perform dtc confirmation procedure-ii Touch "SELF-DIAG RESULT". F Which is displayed on CONSULT-III screen? OK >> INSPECTION END NG >> Go to EC-260, "Diagnosis Procedure". f 4 -PERFORM DTC CONFIRMATION PROCEDURE-II After perform the following procedure, "TESTING" will be displayed on the CONSULT-III screen. Increase the engine speed up to between 4,000 and 5,000 rpm and maintain that speed for 10 seconds. Fully release accelerator pedal and then let engine idle for approximately 10 seconds. If "TESTING" is not displayed after 10 seconds, refer to EC-146, "Component Function Check". 2. Wait for approximately 20 seconds at idle under the condition that "TESTING" is displayed on the CON-SULT-III screen. Check that "TESTING" changes to "COMPLETED". If "TESTING" changed to "OUT OF CONDITION", refer to EC-146, "Component Function Check". Touch "SELF-DIAG RESULT". Which is displayed on CONSULT-III screen? >> INSPECTION END OK NG >> Go to EC-260, "Diagnosis Procedure". 5.CHECK AIR-FUEL RATIO SELF-LEARNING VALUE **With GST** 1. Start engine and warm it up to normal operating temperature. Select Service \$01 with GST. Calculate the total value of "Short term fuel trim" and "Long term fuel trim" indications. Is the total percentage within ±15%? >> GO TO 7. YES NO >> GO TO 6. N **6.**DETECT MALFUNCTIONING PART Check the following. Intake air leaks Exhaust gas leaks • Incorrect fuel pressure Lack of fuel P Fuel injector Incorrect PCV hose connection PCV valve Mass air flow sensor

>> Repair or replace malfunctioning part.

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### P0133, P0153 A/F SENSOR 1

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

# 7. PERFORM DTC CONFIRMATION PROCEDURE

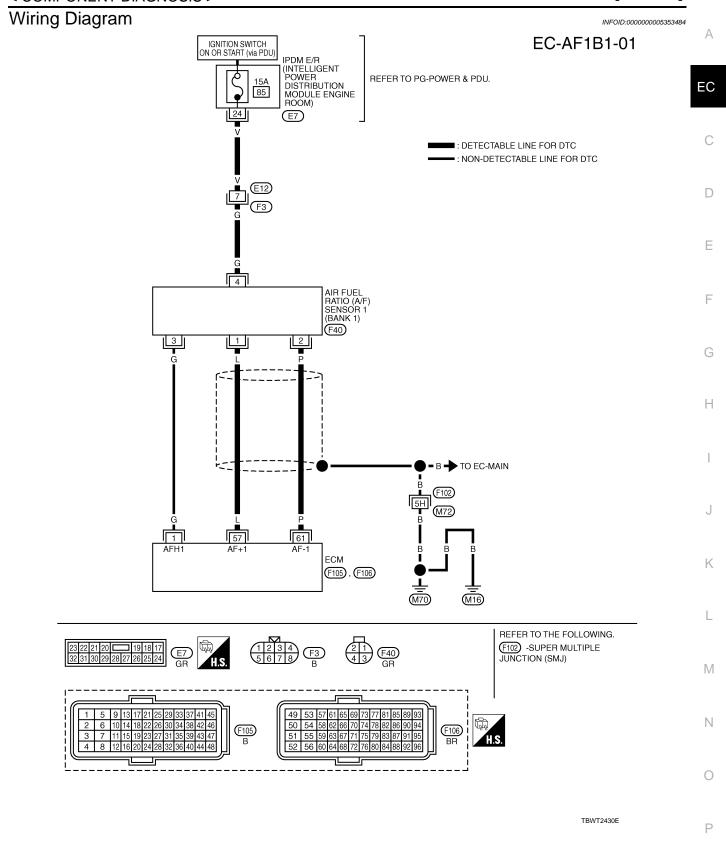
- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 3. Let engine idle for 1 minute.
- 4. Increase the engine speed up to between 4,000 and 5,000 rpm and maintain that speed for 10 seconds.
- 5. Fully release accelerator pedal and then let engine idle for approximately 1 minute.
- 6. Check 1st trip DTC.

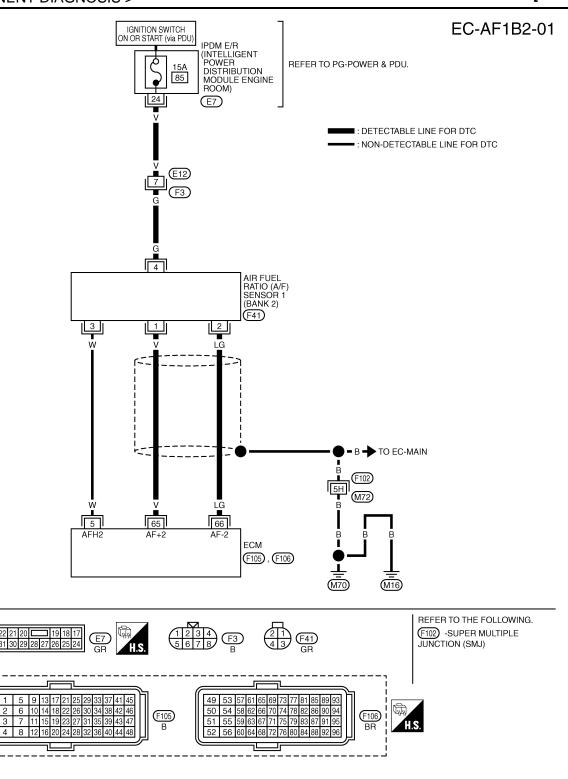
#### Is 1st trip DTC detected?

YES >> Go to EC-260, "Diagnosis Procedure".

NO >> INSPECTION END

[VQ35HR]





#### INFOID:0000000005353485

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### Diagnosis Procedure

# 1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

YES >> GO TO 2.

[VQ35HR]

NO >> Repair or replace ground connections.

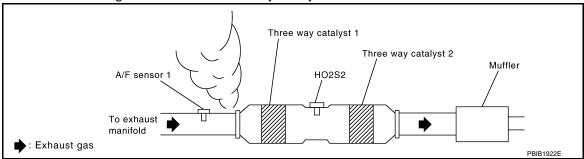
### 2.RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the A/F sensor 1. Refer to EM-24, "Removal and Installation".

>> GO TO 3.

# 3.CHECK EXHAUST GAS LEAK

- Start engine and run it at idle.
- Listen for an exhaust gas leak before three way catalyst 1.



#### Is exhaust gas leak detected?

>> Repair or replace malfunctioning part. YES

NO >> GO TO 4.

### 4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

#### Is intake air leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 5.

### f 5.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to EC-30, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- Run engine for at least 10 minutes at idle speed.

### Is the 1st trip DTC P0171, P172, P0174 or P0175 detected? Is it difficult to start engine?

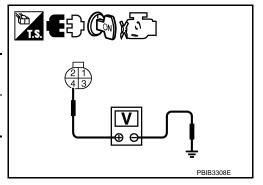
>> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-294, "DTC Logic" or EC-301, "DTC Logic".

NO >> GO TO 6.

### O.CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

- Disconnect A/F sensor 1 harness connector.
- Turn ignition switch ON.
- Check the voltage between A/F sensor 1 harness connector and ground.

DTC	DTC A/F sensor 1				Voltage	
DIO	Bank	Connector	Terminal	Ground	voltage	
P0133	1	F40	4	Ground	Battery voltage	
P0153	2	F41	4	Giodila	Battery voltage	



Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 7.

**EC-261** Revision: 2009 June 2010 M35/M45

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## 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- IPDM E/R harness connector E7
- 15 A fuse (No. 85)
- Harness for open or short between A/F sensor 1 and fuse
  - >> Repair or replace harness or connectors.

### 8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC		A/F sensor 1			ECM		
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0133	1	F40	1	F106	57	Existed	
F0133	!	1 40	2		61		
P0153	2 F41		1	1 100	65	LAISIEU	
FU155	2   F41	2		66			

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

DTC		A/F sensor 1			Continuity
DIC	Bank C		Terminal	Ground	Continuity
P0133	1	F40	1		
F0133	'	1 40	2	Ground	Not existed
D0152	2	E44	1	Giouna	Not existed
P0153	3 2 F41		2		

DTC	E	CM	Ground	Continuity	
DIC	Connector	Terminal	Giouna	Continuity	
P0133		57		Not existed	
F0133	F400	61	Ground		
P0153	F106	65			
		66			

5. Also check harness for short to power.

#### Is the inspection result normal?

YES >> GO TO 9.

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

### 9.CHECK A/F SENSOR 1 HEATER

Refer to EC-178, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 13.

### 10. CHECK MASS AIR FLOW SENSOR

Check both mass air flow sensor (bank 1 and bank 2).

Refer to EC-201, "Component Inspection".

#### Is the inspection result normal?

P0133, P0153 A/F SENSOR 1	
< COMPONENT DIAGNOSIS > [VQ35HR]	
YES >> GO TO 11.	
NO >> Replace malfunctioning mass air flow sensor.	Α
11. CHECK PCV VALVE	
Refer to EC-635, "Component Inspection".	EC
Is the inspection result normal?	
YES >> GO TO 12.  NO >> Repair or replace PCV valve.	
12. CHECK INTERMITTENT INCIDENT	С
Perform EC-154, "Description".	D
Is the inspection result normal?	
YES >> GO TO 13.  NO >> Repair or replace malfunctioning part.	
13. REPLACE A/F SENSOR 1	Е
Replace malfunctioning A/F sensor 1.  CAUTION:	_
• Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a	F
hard surface such as a concrete floor; use a new one.	
• Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize lubricant	G
(commercial service tool).	
>> INSPECTION END	Н
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EC-263 Revision: 2009 June 2010 M35/M45

### P0137, P0157 HO2S2

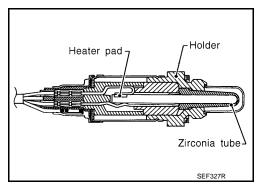
Description INFOID:000000005353486

The heated oxygen sensor 2, after three way catalyst 1, monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

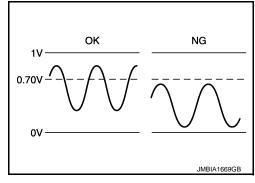


**DTC** Logic

INFOID:000000005353487

#### DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst 1 causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during various driving conditions such as fuel cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0137	Heated oxygen sensor 2 (bank 1) circuit low voltage	The maximum voltage from the sensor does not	<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> </ul>
P0157	Heated oxygen sensor 2 (bank 2) circuit low voltage	reach the specified voltage.	<ul><li>Fuel pressure</li><li>Fuel injector</li><li>Intake air leaks</li></ul>

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### Will CONSULT-III be used?

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

2. PERFORM DTC CONFIRMATION PROCEDURE

#### (P) With CONSULT-III

#### **TESTING CONDITION:**

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30 °C (32 to 86 °F).

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.

#### P0137, P0157 HO2S2

#### [VQ35HR1 < COMPONENT DIAGNOSIS >

- Turn ignition switch ON
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 6. Let engine idle for 1 minute.
- Select "DATA MONITOR" mode with CONSULT-III.
- Check that "COOLAN TEMP/S" indicates more than 70°C (158°F). If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
- 9. Open engine hood.
- 10. Select "HO2S2 (B1) P1147" (for DTC P0137) or "HO2S2 (B2) P1167" (for DTC P0157) of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 11. Follow the instruction of CONSULT-III display.

#### NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

12. Touch "SELF-DIAG RESULTS".

#### Which is displayed on CONSULT-III screen?

OK >> INSPECTION END

NG >> Go to EC-268, "Diagnosis Procedure".

CANNOT BE DIAGNOSED>>GO TO 3.

## 3.perform dtc confirmation procedure again

- Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- Perform DTC confirmation procedure again.

>> GO TO 2.

### 4. PERFORM COMPONENT FUNCTION CHECK

#### 

Perform component function check. Refer to EC-265, "Component Function Check".

#### NOTE:

Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

### Is the inspection result normal?

YES >> INSPECTION END

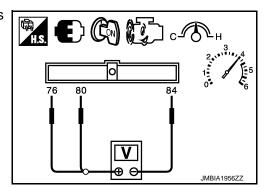
NO >> Go to EC-268, "Diagnosis Procedure".

### Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK-I

#### **With GST**

- Start engine and warm it up to the normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- Check the voltage between ECM harness connector terminals under the following condition.



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		ECM				
DTC	Connector +		_	Condition	Voltage	
	Connector	Terminal	Terminal			
P0137	F106	76	84	Revving up to 4,000 rpm under no load at	The voltage should be above 0.70 V at	
P0157	80		04	least 10 times	least once during this procedure.	

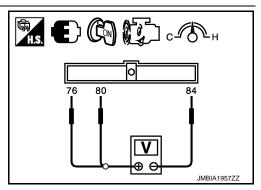
#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

# 2.PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals under the following condition.



	ECM				
DTC	Connector	+	_	Condition	Voltage
Conn	Connector	Terminal	Terminal		
P0137	F106	76	84	Keeping engine at idle for 10 minutes	The voltage should be above 0.70 V at
P0157			04	recepting engine at tale for 10 minutes	least once during this procedure.

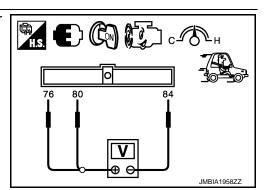
#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

## 3. PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector terminals under the following condition.



DTC	DTC Connector	+	_	Condition	Voltage	
	Connector	Terminal	Terminal			
P0137	F106	76	84	Coasting from 80 km/h (50 MPH) in D po-	The voltage should be above 0.70 V at	
P0157			04	sition	least once during this procedure.	

[VQ35HR]

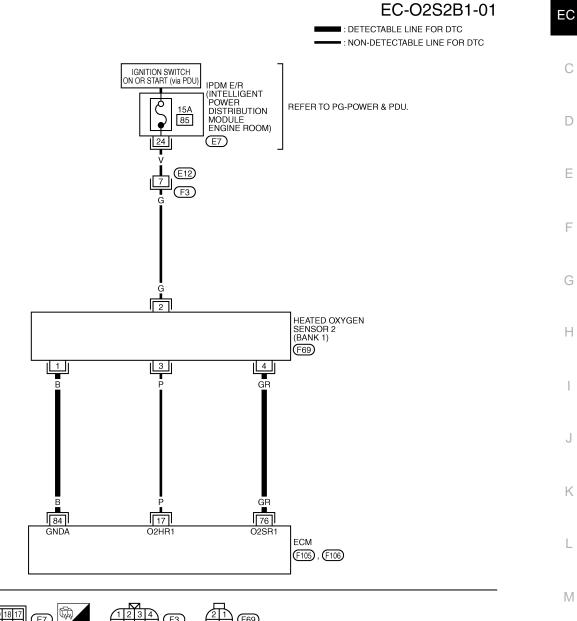
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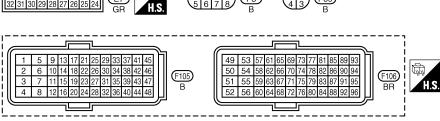
YES >> INSPECTION END

NO >> Go to EC-268, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000005353489



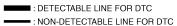


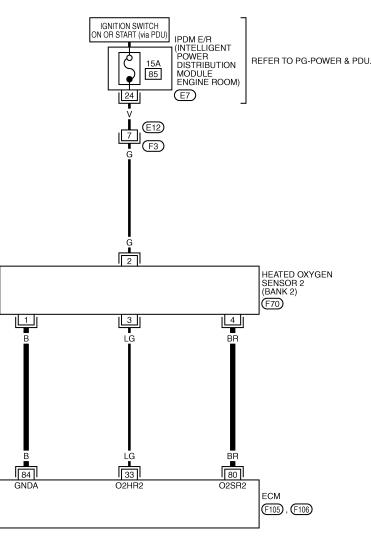
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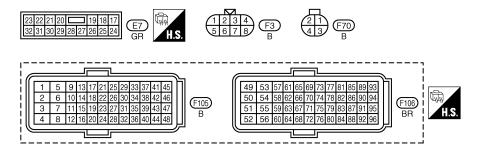
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TBWT2433E

### Diagnosis Procedure

#### INFOID:0000000005353490

# 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

YES >> GO TO 2.

[VQ35HR]

NO >> Repair or replace ground connections.

## 2.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to EC-30, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".

2. Run engine for at least 10 minutes at idle speed.

### Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0174. Refer to EC-294, "DTC Logic".

NO >> GO TO 3.

# 3.check heated oxygen sensor 2 (ho2s2) ground circuit for open and short

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

DTC		HO2S2		EC	Continuity		
ыс	Bank Connecto		Terminal	Connector	Terminal	Continuity	
P0137	1	F69	1	F106	84	Existed	
P0157	2	F70	1	1 100	04	Existed	

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

#### Is the inspection result normal?

>> GO TO 4. YES

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

### f 4 .CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC		HO2S2		EC	Continuity		
ыс	Bank Connector		Terminal Connector		Terminal	Continuity	
P0137	1	F69	4	F106	76	Existed	
P0157	2 F70		4	F100	80	LXISIEU	

Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

DTC		HO2S2	Ground	Continuity		
ыс	Bank	Connector	Terminal	Oround	Continuity	
P0137	1	F69	4	Ground	Not existed	
P0157	0157 2		4	Giouna	inoi existed	

DTC	E	CM	Ground	Continuity	
ыс	Connector	Terminal	Giodila		
P0137	F106	76	Ground	Not existed	
P0157	1 100	80	Giodila		

3. Also check harness for short to power.

#### Is the inspection result normal?

YES >> GO TO 5.

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

### 5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-270, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 7.

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NO >> GO TO 6.

### 6. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

#### **CAUTION:**

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

#### >> INSPECTION END

### 7. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

>> INSPECTION END

### Component Inspection

INFOID:0000000005353491

### 1. INSPECTION START

Will CONSULT-III be used?

#### Will CONSULT-III be used?

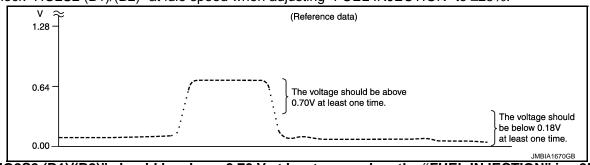
YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2 (HO2S2)

#### (P)With CONSULT-III

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-III.
- Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.



"HO2S2 (B1)/(B2)" should be above 0.70 V at least once when the "FUEL INJECTION" is  $\pm 25\%$ . "HO2S2 (B1)/(B2)" should be below 0.18 V at least once when the "FUEL INJECTION" is  $\pm 25\%$ .

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

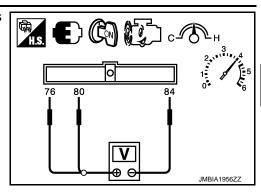
3.CHECK HEATED OXYGEN SENSOR 2-I

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

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.

[VQ35HR]

5. Check the voltage between ECM harness connector terminals under the following condition.



ECM					
Connector	+ -		Condition	Voltage	
Connector	Terminal	Terminal			
F106 -	76 [HO2S2 (bank 1)]	84	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.70 V at least once during this procedure.	
	80 [HO2S2 (bank 2)]	04		The voltage should be below 0.18 V at least once during this procedure.	

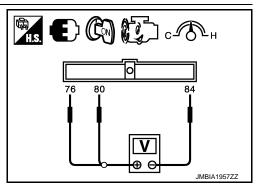
#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

### 4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals under the following condition.



ECM					
Connector	+ -		Condition	Voltage	
	Terminal	Terminal			
F106 -	76 [HO2S2 (bank 1)]	84	Keeping engine at idle for 10 minutes	The voltage should be above 0.70 V at least once during this procedure.	
	80 [HO2S2 (bank 2)]	04		The voltage should be below 0.18 V at least once during this procedure.	

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

### 5. CHECK HEATED OXYGEN SENSOR 2-III

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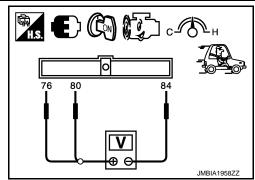
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Check the voltage between ECM harness connector terminals under the following condition.



	ECM				
Connector	+ -		Condition	Voltage	
Comilector	Terminal	Terminal			
E106	76 [HO2S2 (bank 1)]	9.4	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.70 V at least once during this procedure.	
F106 -	80 [HO2S2 (bank 2)]	84		The voltage should be below 0.18 V at least once during this procedure.	

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

### 6. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

#### CAUTION:

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

>> INSPECTION END

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### P0138, P0158 HO2S2

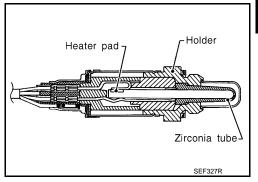
Description

The heated oxygen sensor 2, after three way catalyst 1, monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



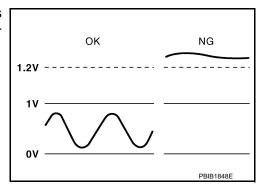
**DTC Logic** 

#### DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst 1 causes the longer switching time.

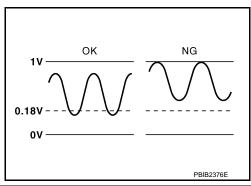
#### **MALFUNCTION A**

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during various driving conditions such as fuel cut.



#### **MALFUNCTION B**

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during various driving conditions such as fuel cut.



DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
	Heated oxygen sensor 2	A)	An excessively high voltage from the sensor is sent to ECM.	Harness or connectors     (The sensor circuit is open or shorted)     Heated oxygen sensor 2
P0138	(bank 1) circuit high voltage	B)	The minimum voltage from the sensor is not reached to the specified voltage.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> <li>Fuel pressure</li> <li>Fuel injector</li> </ul>

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DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
	Heated oxygen sensor 2	A)	An excessively high voltage from the sensor is sent to ECM.	Harness or connectors     (The sensor circuit is open or shorted)     Heated oxygen sensor 2
P0158	(bank 2) circuit high voltage	B)	The minimum voltage from the sensor is not reached to the specified voltage.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> <li>Fuel pressure</li> <li>Fuel injector</li> </ul>

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### >> GO TO 2.

# $2.\mathsf{PERFORM}$ DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

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

#### Is 1st trip DTC detected?

YES >> Go to EC-278, "Diagnosis Procedure".

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

NO-2 >> With GST: GO TO 5.

### 3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

#### (P) With CONSULT-III

#### NOTE:

#### For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30 °C (32 to 86 °F).

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 6. Let engine idle for 1 minute.
- 7. Select "DATA MONITOR" mode with CONSULT-III.
- 8. Check that "COOLAN TEMP/S" indicates more than 70°C (158°F).

  If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
- 9. Open engine hood.
- Select "HO2S2 (B1) P1146" (for DTC P0138) or "HO2S2 (B2) P1166" (for DTC P0158) of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 11. Follow the instruction of CONSULT-III display.

#### NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

12. Touch "SELF-DIAG RESULTS".

#### Which is displayed on CONSULT-III screen?

OK >> INSPECTION END

NG >> Go to EC-278, "Diagnosis Procedure".

CANNOT BE DIAGNOSED>>GO TO 4.

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### f 4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B AGAIN

- Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- 2. Perform DTC confirmation procedure again.

>> GO TO 3.

### 5. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

#### **®With GST**

Perform component function check. Refer to EC-275, "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

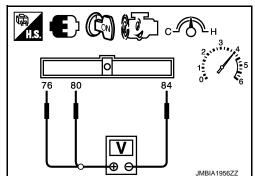
NO >> Go to EC-278, "Diagnosis Procedure".

### Component Function Check

### 1.PERFORM COMPONENT FUNCTION CHECK-I

#### With GST

- 1. Start engine and warm it up to the normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 6. Let engine idle for 1 minute.
- 7. Check the voltage between ECM harness connector terminals under the following condition.



DTC	Connector	+	_	Condition	Voltage
	Connector	Terminal	Terminal		
P0138	F106	76		Revving up to 4,000 rpm under no load at	The voltage should be below 0.18 V at
P0158	F106	80	84	least 10 times	least once during this procedure.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

### 2. PERFORM COMPONENT FUNCTION CHECK-II

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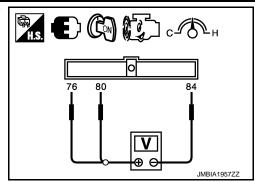
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Check the voltage between ECM harness connector terminals under the following condition.



		ECM			
DTC	Connector	+	_	Condition	Voltage
	Connector	Terminal	Terminal		
P0138	F106	76	84	Keeping engine at idle for 10 minutes	The voltage should be below 0.18 V at
P0158	1 100	80	04	Recping engine at full for 10 minutes	least once during this procedure.

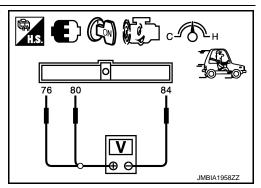
#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

## 3. PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector terminals under the following condition.

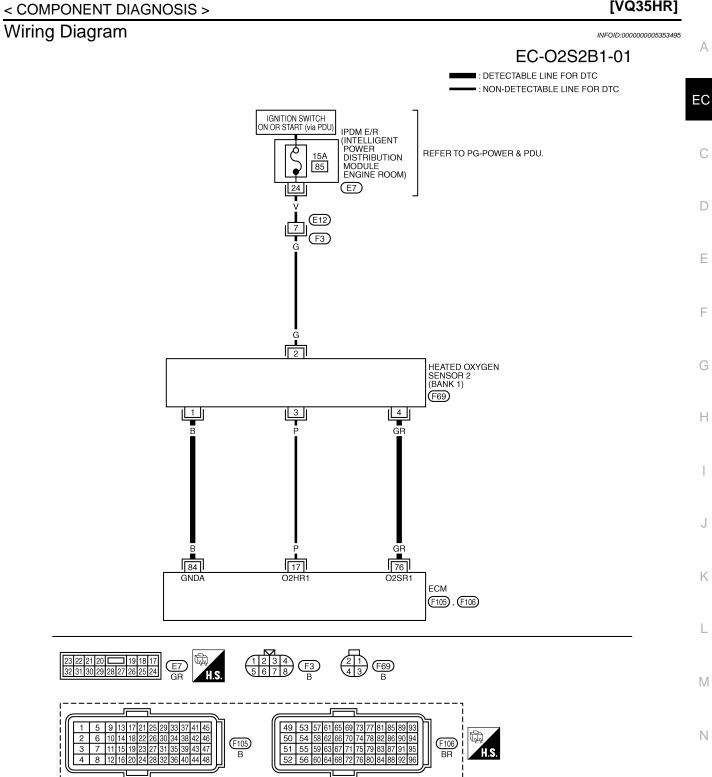


		ECM				
DTC	Connector	+	_	Condition	Voltage	
	Connector	Terminal	Terminal			
P0138	F106	76	84	Coasting from 80 km/h (50 MPH) in D po-	The voltage should be below 0.18 V at	
P0158	1 100	80	04	sition	least once during this procedure.	

#### Is the inspection result normal?

YES >> INSPECTION END

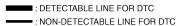
NO >> Go to EC-278, "Diagnosis Procedure".

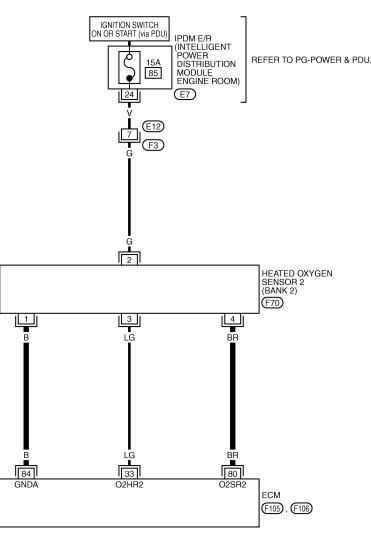


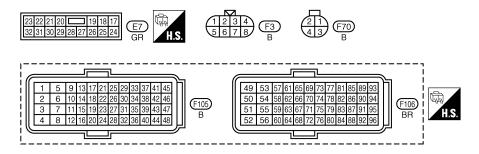
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### Diagnosis Procedure

#### INFOID:0000000005353496

### 1. INSPECTION START

Confirm the detected malfunction (A or B). Refer to <u>EC-273</u>, "<u>DTC Logic</u>". Which malfunction is detected?

A >> GO TO 2

B >> GO TO 9.

# 2.check ground connection

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connections.

# 3.check heated oxygen sensor 2 (ho2s2) connector for water

- 1. Disconnect HO2S2 harness connector.
- 2. Check that water is not inside connectors.

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace harness or connectors.

### 4.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- Disconnect HO2S2 harness connector.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC		HO2S2		EC	CM	Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0138	1	F69	1	F106	84	Existed
P0158	2	F70	1	1 100	04	LAISIEU

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

#### Is the inspection result normal?

YES >> GO TO 5.

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

### ${f 5.}$ CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC		HO2S2		EC	CM	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0138	1	F69	4	F106	76	Existed
P0158	2	F70	4	1 100	80	LAISIEU

Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

DTC		HO2S2		Ground	Continuity
DIC	Bank	Connector	Terminal	Giouna	Continuity
P0138	1	F69	4	Ground	Not existed
P0158	2	F70	4	Ground	INOL EXISTED

DTC	E	CM	Ground	Continuity
DIO	Connector	Terminal	Oround	Continuity
P0138	F106	76	Ground	Not existed
P0158	1 100	80	Giouna	INOL EXISTED

Also check harness for short to power.

#### Is the inspection result normal?

YES >> GO TO 6.

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

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### 6.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-281, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 7.

7.REPLACE HEATED OXYGEN SENSOR  $_2$ 

Replace malfunctioning heated oxygen sensor 2.

#### **CAUTION:**

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

>> INSPECTION END

### 8. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

>> INSPECTION END

### 9. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connections M16, M70. Refer to <u>EC-158</u>, "Ground Inspection".

#### Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace ground connections.

### 10.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to <u>EC-30, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".</u>
- 2. Run engine for at least 10 minutes at idle speed.

#### Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-301, "DTC Logic".

NO >> GO TO 11.

# 11. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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

	DTC		HO2S2		EC	Continuity	
	ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
-	P0138	1	F69	1	F106	84	Existed
	P0158	2	F70	1	1 100	04	LAISIEU

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

# 12. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC		HO2S2		EC	CM	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0138	1	F69	4	F106	76	Existed
P0158	2	F70	4	1 100	80	LXISIGU

Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

DTC		HO2S2		Ground	Continuity
DIO	Bank	Connector	Terminal	Oloulia	Continuity
P0138	1	F69	4	Ground	Not existed
P0158	2	F70	4	Giodila	NOT EXISTED

DTC	E	CM	Ground	Continuity	
ы	Connector Terminal		Ground	Continuity	
P0138	F106	F106		Not existed	
P0158	1 100	80	Ground	NOT EXISTED	

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 13.

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

13. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-281, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 14.

14. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

#### **CAUTION:**

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

>> INSPECTION END

# 15. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

>> INSPECTION END

### Component Inspection

1.INSPECTION START

Will CONSULT-III be used?

Will CONSULT-III be used?

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

2.CHECK HEATED OXYGEN SENSOR 2 (HO2S2)

(P)With CONSULT-III

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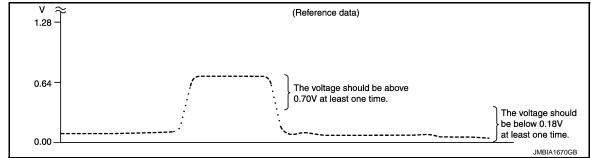
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- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-III.
- 7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.



"HO2S2 (B1)/(B2)" should be above 0.70 V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.18 V at least once when the "FUEL INJECTION" is -25%.

#### Is the inspection result normal?

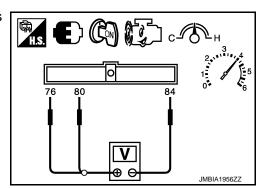
YES >> INSPECTION END

NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-I

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

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.



	ECM				
Connector	+	_	Condition	Voltage	
Connector	Terminal	Terminal			
F106	76 [HO2S2 (bank 1)]	84	Revving up to 4,000 rpm under no load at	The voltage should be above 0.70 V at least once during this procedure.	
1 100	80 [HO2S2 (bank 2)]	04	least 10 times	The voltage should be below 0.18 V at least once during this procedure.	

#### Is the inspection result normal?

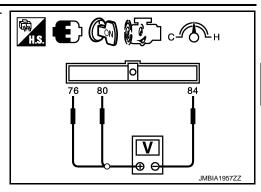
YES >> INSPECTION END

NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

[VQ35HR]

Check the voltage between ECM harness connector terminals under the following condition.



ECM					
Connector	+	_	Condition	Voltage	
Connector	Terminal	Terminal			
F106	76 [HO2S2 (bank 1)]			The voltage should be above 0.70 V at least once during this procedure.	
1 100	80 [HO2S2 (bank 2)]	84	Keeping engine at idle for 10 minutes	The voltage should be below 0.18 V at least once during this procedure.	

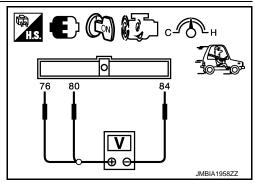
#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

### 5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following condition.



ECM				
Connector -	+	_	Condition	Voltage
	Terminal	Terminal		
F106	76 [HO2S2 (bank 1)]	- 84	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.70 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	80 [HO2S2 (bank 2)]			

### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

### **6.**REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

**CAUTION:** 

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### P0138, P0158 HO2S2

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

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

>> INSPECTION END

### P0139, P0159 HO2S2

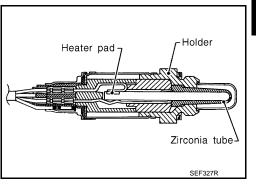
Description INFOID:0000000005353498

The heated oxygen sensor 2, after three way catalyst 1, monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions.

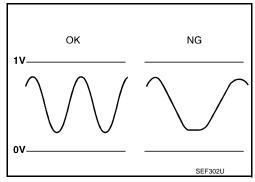
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



**DTC Logic** INFOID:0000000005353499

#### DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst 1 causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during various driving conditions such as fuel cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139	Heated oxygen sensor 2 (bank 1) circuit slow response	It takes more time for the sensor to respond be-	Harness or connectors     (The sensor circuit is open or shorted)     Heated oxygen sensor 2     Fuel pressure     Fuel injector     Intake air leaks
P0159	Heated oxygen sensor 2 (bank 2) circuit slow response	tween rich and lean than the specified time.	

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### Will CONSULT-III be used?

>> GO TO 2. YES

NO >> GO TO 4.

### 2.PERFORM DTC CONFIRMATION PROCEDURE

#### (P)With CONSULT-III

#### **TESTING CONDITION:**

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30 °C (32 to 86 °F).

- Start engine and warm it up to the normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.

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- 3. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- 7. Select "DATA MONITOR" mode with CONSULT-III.
- 8. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).

  If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F).
- 9. Open engine hood.
- 10. Select "HO2S2 (B1) P0139" or "HO2S2 (B2) P0159" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 11. Start engine and follow the instruction of CONSULT-III display.

#### NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

12. Touch "SELF-DIAG RESULTS".

#### Which is displayed on CONSULT-III screen?

OK >> INSPECTION END

NG >> Go to EC-289, "Diagnosis Procedure".

CANNOT BE DIAGNOSED>>GO TO 3.

# 3.perform dtc confirmation procedure again

- 1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- 2. Perform DTC confirmation procedure again.

>> GO TO 2.

### 4. PERFORM COMPONENT FUNCTION CHECK

#### 

Perform component function check. Refer to EC-286, "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-289, "Diagnosis Procedure".

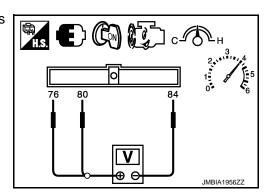
### Component Function Check

INFOID:0000000005353500

### 1. PERFORM COMPONENT FUNCTION CHECK-I

#### With GST

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- 7. Check the voltage between ECM harness connector terminals under the following condition.



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DTC	ECM				
	Connector	+	_	Condition	Voltage
		Terminal	Terminal		
P0139	F106	76	84	Revving up to 4,000 rpm under no load at	
P0159		80	04	least 10 times	0.24 V for 1 second during this procedure.

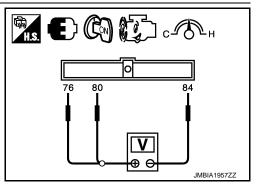
Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

### 2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals under the following condition.



DTC	ECM				
	Connector	+	_	Condition	Voltage
		Terminal	Terminal		
P0139	F106	76	84	Keeping engine at idle for 10 minutes	A change of voltage should be more than 0.24 V for 1 second during this procedure.
P0159		80	04		

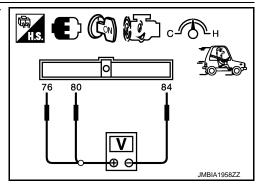
#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

## 3. PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector terminals under the following condition.



DTC	ECM				
	Connector	+	_	Condition	Voltage
	Connector	Terminal	Terminal		
P0139	F106	76	84	Coasting from 80 km/h (50 MPH) in D po-	
P0159		80	04	sition	0.24 V for 1 second during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

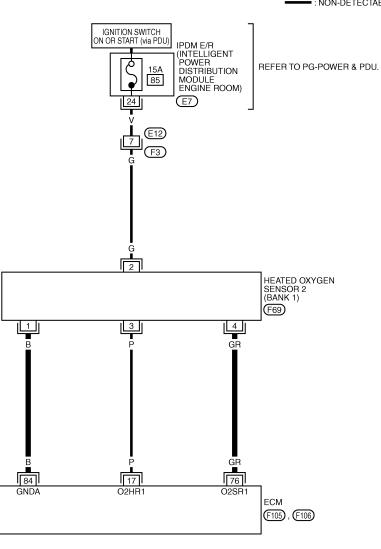
NO >> Go to EC-289, "Diagnosis Procedure".

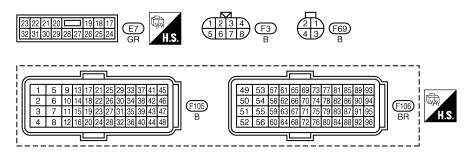
### Wiring Diagram

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#### EC-O2S2B1-01

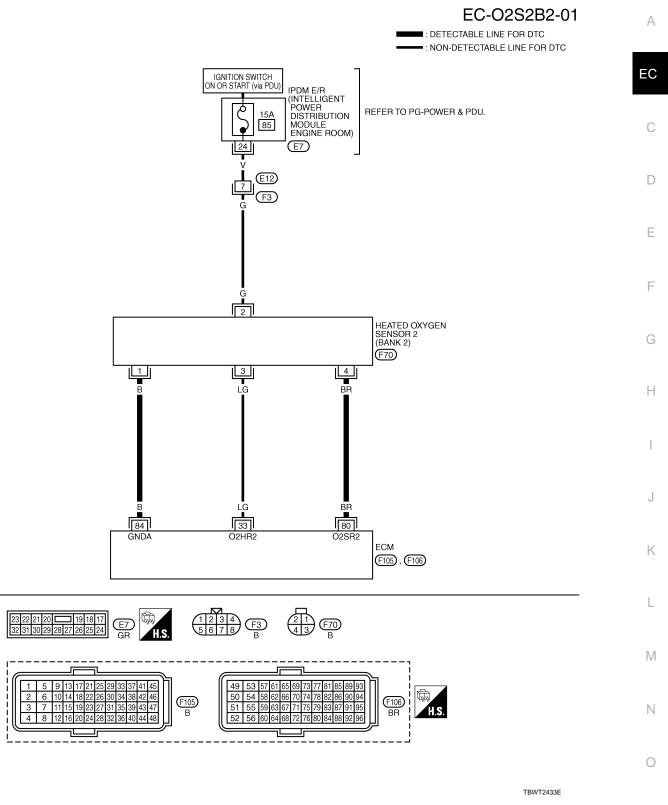
: DETECTABLE LINE FOR DTC : NON-DETECTABLE LINE FOR DTC





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# Diagnosis Procedure

# 1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

YES >> GO TO 2.

#### < COMPONENT DIAGNOSIS >

NO >> Repair or replace ground connections.

# 2.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to <u>EC-30</u>, "MIXTURE RATIO SELF-LEARNING VALUE <u>CLEAR</u>: <u>Special Repair Requirement</u>".
- 2. Run engine for at least 10 minutes at idle speed.

#### Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to <u>EC-294, "DTC Logic"</u> or <u>EC-301, "DTC Logic"</u>.

NO >> GO TO 3.

# 3.check heated oxygen sensor 2 (ho2s2) ground circuit for open and short

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

DTC	HO2S2			EC	Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0139	1	F69	1	F106	84	Existed
P0159	2	F70	1	1 100	04	LAISIEU

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

#### Is the inspection result normal?

YES >> GO TO 4.

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

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

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

DTC		HO2S2		EC	Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0139	1	F69	4	F106	76	Existed
P0159	2	F70	4	F100	80	EXISTECT

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

DTC		HO2S2		Ground	Continuity
DIC	Bank	Bank Connector Termina		Ground	Continuity
P0139	1	F69	4	Ground	Not existed
P0159	2	F70	4	Oround	Not existed

DTC	E	CM	Ground	Continuity	
ы	Connector	Terminal	Ground	Continuity	
P0139	F106	76	Ground	Not existed	
P0159	1 100	80	Giodila	Not existed	

3. Also check harness for short to power.

#### Is the inspection result normal?

YES >> GO TO 5

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

#### $\mathbf{5}$ .CHECK HEATED OXYGEN SENSOR 2

Refer to EC-291, "Component Inspection".

#### Is the inspection result normal?

#### P0139, P0159 HO2S2

#### [VQ35HR] < COMPONENT DIAGNOSIS >

YES >> GO TO 7. NO >> GO TO 6.

# 6.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

#### **CAUTION:**

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

>> INSPECTION END

# .CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

>> INSPECTION END

# Component Inspection

1.INSPECTION START

Will CONSULT-III be used?

Will CONSULT-III be used?

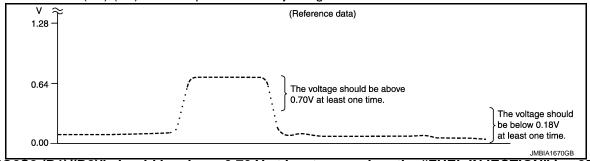
YES >> GO TO 2.

NO >> GO TO 3.

# 2.CHECK HEATED OXYGEN SENSOR 2 (HO2S2)

#### (P) With CONSULT-III

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- Start engine and warm it up to the normal operating temperature. 2.
- Turn ignition switch OFF and wait at least 10 seconds. 3.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-III.
- 7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.



"HO2S2 (B1)/(B2)" should be above 0.70 V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.18 V at least once when the "FUEL INJECTION" is -25%.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

### 3.CHECK HEATED OXYGEN SENSOR 2-I

#### Without CONSULT-III

- Start engine and warm it up to the normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds. 2.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.

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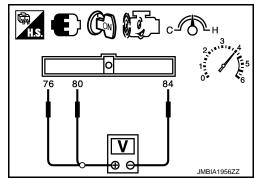
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- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.



	ECM				
Connector	+	_	Condition	Voltage	
Connector Terr	Terminal	Terminal			
E106	76 [HO2S2 (bank 1)]	84	Revving up to 4,000 rpm under no load at	The voltage should be above 0.70 V at least once during this procedure.	
F106 _	80 [HO2S2 (bank 2)]	04	least 10 times	The voltage should be below 0.18 V at least once during this procedure.	

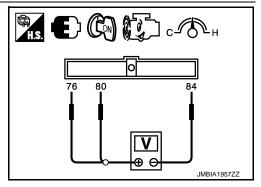
#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

# 4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals under the following condition.



ECM					
Connector	+	_	Condition	Voltage	
	Terminal	Terminal			
E106	76 [HO2S2 (bank 1)]		Keeping engine at idle for 10 minutes	The voltage should be above 0.70 V at least once during this procedure.	
F106 –	80 [HO2S2 (bank 2)]	04	Reeping engine at the for 10 minutes	The voltage should be below 0.18 V at least once during this procedure.	

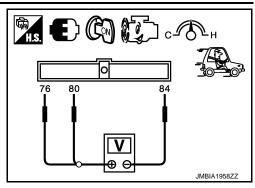
#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

# 5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following condition.



ECM					
Connector	+	_	Condition	Voltage	
Connector	Terminal	Terminal			
F106	76 [HO2S2 (bank 1)]		Coasting from 80 km/h (50 MPH) in D po-	The voltage should be above 0.70 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.	
F106 _	80 [HO2S2 (bank 2)]	04	sition		

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

#### **CAUTION:**

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

>> INSPECTION END

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# P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

#### DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from air fuel ratio (A/F) sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (the actual mixture ratio is too lean), the ECM judges the condition as the fuel injection system malfunction and illuminates the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator	
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector	

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171	Fuel injection system too lean (bank 1)		Intake air leaks     A/F sensor 1
P0174	Fuel injection system too lean (bank 2)	Fuel injection system does not operate properly.     The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	<ul> <li>Fuel injector</li> <li>Exhaust gas leaks</li> <li>Incorrect fuel pressure</li> <li>Lack of fuel</li> <li>Mass air flow sensor</li> <li>Incorrect PCV hose connection</li> </ul>

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

>> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE-I

- Clear the mixture ratio self-learning value. Refer to <u>EC-30, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement"</u>.
- 2. Start engine.

#### Is it difficult to start engine?

YES >> GO TO 3.

NO >> GO TO 4.

### 3. RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too. Crank engine while depressing accelerator pedal.

#### Does the engine start?

YES >> Go to EC-297, "Diagnosis Procedure".

NO >> Check exhaust and intake air leak visually.

# 4.PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. Keep engine idle for at least 5 minutes.
- 2. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-297, "Diagnosis Procedure".

NO >> GO TO 5.

Revision: 2009 June **EC-294** 2010 M35/M45

< COMPONENT DIAGNOSIS >

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# 5. PERFORM DTC CONFIRMATION PROCEDURE-III

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine.
- 5. Maintain the following conditions for at least 10 consecutive minutes. Hold the accelerator pedal as steady as possible.

#### **CAUTION:**

Always drive vehicle at a safe speed.

6. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-297, "Diagnosis Procedure".

NO >> INSPECTION END

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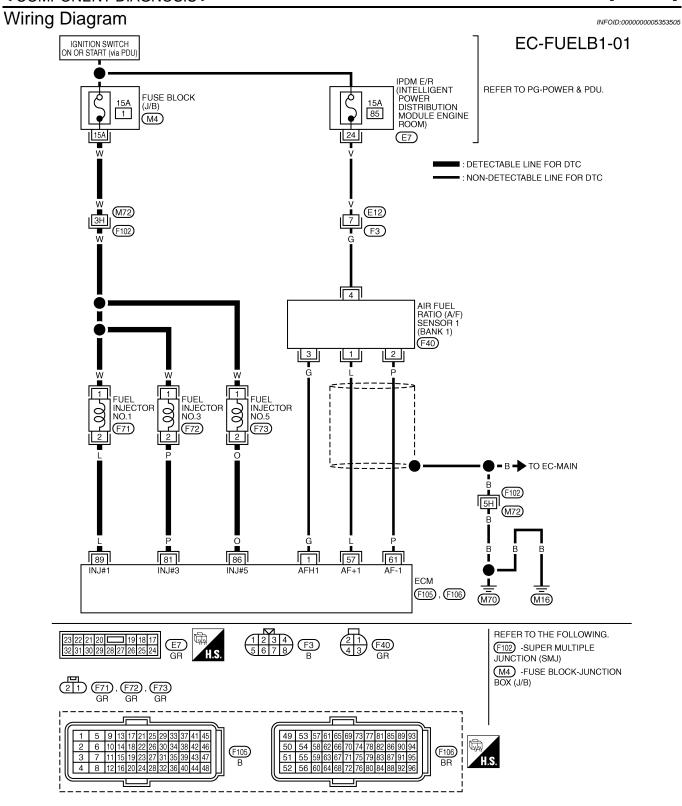
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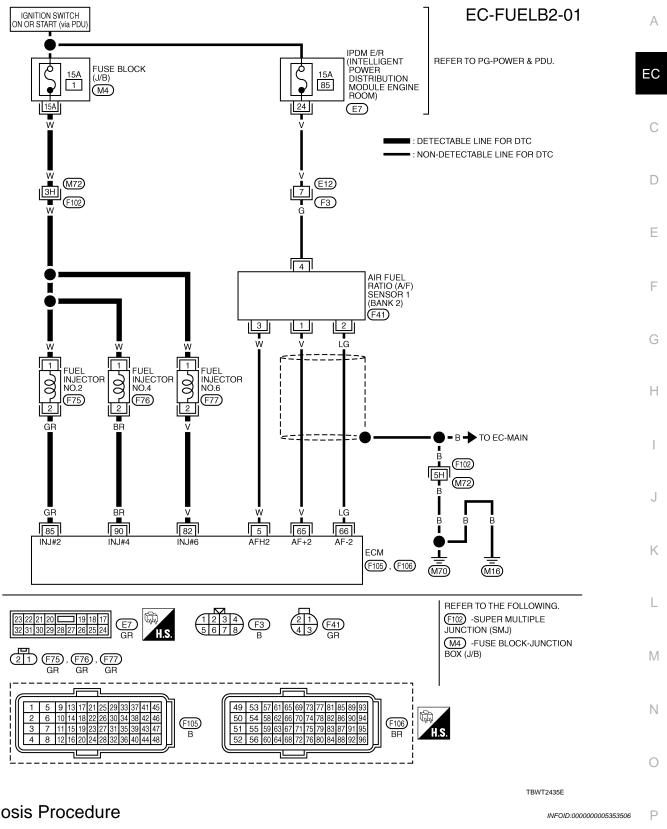
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[VQ35HR]



# Diagnosis Procedure

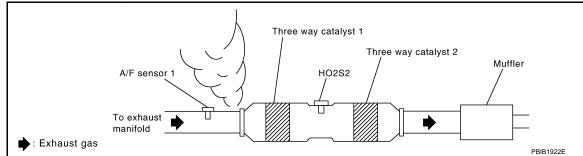
# 1. CHECK EXHAUST GAS LEAK

Start engine and run it at idle.

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

2. Listen for an exhaust gas leak before three way catalyst 1.



#### Is exhaust gas leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 2.

# 2.CHECK FOR INTAKE AIR LEAK

- 1. Listen for an intake air leak after the mass air flow sensor.
- 2. Check PCV hose connection.

#### Is intake air leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 3.

# 3.check air fuel ratio (a/f) sensor 1 input signal circuit

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

DTC	A/F sensor 1			EC	Continuity		
ыс	Bank	Connector	Terminal	inal Connector Termina		Continuity	
P0171	1	F40	1	F106	57		
FUITI	'	1 40	2		61	Existed	
P0174	D0174 2	2 F41	1		65		
P0174 2	2		2		66		

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

DTC		A/F sensor 1		Ground	Continuity
ыс	Bank	Connector	Terminal	Glound	Continuity
P0171	1	F40	1		Not existed
FOITI	'	1 40	2	Ground	
P0174	2	F41	1		
F0174		F41	2		

DTC	ECM		Ground	Continuity
DIC	Connector	Terminal	Glound	Continuity
P0171		57		Not existed
P0171	E400	61	Ground	
P0174	F106	65	Giouna	Not existed
		66		

Also check harness for short to power.

#### Is the inspection result normal?

YES >> GO TO 4.

### < COMPONENT DIAGNOSIS >

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

# 4. CHECK FUEL PRESSURE

Check fuel pressure. Refer to EC-692, "Inspection".

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

### DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

#### Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly".

NO >> Repair or replace malfunctioning part.

### 6.CHECK MASS AIR FLOW SENSOR

#### (P)With CONSULT-III

1. Install all removed parts.

2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III. For specification, refer to EC-697, "Mass Air Flow Sensor".

#### ■With GST

1. Install all removed parts.

Check mass air flow sensor signal in Service \$01 with GST. For specification, refer to EC-697, "Mass Air Flow Sensor".

#### Is the measurement value within the specification?

YES >> GO TO 7.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-208, "Diagnosis Procedure".

### 7.CHECK FUNCTION OF FUEL INJECTOR

#### (P)With CONSULT-III

1. Start engine.

- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Check that each circuit produces a momentary engine speed drop.

#### Without CONSULT-III

- 1. Start engine and let it idle.
- 2. Listen to each fuel injector operating sound.

#### Clicking sound should be heard.

#### Is the inspection result normal?

YES >> GO TO 8.

NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-599, "Diagnosis Procedure".

# At idle Suitable tool PBIB3332E

# 8. CHECK FUEL INJECTOR

- Turn ignition switch OFF.
- Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- 4. Remove fuel tube assembly. Refer to EM-40, "Removal and Installation". Keep fuel hose and all fuel injectors connected to fuel tube.
- 5. For DTC P0171, reconnect fuel injector harness connectors on bank 1. For DTC P0174, reconnect fuel injector harness connectors on bank 2.
- 6. Disconnect all ignition coil harness connectors.
- Prepare pans or saucers under each fuel injector.

**EC-299** Revision: 2009 June 2010 M35/M45

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#### < COMPONENT DIAGNOSIS >

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8. Crank engine for approximately 3 seconds.

For DTC P0171, check that fuel sprays out from fuel injectors on bank 1

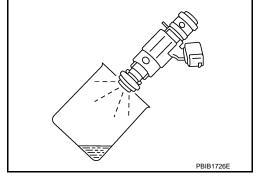
For DTC P0174, check that fuel sprays out from fuel injectors on bank 2.

#### Fuel should be sprayed evenly for each fuel injector.

#### Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones.



# 9.CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

>> INSPECTION END

< COMPONENT DIAGNOSIS >

[VQ35HR]

# P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

#### DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from air fuel ratio (A/F) sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (the actual mixture ratio is too rich), the ECM judges the condition as the fuel injection system malfunction and illuminates the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172	Fuel injection system too rich (bank 1)	Fuel injection system does not operate properly.	
P0175	Fuel injection system too rich (bank 2)	The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	<ul><li>Exhaust gas leaks</li><li>Incorrect fuel pressure</li><li>Mass air flow sensor</li></ul>

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

>> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Clear the mixture ratio self-learning value. Refer to <a href="EC-30">EC-30</a>, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- Start engine.

#### Is it difficult to start engine?

YES >> GO TO 3.

NO >> GO TO 4.

### 3.restart engine

If it is difficult to start engine, the fuel injection system has a malfunction, too.

Crank engine while depressing accelerator pedal.

#### Does the engine start?

YES >> Go to EC-304, "Diagnosis Procedure".

NO >> Remove spark plugs and check for fouling, etc.

### 4. PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. Keep engine idle for at least 5 minutes.
- Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-304, "Diagnosis Procedure".

NO >> GO TO 5.

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### 5. PERFORM DTC CONFIRMATION PROCEDURE-III

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

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#### < COMPONENT DIAGNOSIS >

[VQ35HR]

- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine.
- 5. Maintain the following conditions for at least 10 consecutive minutes. Hold the accelerator pedal as steady as possible.

VHCL SPEED SE	50 – 120 km/h (31 – 75 mph)

#### **CAUTION:**

Always drive vehicle at a safe speed.

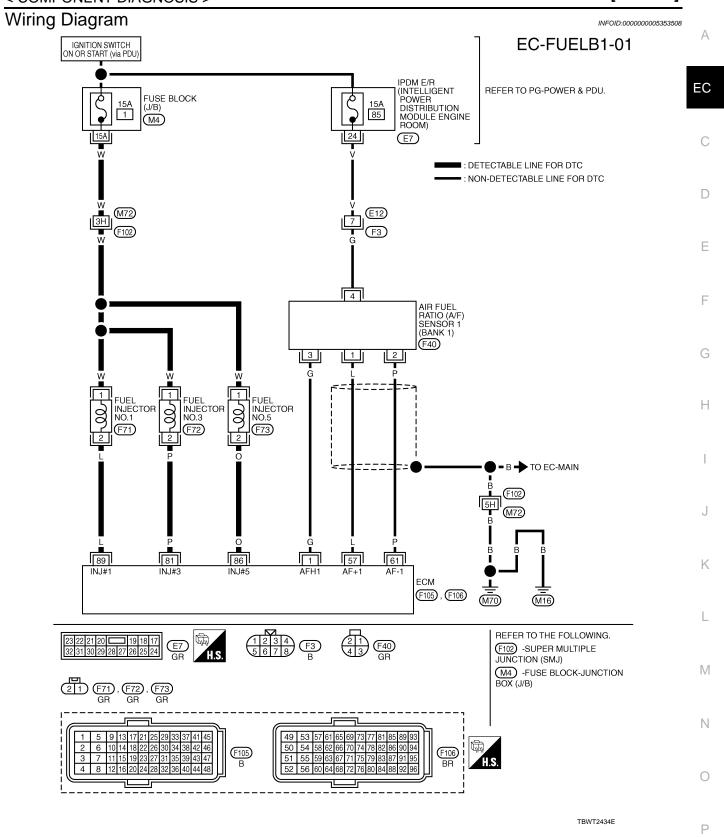
6. Check 1st trip DTC.

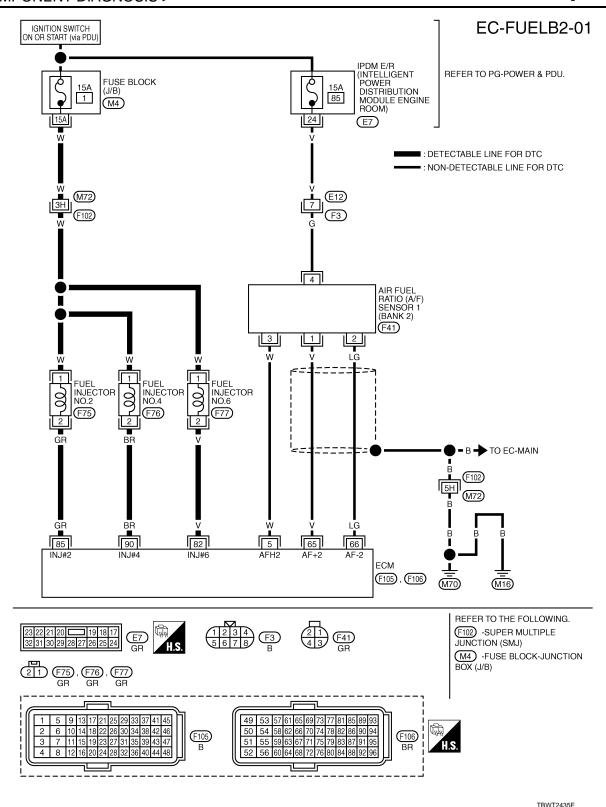
### Is 1st trip DTC detected?

YES >> Go to EC-304, "Diagnosis Procedure".

NO >> INSPECTION END

[VQ35HR]





# Diagnosis Procedure

INFOID:0000000005353509

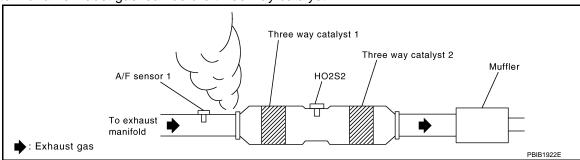
# 1. CHECK EXHAUST GAS LEAK

Start engine and run it at idle.

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

Listen for an exhaust gas leak before three way catalyst 1.



#### Is exhaust gas leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 2.

# 2.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

#### Is intake air leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 3.

# ${\bf 3.}$ CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

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

DTC	A/F sensor 1		ECM		Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0172	1	F40	1	F106	57	
FUITZ	'		2		61	Existed
P0175	2	F41	1	1 100	65	LAISIEU
	2		2			66

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

DTC	A/F sensor 1			Ground	Continuity	
ыс	Bank	Connector	Terminal	Ground	Continuity	
P0172	1	F40	1	Ground	Not existed	
P0172	'	F40	2			
P0175	2	F41	1	Ground	Not existed	
F0175	2	Г41	2			

DTC	ECM		Ground	Continuity	
DIC	Connector	Terminal	Giodila	Continuity	
P0172		57		Not existed	
P0172	F400	61	Ground		
D0175	F106	65			
P0175		66			

Also check harness for short to power.

#### Is the inspection result normal?

YES >> GO TO 4.

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

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#### < COMPONENT DIAGNOSIS >

[VQ35HR]

# 4. CHECK FUEL PRESSURE

Check fuel pressure. Refer to EC-692, "Inspection".

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace "fuel filter and fuel pump assembly".

# 5. CHECK MASS AIR FLOW SENSOR

#### (P)With CONSULT-III

- 1. Install all removed parts.
- 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III. For specification, refer to EC-697, "Mass Air Flow Sensor".

#### **With GST**

- 1. Install all removed parts.
- Check mass air flow sensor signal in "Service \$01" with GST. For specification, refer to <u>EC-697</u>, "Mass Air Flow Sensor".

#### Is the measurement value within the specification?

YES >> GO TO 6.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to <a href="EC-208">EC-208</a>, "Diagnosis Procedure".

### 6. CHECK FUNCTION OF FUEL INJECTOR

#### (E) With CONSULT-III

- Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Check that each circuit produces a momentary engine speed drop.

#### Without CONSULT-III

- Start engine and let it idle.
- 2. Listen to each fuel injector operating sound.

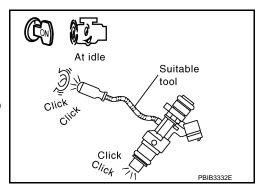
#### Clicking sound should be heard.

#### Is the inspection result normal?

YES >> GO TO 7.

NO

>> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-599, "Diagnosis Procedure".



# 7. CHECK FUEL INJECTOR

- Remove fuel injector assembly. Refer to <u>EM-40, "Removal and Installation"</u>. Keep fuel hose and all fuel injectors connected to fuel tube.
- 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- 4. Disconnect all ignition coil harness connectors.
- 5. Prepare pans or saucers under each fuel injector.
- Crank engine for approximately 3 seconds. Check that fuel does not drip from fuel injector.

#### Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one.

### 8. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

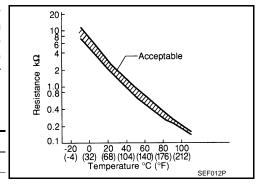
### P0181 FTT SENSOR

Description INFOID:0000000005353510

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

#### <Reference data>

Fluid temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90



<sup>\*:</sup> These data are reference values and are measured between ECM terminals 106 (Fuel tank temperature sensor) and 128 (ECM ground).

**DTC Logic** INFOID:0000000005353511

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0181	Fuel tank temperature sensor circuit range/per-formance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	<ul> <li>Harness or connectors         (The sensor circuit is open or shorted)     </li> <li>Fuel tank temperature sensor</li> </ul>	ŀ

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### >> GO TO 2.

# 2.PERFORM DTC CONFIRMATION PROCEDURE-I

- Turn ignition switch ON and wait at least 10 seconds.
- Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-309, "Diagnosis Procedure".

NO >> GO TO 3.

# 3.CHECK ENGINE COOLANT TEMPERATURE

#### (P)With CONSULT-III

- Select "COOLAN TEMP/S" in "DATA MONITOR" with CONSULT-III.
- Check "COOLAN TEMP/S" value.

#### ■With GST

Follow the procedure "With CONSULT-III" above.

#### "COOLAN TEMP/S" less than 60°C (140°F)?

>> INSPECTION END YES

NO >> GO TO 4.

### f 4 . PERFORM DTC CONFIRMATION PROCEDURE-II

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#### P0181 FTT SENSOR

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

- (a) 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.

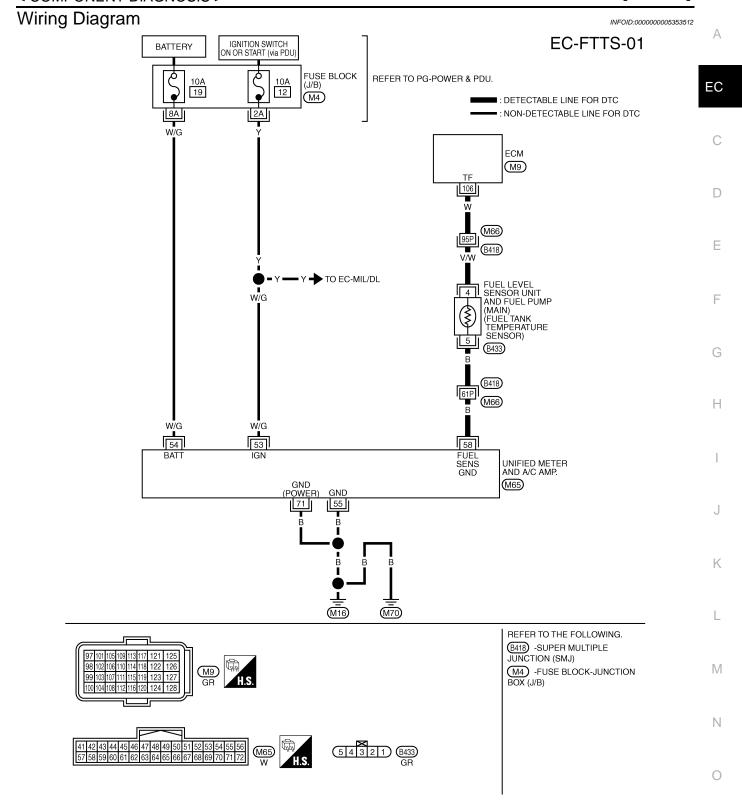
#### **With GST**

Follow the procedure "With CONSULT-III" above.

#### Is 1st trip DTC detected?

YES >> Go to EC-309, "Diagnosis Procedure".

NO >> INSPECTION END



# Diagnosis Procedure

INFOID:0000000005353513

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# 1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to <a href="EC-158">EC-158</a>, "Ground Inspection".

#### Is the inspection result normal?

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#### < COMPONENT DIAGNOSIS >

YES >> GO TO 2.

NO >> Repair or replace ground connections.

# 2.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

#### Refer to DI-18, "CONSULT-III Function (METER/M&A)".

#### Is the inspection result normal?

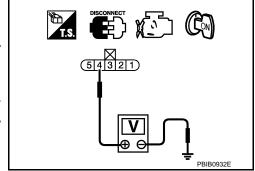
YES >> GO TO 3.

NO >> Go to DI-22, "Fuel Level Sensor Signal Inspection".

# ${f 3.}$ CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump (main)" harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between "fuel level sensor unit and fuel pump (main)" harness connector and ground.

Fuel level sensor unit and fuel pump (main)		Ground	Voltage (V)
Connector	Terminal		
B433	4	Ground	Approx. 5



#### Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

# 4. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors B418, M66
- Harness for open or short between ECM and "fuel level sensor unit and fuel pump (main)"
  - >> Repair open circuit, short to ground or short to power in harness or connector.

# 5.CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect "unified meter and A/C amp." harness connector.
- Check the continuity between "fuel level sensor unit and fuel pump (main)" harness connector and "unified meter and A/C amp." harness connector.

Fuel level sensor unit and fuel pump (main)		Unified meter and A/C amp.		Continuity
Connector	Terminal	Connector Terminal		
B433	5	M65	58	Existed

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

#### Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

### 6. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors B418, M66
- Harness for open or short between "fuel level sensor unit and fuel pump (main)" and "unified meter and A/C amp."
  - >> Repair open circuit, short to ground or short to power in harness or connector.

# 7. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-311, "Component Inspection".

#### P0181 FTT SENSOR

< COMPONENT DIAGNOSIS > [VQ35HR]

#### Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace "fuel level sensor unit and fuel pump (main)".

# 8. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

# Component Inspection

# 1. CHECK FUEL TANK TEMPERATURE SENSOR

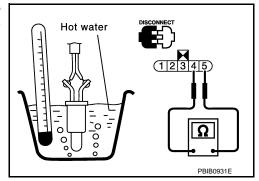
- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump (main)" harness connector.
- 3. Remove "fuel level sensor unit and fuel pump (main)".
- Check resistance between "fuel level sensor unit and fuel pump (main)" terminals by heating with hot water as shown in the figure.

Terminals	Condition			Resistance (kΩ)
4 and 5	Temperature	[°C (°E)]	20 (68)	2.3 - 2.7
4 and 3	remperature	[ ( ( ) )]	50 (122)	0.79 - 0.90

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump (main)".



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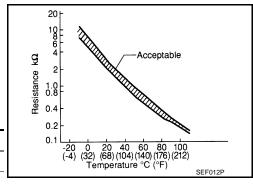
# P0182, P0183 FTT SENSOR

Description INFOID:0000000005353515

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

#### <Reference data>

Fluid temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90



<sup>\*:</sup> These data are reference values and are measured between ECM terminals 106 (Fuel tank temperature sensor) and 128 (ECM ground).

DTC Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0182	Fuel tank temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors     (The sensor circuit is open or shorted.)	
P0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Fuel tank temperature sensor	

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

>> GO TO 2.

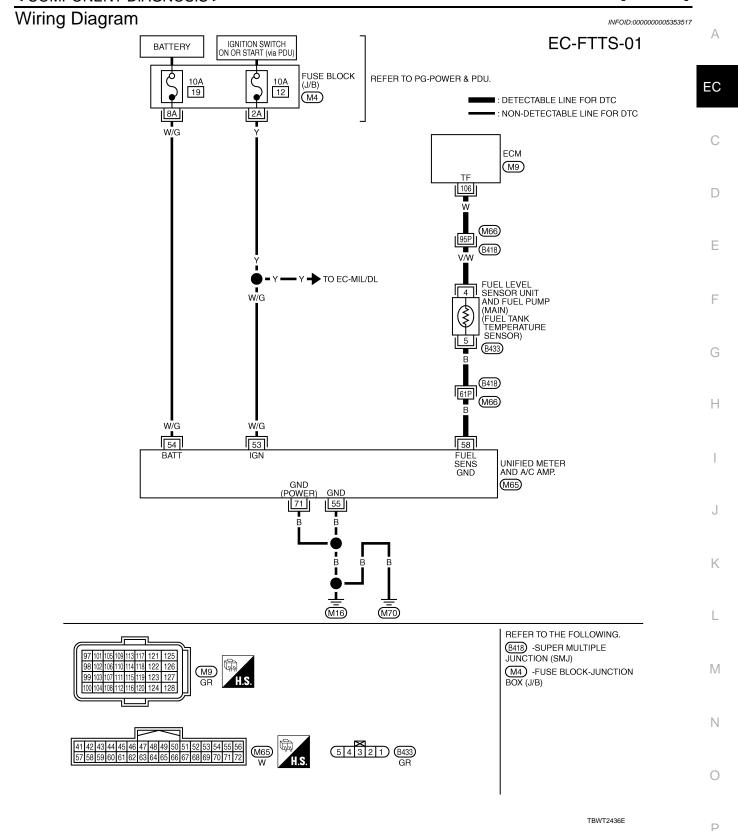
# 2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 5 seconds.
- Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-313, "Diagnosis Procedure".

NO >> INSPECTION END



# Diagnosis Procedure

INFOID:0000000005353518

# 1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

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#### < COMPONENT DIAGNOSIS >

YES >> GO TO 2.

NO >> Repair or replace ground connections.

2.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to DI-18, "CONSULT-III Function (METER/M&A)".

#### Is the inspection result normal?

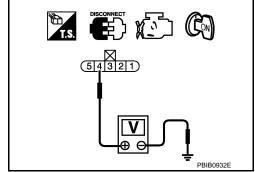
YES >> GO TO 3.

NO >> Go to DI-22, "Fuel Level Sensor Signal Inspection".

# ${f 3.}$ CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump (main)" harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between "fuel level sensor unit and fuel pump (main)" harness connector and ground.

Fuel level sensor unit and fuel pump (main)		Ground	Voltage (V)	
Connector	Terminal			
B433	4	Ground	Approx. 5	



#### Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

# 4. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors B418, M66
- Harness for open or short between ECM and "fuel level sensor unit and fuel pump (main)"
  - >> Repair open circuit, short to ground or short to power in harness or connectors.

# 5. CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect "unified meter and A/C amp." harness connector.
- Check the continuity between "fuel level sensor unit and fuel pump (main)" harness connector and "unified meter and A/C amp." harness connector.

Fuel level sensor unit and fuel pump (main)		Unified meter and A/C amp.		Continuity	
Connector	Terminal	Connector	Terminal		
B433	5	M65	58	Existed	

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

#### Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

### 6. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors B418, M66
- Harness for open or short between "fuel level sensor unit and fuel pump (main)" and "unified meter and A/C amp."
  - >> Repair open circuit, short to ground or short to power in harness or connectors.

### 7. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-315, "Component Inspection".

# **P0182, P0183 FTT SENSOR**

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

INFOID:0000000005353519

#### Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace "fuel level sensor unit and fuel pump (main)".

# 8. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

>> INSPECTION END

# Component Inspection

# 1. CHECK FUEL TANK TEMPERATURE SENSOR

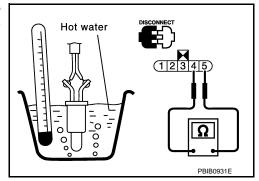
- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump (main)" harness connector.
- Remove "fuel level sensor unit and fuel pump (main)".
- Check resistance between "fuel level sensor unit and fuel pump (main)" terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance ( $k\Omega$ )	
4 and 5	Tomporatura	ature [°C (°F)]	20 (68)	2.3 - 2.7
	remperature		50 (122)	0.79 - 0.90

# Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump (main)".



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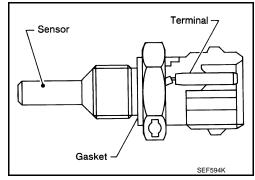
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### P0196 EOT SENSOR

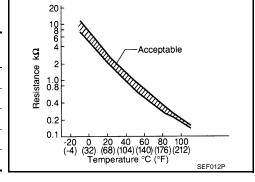
Description INFOID:0000000005353520

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



#### <Reference data>

Engine oil temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)	
-10 (14)	4.4	7.0 - 11.4	
20 (68)	3.5	2.1 - 2.9	
50 (122)	2.2	0.68 - 1.00	
90 (194)	0.9	0.236 - 0.260	
110 (230)	0.6	0.143 - 0.153	



<sup>\*:</sup> These data are reference values and are measured between ECM terminals 78 (Engine oil temperature sensor) and 84 (Sensor ground).

DTC Logic

#### DTC DETECTION LOGIC

#### NOTE

If DTC P0196 is displayed with P0197 or P0198, first perform the trouble diagnosis for DTC P0197, P0198. Refer to <a href="EC-319">EC-319</a>, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0196	Engine oil temperature sensor range/performance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	Harness or connectors     (The sensor circuit is open or shorted)     Engine oil temperature sensor	

#### DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

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

>> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.

#### P0196 EOT SENSOR

#### [VQ35HR] < COMPONENT DIAGNOSIS > Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Α Start engine and let it idle for 5 minutes and 10 seconds. Check 1st trip DTC. Is 1st trip DTC detected? EC YES >> EC-317, "Diagnosis Procedure". NO >> GO TO 3. 3.PERFORM DTC CONFIRMATION PROCEDURE-II (P)With CONSULT-III Select "DATA MONITOR" mode with CONSULT-III. D Check that "COOLAN TEMP/S" indicates above 70°C (158°F). If it is above 70°C (158°F), go to the following steps. If it is below 70°C (158°F), warm engine up until "COOLAN TEMP/S" indicates more than 70°C (158°F). Then perform the following steps. Е 3. Turn ignition switch OFF and soak the vehicle in a cool place. 4. Turn ignition switch ON. NOTE: F Do not turn ignition switch OFF until step 8. 5. Select "DATA MONITOR" mode with CONSULT-III. Check the following. COOLAN TEMP/S Below 40°C (104°F) INT/A TEMP SE Below 40°C (104°F) Н Difference between "COOLAN TEMP/S" and "INT/A TEMP SE" Within 6°C (11°F) If they are within the specified range, perform the following steps. If they are out of the specified range, soak the vehicle to meet the above conditions. Then perform the following steps. NOTE: Do not turn ignition switch OFF. If it is supposed to need a long period of time, do not deplete the battery. Start engine and let it idle for 5 minutes. Check 1st trip DTC. ■With GST Follow the procedure "With CONSULT-III" above. Is 1st trip DTC detected? YES >> EC-317, "Diagnosis Procedure". >> INSPECTION END NO Diagnosis Procedure INFOID:0000000005353522 M 1. CHECK GROUND CONNECTION Turn ignition switch OFF. N Check ground connections M16, M70. Refer to EC-158, "Ground Inspection". Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace ground connections. 2.check engine oil temperature sensor Refer to EC-318. "Component Inspection". Is the inspection result normal? YES >> GO TO 3. NO >> Replace engine oil temperature sensor. 3.CHECK INTERMITTENT INCIDENT Refer to EC-154, "Description".

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#### >> INSPECTION END

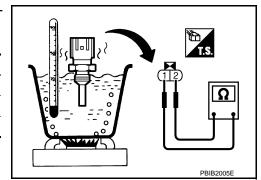
# Component Inspection

INFOID:0000000005353523

# 1.CHECK ENGINE OIL TEMPERATURE SENSOR

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

Terminals	Condition	Condition	
	Temperature [°C (°F)]	20 (68)	2.1 - 2.9
1 and 2		50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260



#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor.

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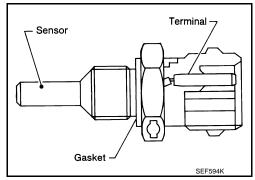
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# P0197, P0198 EOT SENSOR

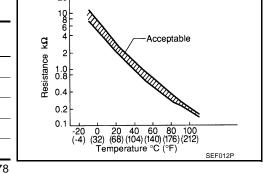
Description INFOID:0000000005353524

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



#### <Reference data>

Engine oil temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)	
-10 (14)	4.4	7.0 - 11.4	
20 (68)	3.5	2.1 - 2.9	
50 (122)	2.2	0.68 - 1.00	
90 (194)	0.9	0.236 - 0.260	
110 (230)	0.6	0.143 - 0.153	



<sup>\*:</sup> These data are reference values and are measured between ECM terminals 78 (Engine oil temperature sensor) and 84 (Sensor ground).

DTC Logic INFOID:000000005353525

#### DTC DETECTION LOGIC

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause	<b>'</b>
P0197	Engine oil tempera- ture sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors     (The sensor circuit is open or shorted.)	•
P0198	Engine oil tempera- ture sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	<u> </u>	

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

>> GO TO 2.

# 2.PERFORM DTC CONFIRMATION PROCEDURE

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

#### Is 1st trip DTC detected?

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**EC-319** 2010 M35/M45

YES >> Go to EC-320, "Diagnosis Procedure".

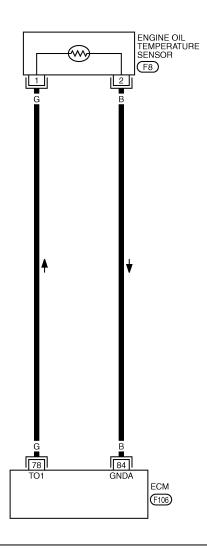
NO >> INSPECTION END

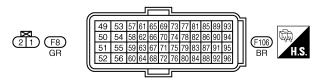
Wiring Diagram

INFOID:0000000005353526

#### EC-EOTS-01

: DETECTABLE LINE FOR DTC : NON-DETECTABLE LINE FOR DTC





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# Diagnosis Procedure

1. CHECK GROUND CONNECTION

INFOID:0000000005353527

#### **P0197, P0198 EOT SENSOR**

#### < COMPONENT DIAGNOSIS >

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- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

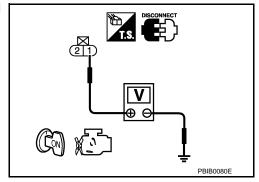
YES >> GO TO 2.

NO >> Repair or replace ground connections.

# 2.check engine oil temperature (eot) sensor power supply circuit

- 1. Disconnect EOT sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between EOT sensor harness connector and ground.

EOT sensor		Ground	Voltage (V)
Connector	Terminal	Oround	vollage (v)
F8	1	Ground	Approx. 5



#### Is the inspection result normal?

YES >> GO TO 3.

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

# ${f 3.}$ CHECK EOT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

EOT sensor		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
F8	2	F106	84	Existed

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

#### Is the inspection result normal?

YES >> GO TO 4.

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

### 4. CHECK EOT SENSOR

Refer to EC-321, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace engine oil temperature sensor.

### $oldsymbol{5}.$ CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

# Component Inspection

# 1. CHECK ENGINE OIL TEMPERATURE SENSOR

- Turn ignition switch OFF.
- 2. Disconnect engine oil temperature sensor harness connector.
- Remove engine oil temperature sensor.

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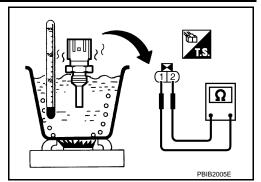
# **P0197, P0198 EOT SENSOR**

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

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

Terminals	Condition		Resistance (kΩ)
1 and 2	Temperature [°C (°F)]	20 (68)	2.1 - 2.9
		50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260



#### Is the inspection result normal?

YES >> INSPECTION END

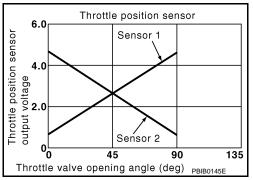
NO >> Replace engine oil temperature sensor.

# P0222, P0223, P2132, P2133 TP SENSOR

Description INFOID:0000000005353529

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

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



DTC Logic INFOID:0000000005353530

#### DTC DETECTION LOGIC

NOTE:

If DTC P0222, P0223, P2132 or P2133 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-445, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0222	Throttle position (TP) sensor 1 (bank 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.)     Electric throttle control actuator     (TP sensor 1)	
P0223	Throttle position (TP) sensor 1 (bank 1) circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.		
P2132	Throttle position (TP) sensor 1 (bank 2) circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.		
P2133	Throttle position (TP) sensor 1 (bank 2) circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.		

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

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

>> GO TO 2.

# 2.PERFORM DTC CONFIRMATION PROCEDURE

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

#### Is DTC detected?

>> Go to EC-325, "Diagnosis Procedure". YES

NO >> INSPECTION END

**EC-323** Revision: 2009 June 2010 M35/M45

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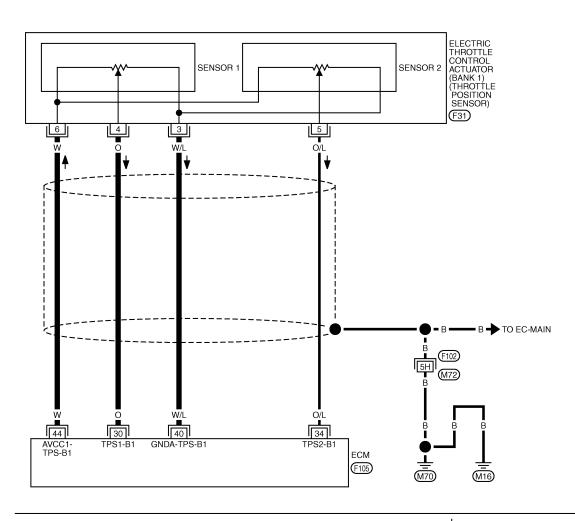
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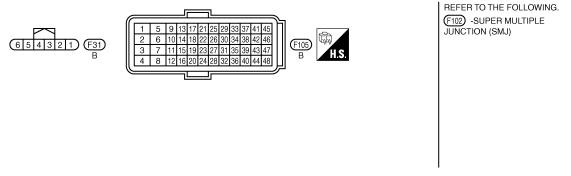
Wiring Diagram

INFOID:0000000005353531

#### EC-TPS1B1-01

: DETECTABLE LINE FOR DTC : NON-DETECTABLE LINE FOR DTC



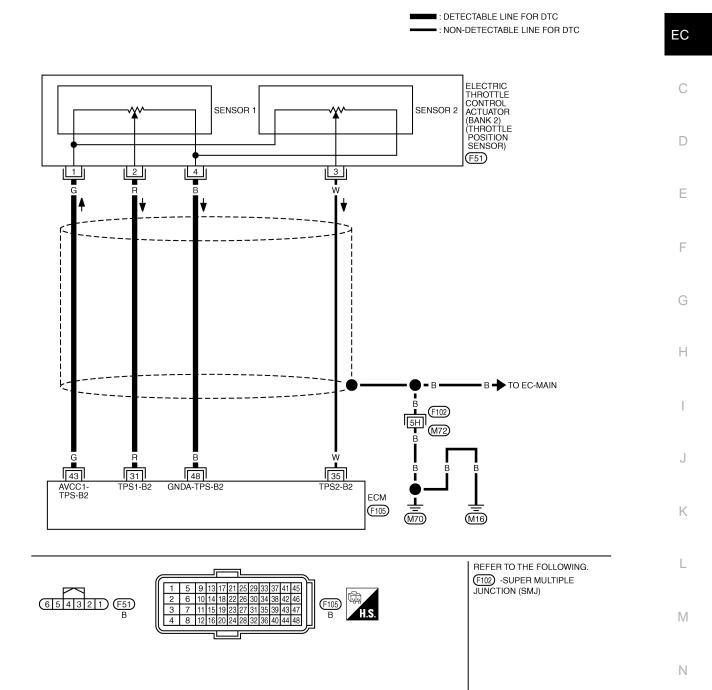


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#### EC-TPS1B2-01



TBWT2439E

INFOID:0000000005353532

## Diagnosis Procedure

## 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connections M16, M70. Refer to <u>EC-158, "Ground Inspection"</u>.

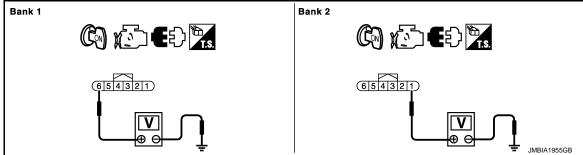
#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connections.

## 2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

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



DTC		Electric throttle control	actuator	Ground	Voltage (V)
DIC	Bank	Connector	Terminal	Giouna	vollage (v)
P0222, P0223	1	F31	6	Ground	Approx 5
P2132, P2133	2	F51	1	- Ground	Approx. 5

#### Is the inspection result normal?

YES >> GO TO 3.

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

### 3. CHECK THROTTLE POSITION SENSOR 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.

DTC	Electric throttle control actuator			EC	Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0222, P0223	1	F31	3	F105	40	Existed
P2132, P2133	2	F51	4	F 105	48	Existed

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

#### Is the inspection result normal?

YES >> GO TO 4.

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

### 4.CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	Electri	c throttle cont	rol actuator	EC	CM	Continuity
ы	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0222, P0223	1	F31	4	F105	30	Existed
P2132, P2133	2	F51	2	F 105	31	Existed

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

#### Is the inspection result normal?

YES >> GO TO 5.

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

### ${f 5.}$ CHECK THROTTLE POSITION SENSOR

### P0222, P0223, P2132, P2133 TP SENSOR

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

INFOID:0000000005353533

Refer to EC-327, "Component Inspection".

### Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

### 6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace malfunctioning electric throttle control actuator.

Go to EC-328, "Special Repair Requirement".

#### >> INSPECTION END

### .CHECK INTERMITTENT INCIDENT

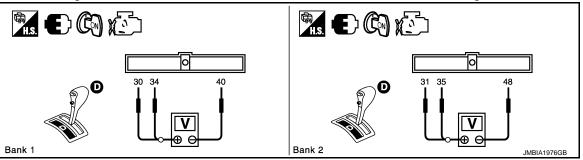
Refer to EC-154, "Description".

#### >> INSPECTION END

### Component Inspection

1. CHECK THROTTLE POSITION (TP) SENSOR

- Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- Turn ignition switch ON.
- Set selector lever position to D.
- Check the voltage between ECM harness connector terminals under the following conditions.



	ECM				
Connector	+	_	Condition	Voltage (V)	
Connector	Terminal	Terminal			
	30	40	Accelerator pedal: Fully released	More than 0.36	
	[TP sensor 1 (bank 1)]	40	Accelerator pedal: Fully depressed	Less than 4.75	
	31 [TP sensor 1 (bank 2)]	48	Accelerator pedal: Fully released	More than 0.36	
F105		40	Accelerator pedal: Fully depressed	Less than 4.75	
F105	34	40	Accelerator pedal: Fully released	Less than 4.75	
	[TP sensor 2 (bank 1)]	40	Accelerator pedal: Fully depressed	More than 0.36	
	35	35	Accelerator pedal: Fully released	Less than 4.75	
	[TP sensor 2 (bank 2)]	48	Accelerator pedal: Fully depressed	More than 0.36	

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

## 2.replace electric throttle control actuator

- Replace malfunctioning electric throttle control actuator.
- Go to EC-328, "Special Repair Requirement".

**EC-327** Revision: 2009 June 2010 M35/M45

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### P0222, P0223, P2132, P2133 TP SENSOR

< COMPONENT DIAGNOSIS >

[VQ35HR]

>> INSPECTION END

### Special Repair Requirement

INFOID:0000000005353534

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-27, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END

< COMPONENT DIAGNOSIS >

[VQ35HR]

### P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

DTC Logic INFOID:0000000005353535

#### DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
CKP sensor	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 in any one cylinder or in multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300	Multiple cylinder misfires detected	Multiple cylinder misfire.	Improper spark plug
P0301	No. 1 cylinder misfire detected	No. 1 cylinder misfires.	Insufficient compression     Incorrect fuel pressure
P0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	The fuel injector circuit is open or shorted
P0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	Fuel injector     Intake air leak
P0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	The ignition signal circuit is open or short-
P0305	No. 5 cylinder misfire detected	No. 5 cylinder misfires.	ed • Lack of fuel
P0306	No. 6 cylinder misfire detected	No. 6 cylinder misfires.	<ul> <li>Signal plate</li> <li>Air fuel ratio (A/F) sensor 1</li> <li>Incorrect PCV hose connection</li> </ul>

### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### >> GO TO 2.

### 2.PERFORM DTC CONFIRMATION PROCEDURE-I

- Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON. 3.
- Turn ignition switch OFF and wait at least 10 seconds.
- Restart engine and let it idle for approximately 15 minutes.
- Check 1st trip DTC.

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**EC-329** Revision: 2009 June 2010 M35/M45

#### < COMPONENT DIAGNOSIS >

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#### Is 1st trip DTC detected?

YES >> Go to EC-330, "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.
- Start engine and drive the vehicle under similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.

#### Hold the accelerator pedal as steady as possible.

Similar conditions to (1st trip) Freeze Frame Data mean that the following conditions should be satisfied at the same time.

#### **CAUTION:**

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

Engine speed	Engine speed in the freeze frame data $\pm$ 400 rpm	
Vehicle speed	Vehicle speed in the freeze frame data $\pm$ 10 km/h (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).	

Driving time varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approx. 10 minutes
Around 2,000 rpm	Approx. 5 minutes
More than 3,000 rpm	Approx. 3.5 minutes

#### Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-330, "Diagnosis Procedure".

NO >> INSPECTION END

### Diagnosis Procedure

INFOID:0000000005353536

## 1. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

- Start engine and run it at idle speed.
- 2. Listen for the sound of the intake air leak.
- 3. Check PCV hose connection.

#### Is intake air leak detected?

YES >> Discover air leak location and repair.

NO >> GO TO 2.

## 2.CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

#### Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 3.

YES-2 >> Without CONSULT-III: GO TO 4.

NO >> Repair or replace malfunctioning part.

### 3. PERFORM POWER BALANCE TEST

#### (II) With CONSULT-III

Start engine.

< COMPONENT DIAGNOSIS >

- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- Check that each circuit produces a momentary engine speed drop.

#### Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 4.

### 4. CHECK FUNCTION OF FUEL INJECTOR

- Start engine and let it idle.
- Listen to each fuel injector operation.

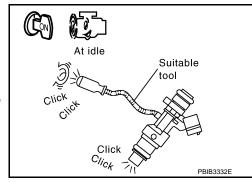
#### Clicking sound should be heard.

#### Is the inspection result normal?

YES >> GO TO 5.

NO

>> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-599, "Diagnosis Procedure".



### 5.CHECK FUNCTION OF IGNITION COIL-I

#### **CAUTION:**

Perform the following procedure in a place with no combustible objects and good ventilation.

- Turn ignition switch OFF.
- 2. Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

#### NOTE:

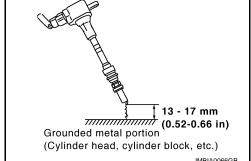
Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- 3. Start engine.
- 4. After engine stalls, crank it 2 or 3 times to release all fuel pressure.
- Turn ignition switch OFF.
- 6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 7. Remove ignition coil and spark plug of the cylinder to be checked.
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 9. Connect spark plug and harness connector to ignition coil.
- 10. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 -0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 11. Crank engine for approximately 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

#### Spark should be generated.

#### **CAUTION:**

 Never place to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.



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• It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made. NOTE:

When the gap is less than 13 mm (0.52 in), a spark might be generated even if the coil is malfunctioning.

### Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 6.

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## 6.CHECK FUNCTION OF IGNITION COIL-II

- 1. Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a known-good spark plug.
- 3. Crank engine for approximately 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

#### Spark should be generated.

#### Is the inspection result normal?

YES >> GO TO 7.

NO >> Check ignition coil, power transistor and their circuits. Refer to EC-620, "Diagnosis Procedure".

### 7. CHECK SPARK PLUG

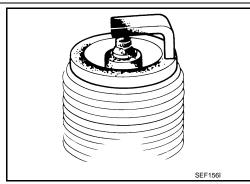
Check the initial spark plug for fouling, etc.

#### Is the inspection result normal?

YES >> Replace spark plug(s)

>> Replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-16. "Changing Spark Plugs (Iridium-Tipped Type)".

NO >> Repair or clean spark plug. Then GO TO 8.



## 8.CHECK FUNCTION OF IGNITION COIL-III

- 1. Reconnect the initial spark plugs.
- 2. Crank engine for approximately 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

#### Spark should be generated.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-16, "Changing Spark Plugs (Iridium-Tipped Type)".

### 9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-96, "On-Vehicle Service".

#### Is the inspection result normal?

YES >> GO TO 10.

NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

### 10. CHECK FUEL PRESSURE

- 1. Install all removed parts.
- Check fuel pressure. Refer to <u>EC-692</u>, "Inspection".

#### Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

## 11. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

#### Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly".

NO >> Repair or replace malfunctioning part.

### 12. CHECK IDLE SPEED AND IGNITION TIMING

Check idle speed and ignition timing.

#### < COMPONENT DIAGNOSIS >

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For procedure, refer to EC-22, "BASIC INSPECTION: Special Repair Requirement".

For specification, refer to EC-697, "Idle Speed" and EC-697, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Follow the EC-22, "BASIC INSPECTION: Special Repair Requirement".

## 13. CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

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

	A/F sensor 1			ECM			
Bank	Connector	Terminal	Connector	Terminal	Continuity		
1	F40	1		57			
ļ	1 40	2	2		E400	61	Existed
2	F41	1	F100	65	Existed		
2	Г <del>4</del> I	2		66			

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

	A/F sensor 1			Continuity	
Bank	Connector	Terminal	Ground		
1	1 F40 1				
'	140	2	Ground	Not existed	
2	F41	1	Giodila	Not existed	
2	141	2			

ECM		Ground	Continuity	
Connector	Terminal	Glound	Continuity	
	57			
F106	61	Ground	Not existed	
F 100	65	Glound		
	66			

Also check harness for short to power.

#### Is the inspection result normal?

YES >> GO TO 14.

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

## 14. CHECK A/F SENSOR 1 HEATER

Refer to EC-178, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace (malfunctioning) A/F sensor 1.

## 15. CHECK MASS AIR FLOW SENSOR

#### With CONSULT-III

Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT-III.

For specification, refer to EC-697, "Mass Air Flow Sensor".

#### 

Check mass air flow sensor signal in Service \$01 with GST.

For specification, refer to EC-697, "Mass Air Flow Sensor".

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#### < COMPONENT DIAGNOSIS >

[VQ35HR]

Is the measurement value within the specification?

YES >> GO TO 16.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to <a href="EC-208">EC-208</a>, "Diagnosis Procedure".

## 16. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in EC-680, "Symptom Table".

Is the inspection result normal?

YES >> GO TO 17.

NO >> Repair or replace malfunctioning part.

17. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.

Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to <u>EC-121, "Diagnosis Description"</u>.

>> GO TO 18.

## 18. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

>> INSPECTION END

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

### P0327, P0328, P0332, P0333 KS

**Description** 

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

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**DTC** Logic

INFOID:0000000005353538

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detected condition	Possible cause
P0327	Knock sensor (bank 1) circuit low input	An excessively low voltage from the sensor is sent to ECM.	
P0328	Knock sensor (bank 1) circuit high input	An excessively high voltage from the sensor is sent to ECM.	Harness or connectors     (The sensor circuit is open or shorted.)
P0332	Knock sensor (bank 2) circuit low input	An excessively low voltage from the sensor is sent to ECM.	Knock sensor
P0333	Knock sensor (bank 2) circuit high input	An excessively high voltage from the sensor is sent to ECM.	

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

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

>> GO TO 2.

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## 2.perform dtc confirmation procedure

- 1. Start engine and run it for at least 5 seconds at idle speed.
- 2. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-337, "Diagnosis Procedure".

NO >> INSPECTION END

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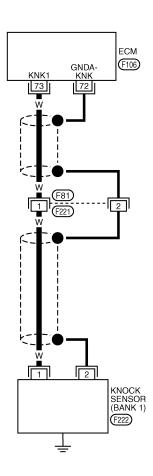
[VQ35HR]

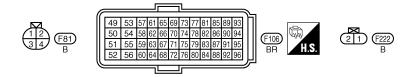
Wiring Diagram

INFOID:0000000005353539

### EC-KSB1-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





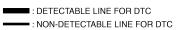
TBWT2440E

GNDA-

F106 BR KNOCK SENSOR (BANK 2)

ECM (F106)





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TBWT2441E

INFOID:0000000005353540

## Diagnosis Procedure

1 2 F81 3 4 B

## 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

YES >> GO TO 2.

[VQ35HR]

NO >> Repair or replace ground connections.

## 2.CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

DTC	Knock sensor		ECM		Continuity	
ы	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0327, P0328	1	F222	2	F106	72	Existed
P0332, P0333	2	F223	2	1 100	12	LAISIEU

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

#### Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F81, F221
- Harness for open or short between knock sensor and ECM

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

### 4. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	Knock sensor			EC	Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0327, P0328	1	F222	1	F106	73	Existed
P0332, P0333	2	F223	1	1 100	69	LAISIEU

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

#### Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

### 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F81, F221
- Harness for open or short between knock sensor and ECM

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

### 6.CHECK KNOCK SENSOR

Refer to EC-339, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning knock sensor.

### 7. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

#### < COMPONENT DIAGNOSIS >

Component Inspection

[VQ35HR]

INFOID:0000000005353541

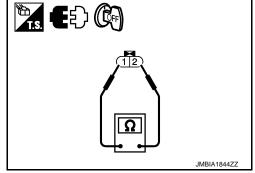
## 1. CHECK KNOCK SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect knock sensor harness connector.
- Check resistance between knock sensor terminals as per the following.

#### NOTE:

It is necessary to use an ohmmeter which can measure more than 10  $M\Omega.$ 

Terminals	Resistance
1 and 2	Approx. 532 - 588 kΩ [at 20°C (68°F)]



#### **CAUTION:**

Never use any knock sensors that have been dropped or physically damaged. Use only new ones.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning knock sensor.

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### P0335 CKP SENSOR

**Description** 

The crankshaft position (CKP) sensor is located on the cylinder block facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet and Hall IC.

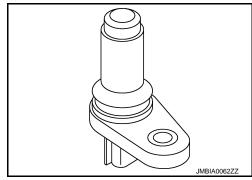
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

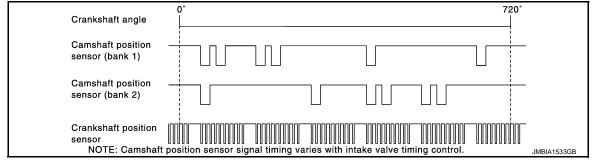
The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

ECM receives the signals as shown in the figure.





DTC Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position (CKP) sensor circuit	<ul> <li>The crankshaft position sensor 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 is not sent to ECM while the engine is running.</li> <li>The crankshaft position sensor signal is not in the normal pattern during engine running.</li> </ul>	Harness or connectors     (CKP sensor circuit is open or shorted.)     [Camshaft position (CMP) sensor (bank 2) circuit is shorted.]     [Exhaust valve timing (EVT) control position sensor (bank 2) circuit is shorted.]     (Battery current sensor circuit is shorted.)     [Accelerator pedal position (APP) sensor 2 circuit is shorted.]     (EVAP control system pressure sensor circuit is shorted.)     (Refrigerant pressure sensor circuit is shorted.)     CKP sensor     CMP sensor (bank 2)     EVT control position sensor (bank 2)     Battery current sensor     APP sensor     EVAP control system pressure sensor     Refrigerant pressure sensor     Signal plate

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### P0335 CKP SENSOR

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

>> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for at least 5 seconds. If engine does not start, crank engine for at least 2 seconds.
- 2. Check 1st trip DTC.

### Is 1st trip DTC detected?

YES >> Go to EC-342, "Diagnosis Procedure".

>> INSPECTION END NO

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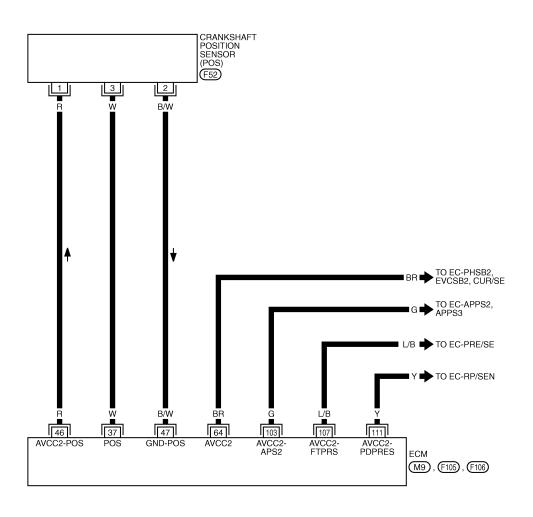
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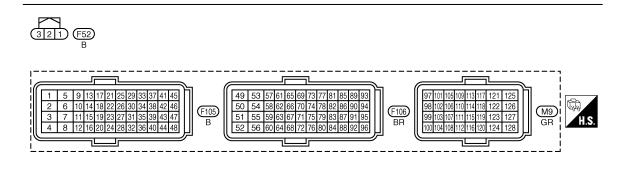
Wiring Diagram

INFOID:0000000005353544

#### EC-POS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





TBWT2442E

## Diagnosis Procedure

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## 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

Is the inspection result normal?

### P0335 CKP SENSOR

### < COMPONENT DIAGNOSIS >

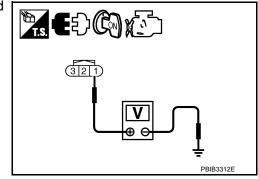
YES >> GO TO 2.

NO >> Repair or replace ground connections.

## 2.CHECK CRANKSHAFT POSITION (CKP) SENSOR POWER SUPPLY CIRCUIT-I

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

CKP :	sensor	Ground	Voltage (V)
Connector	Terminal	Oround	voltage (v)
F52	1	Ground	Approx. 5



#### Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 3.

## 3.CHECK CKP SENSOR POWER SUPPLY CIRCUIT-II

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

CKP sensor		EC	Continuity	
Connector	Connector Terminal		Terminal	Continuity
F52	1	F105	46	Existed

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

### f 4.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor				
Connector	Terminal	Name	Connector	Terminal		
F105	46	CKP sensor	F52	1		
		Camshaft position (CMP) sensor (bank 2)	F32	1		
F106	64	Exhaust valve timing (EVT) control position sensor (bank 2)	F83	1		
			Battery current sensor	E67	1	
	103	Accelerator pedal position (APP) sensor	E113	5		
M9	107	EVAP control system pressure sensor	B172	3		
	111	Refrigerant pressure sensor	E66	1		

#### 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.

- CMP sensor (bank 2) (Refer to EC-352, "Component Inspection".)
- EVT control position sensor (bank 2) (Refer to EC-459, "Component Inspection".)

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#### [VQ35HR]

#### < COMPONENT DIAGNOSIS >

- Battery current sensor (Refer to EC-502, "Component Inspection".)
- EVAP control system pressure sensor (Refer to <u>EC-394, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to ATC-80, "Magnet Clutch Circuit".)

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning component.

### 6.CHECK APP SENSOR

Refer to EC-561, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 7.

## 7.replace accelerator pedal assembly

- 1. Replace accelerator pedal assembly.
- 2. Go to EC-562, "Special Repair Requirement".

#### >> INSPECTION END

## 8.CHECK CKP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

CKP se	ensor	EC	Continuity	
Connector	tor Terminal Connector Terminal		Continuity	
F52	2	F105	47	Existed

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

#### Is the inspection result normal?

YES >> GO TO 9.

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

### 9.CHECK CKP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

CKP sensor		EC	Continuity	
Connector	Terminal	Connector Terminal		Continuity
F52	3	F105	37	Existed

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

#### Is the inspection result normal?

YES >> GO TO 10.

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

### 10.CHECK CKP SENSOR

Refer to EC-345, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace crankshaft position sensor.

### 11. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

#### Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace the signal plate.

Revision: 2009 June **EC-344** 2010 M35/M45

## 12. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

### Component Inspection

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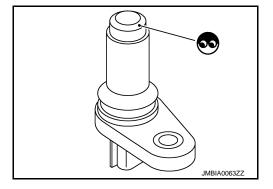
## 1. CHECK CRANKSHAFT POSITION SENSOR-I

- 1. Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect crankshaft position sensor harness connector.
- 4. Remove the sensor.
- 5. Visually check the sensor for chipping.

### Is the inspection result normal?

YES >> GO TO 2.

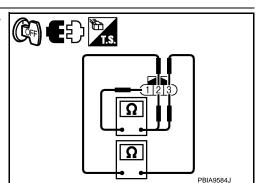
NO >> Replace crankshaft position sensor.



## 2. CHECK CRANKSHAFT POSITION SENSOR-II

Check resistance between crankshaft position sensor terminals as per the following.

Terminals (Polarity)	Resistance	
1 (+) - 2 (-)		
1 (+) - 3 (-)	Except 0 or ∞ Ω [at 25°C (77°F)]	
2 (+) - 3 (-)		



#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace crankshaft position sensor.

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Revision: 2009 June **EC-345** 2010 M35/M45

### P0340, P0345 CMP SENSOR

**Description** 

The camshaft position (CMP) sensor senses the retraction of camshaft (INT) to identify a particular cylinder. The camshaft position sensor senses the piston position.

When the crankshaft position sensor system becomes inoperative, the camshaft position sensor provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

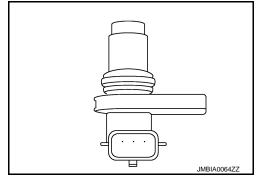
The sensor consists of a permanent magnet and Hall IC.

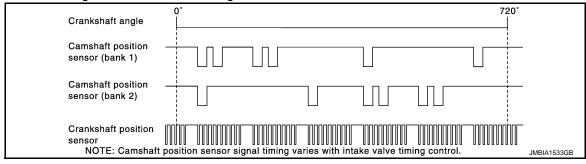
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

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-445, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	Α
P0340	Camshaft position (CMP) sensor (bank 1) circuit		Harness or connectors     [CMP sensor (bank 1) circuit is open or shorted.]     CMP sensor (bank 1)     Camshaft (INT)     Starter motor     Starting system circuit     Dead (Weak) battery	EC
P0345	Camshaft position (CMP) sensor (bank 2) circuit	<ul> <li>The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking.</li> <li>The cylinder No. signal is not sent to ECM during engine running.</li> <li>The cylinder No. signal is not in the normal pattern during engine running.</li> </ul>	Harness or connectors [CMP sensor (bank 2) circuit is open or shorted.] [Crankshaft position (CKP) sensor circuit is shorted.] [Exhaust valve timing (EVT) control position sensor (bank 2) circuit is shorted.] (Battery current sensor circuit is shorted.) [Accelerator pedal position (APP) sensor 2 circuit is shorted.] (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.)  CMP sensor (bank 2) CKP sensor EVT control position sensor (bank 2) Battery current sensor APP sensor EVAP control system pressure sensor Refrigerant pressure sensor Camshaft (INT) Starter motor Starting system circuit Dead (Weak) battery	E F G

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

Turn ignition switch OFF and wait at least 10 seconds.

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

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

>> GO TO 2.

## 2.PERFORM DTC CONFIRMATION PROCEDURE-I

- Start engine and let it idle for at least 5 seconds. If engine does not start, crank engine for at least 2 seconds.
- 2. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-349, "Diagnosis Procedure".

NO >> GO TO 3.

## 3.perform dtc confirmation procedure-i

- Maintaining engine speed at more than 800 rpm for at least 5 seconds.
- Check 1st trip DTC. 2.

#### Is 1st trip DTC detected?

**EC-347** Revision: 2009 June 2010 M35/M45

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YES >> Go to EC-349, "Diagnosis Procedure".

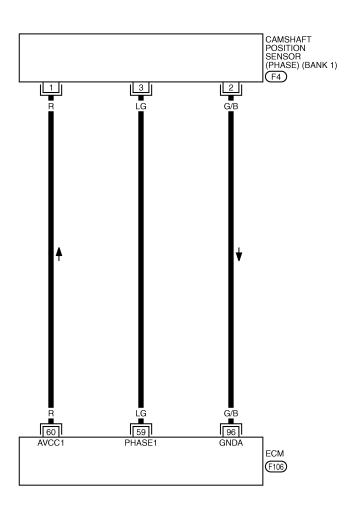
NO >> INSPECTION END

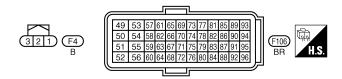
## Wiring Diagram

INFOID:0000000005353549

### EC-PHSB1-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

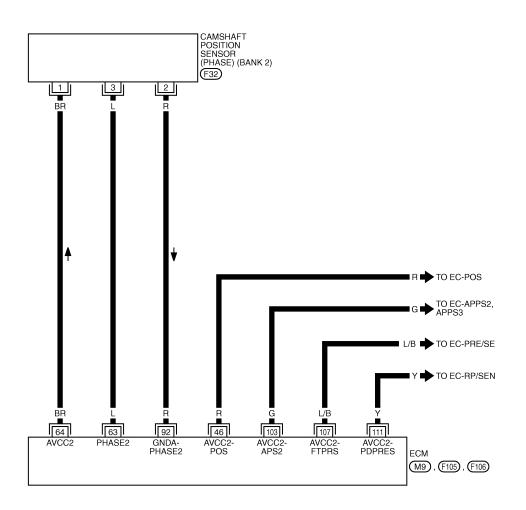


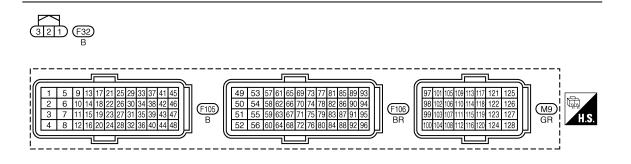


TBWT2443E



: DETECTABLE LINE FOR DTC : NON-DETECTABLE LINE FOR DTC





#### TBWT2444F

INFOID:0000000005353550

Diagnosis Procedure

### 1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

YES >> GO TO 2.

NO >> Check starting system. (Refer to SC-8, "System Description".)

**EC-349** Revision: 2009 June 2010 M35/M45

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#### < COMPONENT DIAGNOSIS >

# $\overline{2}$ .check ground connection

- 1. Turn ignition switch OFF.
- Check ground connections M16, M70. Refer to <u>EC-158, "Ground Inspection"</u>.

#### Is the inspection result normal?

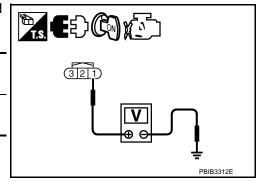
YES >> GO TO 3.

NO >> Repair or replace ground connections.

## 3.CHECK CAMSHAFT POSITION (CMP) SENSOR POWER SUPPLY CIRCUIT-I

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

DTC			CMP sensor			Voltage (V)	
D	10	Bank	Connector	Terminal	Ground	voltage (v)	
P0	340	1	F4	1	Ground	Approx. 5	
P0	345	2	F32	1	Giodila	дрргох. 3	



#### Is the inspection result normal?

YES >> GO TO 9.

NO-1 >> P0340: Repair open circuit, short to ground or short to power in harness or connectors.

NO-2 >> P0345: GO TO 4.

### 4. CHECK CMP SENSOR POWER SUPPLY CIRCUIT-II

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

CMP sensor			EC	Continuity	
Bank	Connector	Terminal	Connector	Terminal	Continuity
2	F32	1	F106	64	Existed

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit.

### 5. CHECK CMP SENSOR POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor			
Connector	Terminal	Name	Connector	Terminal	
F105	46	Crankshaft position (CKP) sensor	F52	1	
		CMP sensor (bank 2)	F32	1	
F106	F106 64	Exhaust valve timing (EVT) control position sensor (bank 2)		F83	1
	Battery current sensor	E67	1		
	103	Accelerator pedal position (APP) sensor	E113	5	
M9	107	EVAP control system pressure sensor	B172	3	
	111	Refrigerant pressure sensor	E66	1	

#### Is the inspection result normal?

#### **P0340, P0345 CMP SENSOR** [VQ35HR] < COMPONENT DIAGNOSIS > YES >> GO TO 6. NO >> Repair short to ground or short to power in harness or connectors. 6. CHECK COMPONENTS Check the following. EC CKP sensor (Refer to <u>EC-345</u>, "Component Inspection".) EVT control position sensor (bank 2) (Refer to EC-459, "Component Inspection".)

### Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning component.

#### **1.**CHECK APP SENSOR

Refer to EC-561, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 8.

### 8.REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly.
- Go to EC-562, "Special Repair Requirement".

#### >> INSPECTION END

### 9.CHECK CMP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

Battery current sensor (Refer to <u>EC-502</u>, "Component Inspection".)

• Refrigerant pressure sensor (Refer to ATC-80, "Magnet Clutch Circuit".)

• EVAP control system pressure sensor (Refer to EC-394, "Component Inspection".)

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

DTC		CMP senso	or	EC	CM	Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0340	1	F4	2	F106	96	Existed
P0345	2	F32	2	F100	92	Existed

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

#### Is the inspection result normal?

>> GO TO 10. YES

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

### 10.CHECK CMP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTO	`		CMP sense	or	EC	CM	Continuity
DIC	,	Bank	Connector	Terminal	Connector	Terminal	Continuity
P034	Ю	1	F4	3	F106	59	Existed
P034	<b>1</b> 5	2	F32	3	F 100	63	Existed

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

#### Is the inspection result normal?

YES >> GO TO 11.

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

### 11. CHECK CMP SENSOR

Refer to EC-352, "Component Inspection".

#### Is the inspection result normal?

EC-351 Revision: 2009 June 2010 M35/M45

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#### < COMPONENT DIAGNOSIS >

YES >> GO TO 12.

NO >> Replace malfunctioning camshaft position sensor.

# 12. CHECK CAMSHAFT (INT)

Check the following.

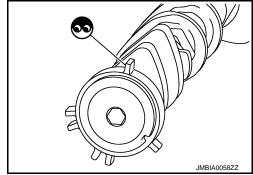
- · Accumulation of debris to the signal plate of camshaft rear end
- · Chipping signal plate of camshaft rear end

### Is the inspection result normal?

YES >> GO TO 13.

NO >> Re

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



### 13. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

### Component Inspection

INFOID:0000000005353551

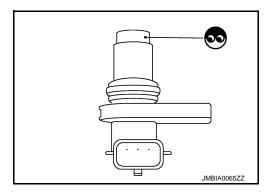
## 1. CHECK CAMSHAFT POSITION SENSOR-I

- 1. Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect camshaft position sensor harness connector.
- 4. Remove the sensor.
- 5. Visually check the sensor for chipping.

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning camshaft position sensor.



## 2. CHECK CAMSHAFT POSITION SENSOR-II

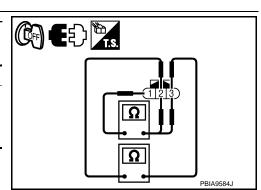
Check resistance camshaft position sensor terminals as per the following.

Terminals (Polarity)	Resistance
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or ∞ Ω [at 25°C (77°F)]
2 (+) - 3 (-)	

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning camshaft position sensor.



[VQ35HR]

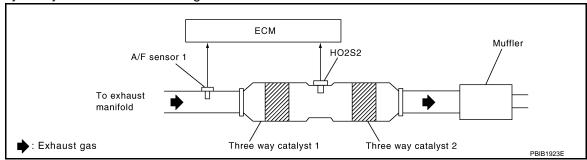
### P0420, P0430 THREE WAY CATALYST FUNCTION

DTC Logic INFOID:0000000005353552

#### DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2. A three way catalyst 1 with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.

When the frequency ratio of A/F sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst 1 malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420	Catalyst system efficiency below threshold (bank 1)	Three way catalyst 1 does not operate	Three way catalyst 1     Exhaust tube
P0430	Catalyst system efficiency below threshold (bank 2)	<ul> <li>properly.</li> <li>Three way catalyst 1 does not have enough oxygen storage capacity.</li> </ul>	<ul><li>Intake air leaks</li><li>Fuel injector</li><li>Fuel injector leaks</li><li>Spark plug</li><li>Improper ignition timing</li></ul>

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### Will CONSULT-III be used?

YES >> GO TO 2.

NO >> GO TO 6.

### 2.PERFORM DTC CONFIRMATION PROCEDURE-I

#### (P)With CONSULT-III **TESTING CONDITION:**

#### Do not maintain engine speed for more than the specified minutes below.

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- Start engine and warm it up to the normal operating temperature. 2.
- Turn ignition switch OFF and wait at least 10 seconds. 3.
- Turn ignition switch ON. 4.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 7. Let engine idle for 1 minute.
- Check that "COOLAN TEMP/S" indicates more than 70°C (158°F). If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F).
- Open engine hood.
- 10. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-III.

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**EC-353** Revision: 2009 June

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

- 11. Rev engine between 2,000 and 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
- 12. Check the indication of "CATALYST".

#### Which is displayed on CONSULT-III screen?

CMPLT>> GO TO 5.

INCMP >> GO TO 3.

### 3.PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. Wait 5 seconds at idle.
- 2. Rev engine between 2,000 and 3,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take approximately 5 minutes).

#### Does the indication change to "CMPLT"?

YES >> GO TO 5.

NO >> GO TO 4.

### f 4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- 1. Stop engine and cool it down to less than 70°C (158°F).
- 2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 2.

## 5. PERFORM DTC CONFIRMATION PROCEDURE-III

Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-355, "Diagnosis Procedure".

NO >> INSPECTION END

### 6.PERFORM COMPONENT FUNCTION CHECK

#### **With GST**

Perform component function check. Refer to EC-354, "Component Function Check".

#### NOTE:

Use component function check to check the overall function of the three way catalyst 1. During this check, a 1st trip DTC might not be confirmed.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-355, "Diagnosis Procedure".

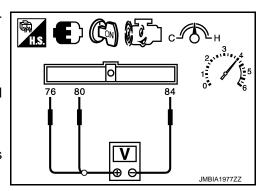
### Component Function Check

INFOID:0000000005353553

### 1. PERFORM COMPONENT FUNCTION CHECK

#### With GST

- 1. Start engine and warm it up to the normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 6. Let engine idle for 1 minute.
- 7. Open engine hood.
- 8. Check the voltage between ECM harness connector terminals under the following condition.



< COMPONENT DIAGNOSIS >

[VQ35HR]

	ECM					
DTC	Connector	+	_	Condition	Voltage	
	Connector	Terminal	Terminal			
P0420	F106	76 [HO2S2 (bank 1)]		Keeping engine speed at 2.500 rg	Keeping engine speed at 2,500 rpm	The voltage fluctuation cycle takes more than 5 seconds.
P0430	F100 -	80 [HO2S2 (bank 2)]	84	constant under no load	• 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0	

YES >> INSPECTION END

NO >> Go to EC-355, "Diagnosis Procedure".

### Diagnosis Procedure

### 1. CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dents.

#### Is the inspection result normal?

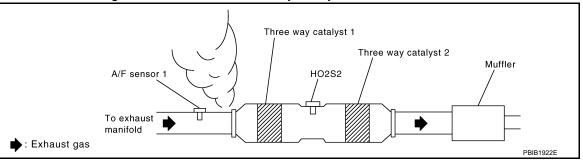
YES >> GO TO 2.

>> Repair or replace malfunctioning part. NO

## 2. CHECK EXHAUST GAS LEAK

Start engine and run it at idle.

Listen for an exhaust gas leak before the three way catalyst 1.



#### Is exhaust gas leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 3.

### 3.CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

#### Is intake air leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 4.

### 4. CHECK IDLE SPEED AND IGNITION TIMING

Check idle speed and ignition timing.

For procedure, refer to EC-22, "BASIC INSPECTION: Special Repair Requirement".

For specification, refer to EC-697, "Idle Speed" and EC-697, "Ignition Timing".

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> Follow the EC-22, "BASIC INSPECTION: Special Repair Requirement".

### ${f 5.}$ CHECK FUEL INJECTORS

Stop engine and then turn ignition switch ON.

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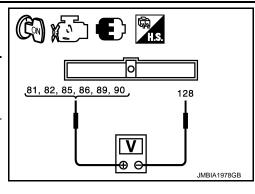
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#### < COMPONENT DIAGNOSIS >

[VQ35HR]

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

	+		_		
Connector	Terminal	Connector	Terminal	-	
	81				
	82		128	Battery voltage	
E400	85	M9			
F106	86	WI9			
	89				
	90				



#### Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform <u>EC-599</u>, "<u>Diagnosis Procedure</u>".

6. CHECK FUNCTION OF IGNITION COIL-I

#### **CAUTION:**

#### Perform the following procedure in a place with no combustible objects and good ventilation.

- 1. Turn ignition switch OFF.
- Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

#### NOTE:

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- 3. Start engine.
- After engine stalls, crank it 2 or 3 times to release all fuel pressure.
- 5. Turn ignition switch OFF.
- 6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 7. Remove ignition coil and spark plug of the cylinder to be checked.
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 9. Connect spark plug and harness connector to ignition coil.
- 10. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 11. Crank engine for approximately 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



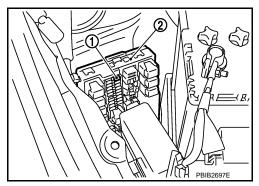
#### **CAUTION:**

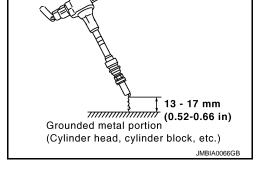
- Never place to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made. NOTE:

When the gap is less than 13 mm (0.52 in), a spark might be generated even if the coil is malfunctioning.

#### Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 7.





< COMPONENT DIAGNOSIS >

[VQ35HR]

## 7.check function of ignition coil-ii

- 1. Turn ignition switch OFF.
- Disconnect spark plug and connect a known-good spark plug.
- Crank engine for approximately 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

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#### Spark should be generated.

#### Is the inspection result normal?

YES >> GO TO 8.

NO >> Check ignition coil, power transistor and their circuits. Refer to EC-620, "Diagnosis Procedure".

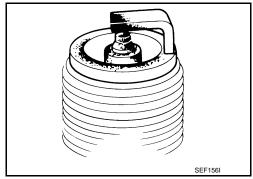
### 8.CHECK SPARK PLUG

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 MA-16, "Changing Spark Plugs (Iridium-Tipped Type)".

NO >> Repair or clean spark plug. Then GO TO 9.



## 9. CHECK FUNCTION OF IGNITION COIL-III

- Reconnect the initial spark plugs.
- Crank engine for approximately 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

#### Spark should be generated.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-16, "Changing Spark Plugs (Iridium-Tipped Type)".

### 10. CHECK FUEL INJECTOR

- 1. Turn ignition switch OFF.
- Remove fuel injector assembly.

Refer to EM-40, "Removal and Installation".

Keep fuel hose and all fuel injectors connected to fuel tube.

- 3. Disconnect all ignition coil harness connectors.
- Reconnect all fuel injector harness connectors disconnected.
- 5. Turn ignition switch ON.

#### Does fuel drip from fuel injector?

YES >> Replace the fuel injector(s) from which fuel is dripping.

NO >> GO TO 11.

### 11. CHECK INTERMITTENT INCIDENT

### Refer to EC-154, "Description".

## Is the inspection result normal?

YES >> Replace three way catalyst assembly.

NO >> Repair or replace harness or connector.

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### P0441 EVAP CONTROL SYSTEM

DTC Logic

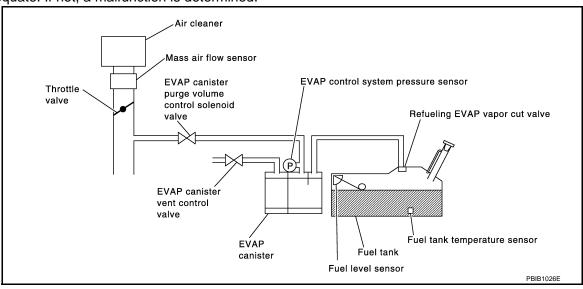
#### DTC DETECTION LOGIC

#### NOTE:

# If DTC P0441 is displayed with other DTC such as P2122, P2123, P2127, P2128 or P2138, first perform trouble diagnosis for other DTC.

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0441	EVAP control system incorrect purge flow	EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	EVAP canister purge volume control solenoid valve stuck closed     EVAP control system pressure sensor and the circuit     Loose, disconnected or improper connection of rubber tube     Blocked rubber tube     Cracked EVAP canister     EVAP canister purge volume control solenoid valve circuit     Accelerator pedal position sensor     Blocked purge port     EVAP canister vent control valve

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### Will CONSULT-III be used?

YES >> GO TO 2. NO >> GO TO 5.

#### P0441 EVAP CONTROL SYSTEM

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

# 2.perform dtc confirmation procedure-i

#### (A) With CONSULT-III

#### **TESTING CONDITION:**

#### Always perform test at a temperature of 5°C (41°F) or more.

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and let it idle for at least 70 seconds.
- Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CON-SULT-III.
- Touch "START". 7.

#### Is "COMPLETED" displayed on CONSULT-III screen?

YES >> GO TO 4.

NO >> GO TO 3.

### 3.PERFORM DTC CONFIRMATION PROCEDURE-II

When the following conditions are met, "TESTING" will be displayed on the CONSULT-III screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Selector lever	Suitable position
VHCL SPEED SE	32 - 120 km/h (20 - 75 mph)
ENG SPEED	500 - 3,000 rpm
B/FUEL SCHDL	1.3 - 9.0 msec
COOLAN TEMP/S	More than 0°C (32°F)

#### **CAUTION:**

#### Always drive vehicle at a safe speed.

#### If "TESTING" does not change for a long time, retry from step 2.

#### Is "COMPLETED" displayed on CONSULT-III screen?

YES >> GO TO 4.

NO >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 2.

### f 4.PERFORM DTC CONFIRMATION PROCEDURE-III

Touch "SELF-DIAG RESULTS".

#### Which is displayed on CONSULT-III screen?

OK >> INSPECTION END

NG >> Go to EC-360, "Diagnosis Procedure".

#### ${f 5.}$ PERFORM COMPONENT FUNCTION CHECK

#### 

Perform component function check. Refer to EC-359, "Component Function Check".

Use component function check to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

#### Is the inspection result normal?

>> INSPECTION END YES

NO >> Go to EC-360, "Diagnosis Procedure".

#### Component Function Check

## 1. PERFORM COMPONENT FUNCTION CHECK

#### 

- 1. Lift up drive wheels.
- Start engine (VDC switch OFF) and warm it up to normal operating temperature.

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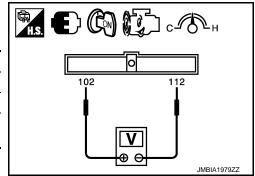
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#### < COMPONENT DIAGNOSIS >

- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Start engine and wait at least 70 seconds.
- Set voltmeter probes to ECM harness connector terminals under the following condition.

	ECM	
Connector	+	_
Connector	Terminal	Terminal
M9	102 (EVAP control system pressure sensor signal)	112



- Check EVAP control system pressure sensor value at idle speed and note it.
- 9. Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch	ON
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Gear position	Any position other than P, N or R

Verify that EVAP control system pressure sensor value stays 0.1 V less than the value at idle speed (measured at step 6) for at least 1 second.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-360, "Diagnosis Procedure".

### Diagnosis Procedure

### 1. CHECK EVAP CANISTER

- 1. Turn ignition switch OFF.
- 2. Check EVAP canister for cracks.

#### Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 2.

YES-2 >> Without CONSULT-III: GO TO 3.

NO >> Replace EVAP canister.

## 2. CHECK PURGE FLOW

#### (P)With CONSULT-III

- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port.
- 2. Start engine and let it idle.
- 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III.
- 4. Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG VOL CONT/V" opening and check vacuum existence.

PURG VOL CONT/V	Vacuum
100%	Existed
0%	Not existed

#### Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 4.

### P0441 EVAP CONTROL SYSTEM

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

# 3.CHECK PURGE FLOW

### ₩ Without CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- Stop engine.
- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to <a href="EC-86">EC-86</a>, "System Diagram".
- 4. Start engine and let it idle.

#### Do not depress accelerator pedal even slightly.

5. Check vacuum gauge indication before 60 seconds pass after starting engine.

#### Vacuum should not exist.

6. Rev engine up to 2,000 rpm after 100 seconds pass after starting engine.

#### Vacuum should exist.

#### Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 4.

# 4. CHECK EVAP PURGE LINE

- Turn ignition switch OFF.
- 2. Check EVAP purge line for improper connection or disconnection. Refer to <u>EC-86</u>, "System Diagram".

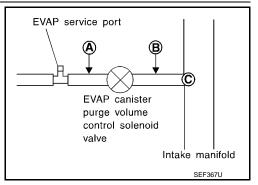
#### Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair EVAP purge line.

## 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**.
- 2. Blow air into each hose and EVAP purge port C.



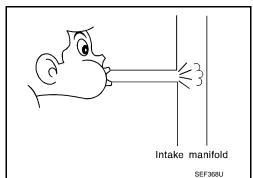
3. Check that air flows freely.

#### Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 6.

YES-2 >> Without CONSULT-III: GO TO 7.

NO >> Repair or clean hoses and/or purge port.



# 6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### (P)With CONSULT-III

- Start engine.
- 2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

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### **P0441 EVAP CONTROL SYSTEM**

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

Does engine speed vary according to the valve opening?

YES >> GO TO 8. NO >> GO TO 7.

7.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-374, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP canister purge volume control solenoid valve.

8.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

- 1. Disconnect EVAP control system pressure sensor harness connector.
- Check connectors for water.

#### Water should not exist.

### Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP control system pressure sensor.

9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to EC-395, "DTC Logic" for DTC P0452, EC-402, "DTC Logic" for DTC P0453.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace EVAP control system pressure sensor.

10. CHECK RUBBER TUBE FOR CLOGGING

- 1. Disconnect rubber tube connected to EVAP canister vent control valve.
- 2. Check the rubber tube for clogging.

### Is the inspection result normal?

YES >> GO TO 11.

NO >> Clean the rubber tube using an air blower.

11. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-382, "Component Inspection".

### Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace EVAP canister vent control valve.

12. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.

Refer to EC-86, "System Diagram".

### Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace malfunctioning part.

13. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 14.

# 14. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

>> INSPECTION END

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# P0442 EVAP CONTROL SYSTEM

DTC Logic

#### DTC DETECTION LOGIC

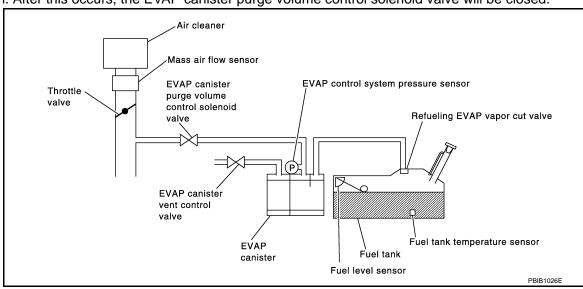
#### NOTE:

# If DTC P0442 is displayed with DTC P0456, first perform the trouble diagnosis for DTC P0456. Refer to <u>EC-416, "DTC Logic"</u>.

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.

If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following "Vacuum test" conditions.

The EVAP canister vent control valve is closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve will then be opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0442	EVAP control system small leak detected (negative pressure)	EVAP control system has a leak, EVAP control system does not operate properly.	<ul> <li>Incorrect fuel tank vacuum relief valve</li> <li>Incorrect fuel filler cap used</li> <li>Fuel filler cap remains open or does not close.</li> <li>Foreign matter caught in fuel filler cap.</li> <li>Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>Foreign matter caught in EVAP canister vent control valve.</li> <li>EVAP canister or fuel tank leaks</li> <li>EVAP purge line (pipe and rubber tube) leaks</li> <li>EVAP purge line rubber tube bent</li> <li>Loose or disconnected rubber tube</li> <li>EVAP canister vent control valve and the circuit</li> <li>EVAP canister purge volume control solenoid valve and the circuit</li> <li>Fuel tank temperature sensor</li> <li>O-ring of EVAP canister vent control valve is missing or damaged</li> <li>EVAP canister is saturated with water</li> <li>EVAP control system pressure sensor</li> <li>Fuel level sensor and the circuit</li> <li>Refueling EVAP vapor cut valve</li> <li>ORVR system leaks</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 illuminate.
- If the fuel filler cap is not tightened properly, the MIL may illuminate.

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[VQ35HR]

Use only a genuine NISSAN rubber tube as a replacement.

## DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

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

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

#### NOTE:

Check that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

#### Will CONSULT-III be used?

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

# 2. PERFORM DTC CONFIRMATION PROCEDURE

### (P)With CONSULT-III

#### **TESTING CONDITION:**

- Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Always perform test at a temperature of 0 to 30°C (32 to 86°F).
- 1. Turn ignition switch ON.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 4. Check that the following conditions are met.

COOLAN TEMP/S: 0 - 70°C (32 - 158°F)

INT/A TEMP SE: 0 - 30°C (32 - 86°F)

 Select "EVP SML LEAK PÒ442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.

Follow the instructions displayed.

#### NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to EC-22, "BASIC INSPECTION: Special Repair Requirement".

#### Which is displayed on CONSULT-III screen?

OK >> INSPECTION END

NG >> Go to EC-364, "Diagnosis Procedure".

# 3.PERFORM DTC CONFIRMATION PROCEDURE

#### With GST

#### NOTE:

Be sure to read the explanation of Driving Pattern in <u>EC-671</u>, "How to Set SRT Code" before driving vehicle.

- Start engine.
- 2. Drive vehicle according to Driving Pattern.
- 3. Stop vehicle.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Turn ignition switch OFF and wait at least 10 seconds.
- 7. Turn ignition switch ON.
- 8. Check 1st trip DTC.

#### Is 1st trip DTC displayed?

YES-1 >> P0441: Go to <u>EC-360</u>, "<u>Diagnosis Procedure</u>". YES-2 >> P0442: Go to <u>EC-364</u>, "<u>Diagnosis Procedure</u>". NO >> INSPECTION END

# Diagnosis Procedure

INFOID:0000000005353559

# ${f 1}$ .CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.

#### P0442 EVAP CONTROL SYSTEM

### < COMPONENT DIAGNOSIS >

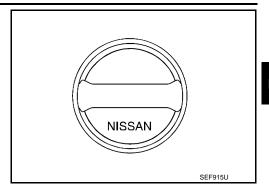
[VQ35HR]

Check for genuine NISSAN fuel filler cap design.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace with genuine NISSAN fuel filler cap.



# 2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Retighten until ratcheting sound is heard.

3.CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-368, "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-693, "Inspection".

Is there any leak in EVAP line?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 6.

**6.**CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

• EVAP canister vent control valve is installed properly.

Refer to EC-695, "Removal and Installation".

EVAP canister vent control valve.

Refer to EC-382, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace EVAP canister vent control valve and O-ring.

7.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

 Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

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### P0442 EVAP CONTROL SYSTEM

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

2. Check if water will drain from EVAP canister (1).

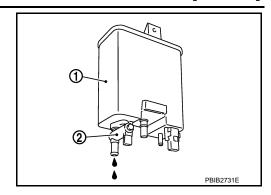
2 : EVAP canister vent control valve

#### Does water drain from the EVAP canister?

YES >> GO TO 8.

NO-1 >> With CONSULT-III: GO TO 10.

NO-2 >> Without CONSULT-III: GO TO 11.



# 8. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

### The weight should be less than 2.0 kg (4.0 lb).

#### Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 10.

YES-2 >> Without CONSULT-III: GO TO 11.

NO >> GO TO 9.

# 9. DETECT MALFUNCTIONING PART

#### Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

# 10.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

#### (P)With CONSULT-III

- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port.
- Start engine and let it idle.
- 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode.
- 4. Touch "Qu" on CONSULT-III screen to increase "PURG VOL CONT/V" opening to 100%.
- Check vacuum hose for vacuum.

#### Vacuum should exist.

#### Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

# 11.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

### **⋈**Without CONSULT-III

- Start engine and warm it up to normal operating temperature.
- Stop engine.
- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port.
- 4. Start engine and let it idle for at least 80 seconds.
- 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

#### Vacuum should exist.

#### Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

# 12. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-86, "System Diagram".

# **P0442 EVAP CONTROL SYSTEM**

COMPONENT DIAGNOSIS >	[VQ35HR]
s the inspection result normal?	
YES >> GO TO 13.	
NO >> Repair or reconnect the hose.	_
3.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
Refer to EC-374, "Component Inspection".	
s the inspection result normal?	•
YES >> GO TO 14.	
NO >> Replace EVAP canister purge volume control solenoid valve.	
4.CHECK FUEL TANK TEMPERATURE SENSOR	
Refer to EC-311, "Component Inspection".	
s the inspection result normal?	
YES >> GO TO 15.	
NO >> Replace "fuel level sensor unit and fuel pump (main)".	
5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	
Refer to EC-394, "Component Inspection".	
s the inspection result normal?	
YES >> GO TO 16.	
NO >> Replace EVAP control system pressure sensor.	
6.CHECK EVAP PURGE LINE	
heck EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or imprope	er connection.
efer to EC-86, "System Diagram".	
s the inspection result normal?	
YES >> GO TO 17.	
NO >> Repair or reconnect the hose.	
7.CLEAN EVAP PURGE LINE	
Clean EVAP purge line (pipe and rubber tube) using air blower.	
>> GO TO 18.	
8.CHECK EVAP/ORVR LINE	
Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kinks, loosenes	ss and improper
onnection. For location, refer to <u>EC-630, "Description"</u> .	
s the inspection result normal?	
YES >> GO TO 19.	
NO >> Repair or replace hoses and tubes.	
9. CHECK RECIRCULATION LINE	
theck recirculation line between filler neck tube and fuel tank for clogging, kinks, cracks, approper connection.	, looseness and
s the inspection result normal?	
YES >> GO TO 20.	
NO >> Repair or replace hose, tube or filler neck tube.	
20.CHECK REFUELING EVAP VAPOR CUT VALVE	
efer to EC-633, "Component Inspection".	
s 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 DI-24, "Electrical Component Inspection".	

Revision: 2009 June **EC-367** 2010 M35/M45

Is the inspection result normal?

#### < COMPONENT DIAGNOSIS >

YES >> GO TO 22.

NO >> Replace "fuel level sensor unit and fuel pump (main)".

# 22. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

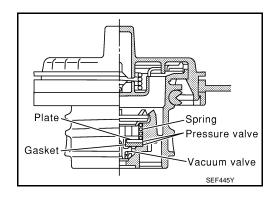
>> INSPECTION END

# Component Inspection

INFOID:0000000005353560

# 1. CHECK FUEL FILLER CAP

- Turn ignition switch OFF.
- Remove fuel filler cap.
- Wipe clean valve housing.



- Install fuel filler cap adapter (commercial service tool) to fuel filler cap.
- Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm<sup>2</sup>, 2.22 -

2.90 psi)

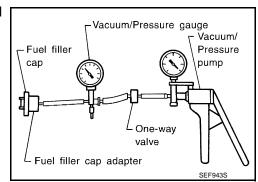
Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm<sup>2</sup>,

-0.87 to -0.48 psi)

### Is the inspection result normal?

YES >> INSPECTION END NO >> GO TO 2.

# 2. REPLACE FUEL FILLER CAP



Replace fuel filler cap.

#### **CAUTION:**

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.

>> INSPECTION END

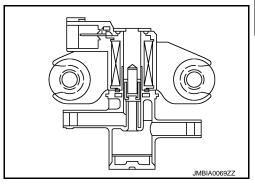
< COMPONENT DIAGNOSIS >

[VQ35HR]

# P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description INFOID:0000000005353561

The EVAP canister purge volume control solenoid valve is used to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



**DTC Logic** INFOID:0000000005353562

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0443	EVAP canister purge volume control solenoid valve	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	EVAP control system pressure sensor     EVAP canister purge volume control solenoid valve     (The valve is stuck open.)     EVAP canister vent control valve     EVAP canister     Hoses     (Hoses are connected incorrectly or clogged.)

#### DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

Always perform test at a temperature of 5°C (41°F) or more.

#### Will CONSULT-III be used?

YES >> GO TO 2.

NO >> GO TO 3.

# 2.PERFORM DTC CONFIRMATION PROCEDURE

### (P)With CONSULT-III

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds. 2.
- Turn ignition switch ON
- Turn ignition switch OFF and wait at least 10 seconds. 4.
- 5. Turn ignition switch ON.
- 6. Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
- Touch "START".
- Start engine and let it idle until "TESTING" on CONSULT-III changes to "COMPLETED". (It will take approximately 10 seconds.)

If "TESTING" is not displayed after 5 minutes, retry from step 2.

Touch "SELF-DIAG RESULTS".

#### Which is displayed on CONSULT-III screen?

**EC-369** Revision: 2009 June 2010 M35/M45

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OK >> INSPECTION END

NG >> Go to EC-371, "Diagnosis Procedure".

# 3. PERFORM DTC CONFIRMATION PROCEDURE

### **With GST**

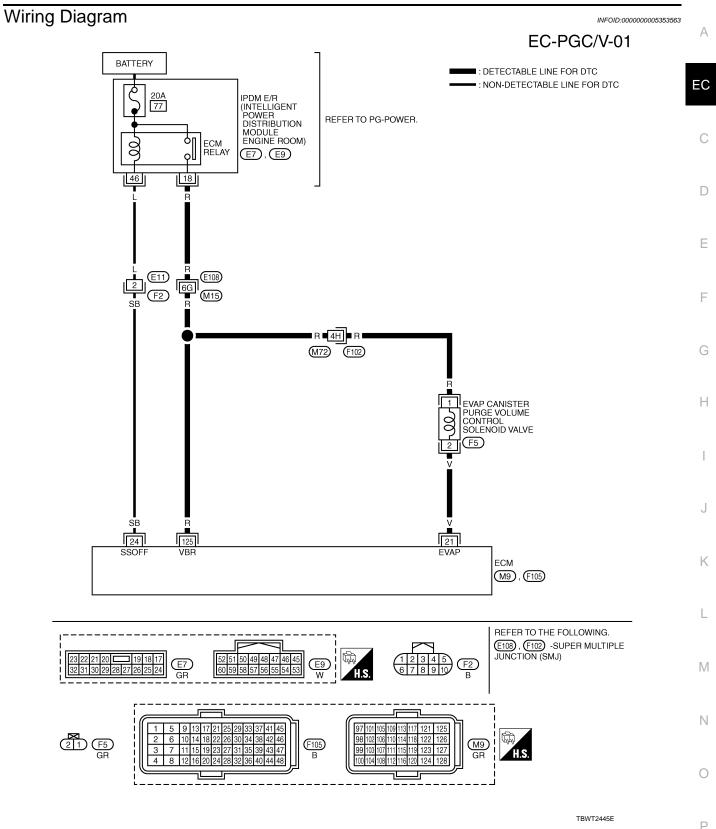
- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and let it idle for at least 20 seconds.
- 6. Check 1st trip DTC.

### Is 1st trip DTC displayed?

YES >> Go to EC-371, "Diagnosis Procedure".

NO >> INSPECTION END

< COMPONENT DIAGNOSIS > [VQ35HR]



# Diagnosis Procedure

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

INFOID:0000000005353564

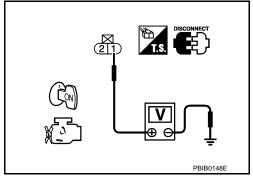
- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- Turn ignition switch ON.

< COMPONENT DIAGNOSIS >

[VQ35HR]

4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

EVAP canister purge volum	Ground	Voltage	
Connector Terminal			
F5	1	Ground	Battery voltage



### Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

# 2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness connectors F102, M72
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

# 3.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volum	EC	Continuity		
Connector	Terminal	Connector	Terminal	
F5	2	F105	21	Existed

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

#### Is the inspection result normal?

YES >> GO TO 4.

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

# f 4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

- Disconnect EVAP control system pressure sensor harness connector.
- 2. Check that water is not inside connectors.

#### 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-394, "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.

# 6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### (P) With CONSULT-III

1. Turn ignition switch OFF.

[VQ35HR1 < COMPONENT DIAGNOSIS >

- Reconnect harness connectors disconnected.
- 3. Start engine.

4. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 8. NO >> GO TO 7.

7.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-374, "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

- Disconnect rubber tube connected to EVAP canister vent control valve.
- 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-382, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace EVAP canister vent control valve.

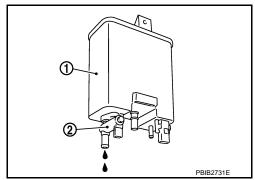
10. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor
- Check if water will drain from EVAP canister (1).

2 : EVAP canister vent control valve

Does water drain from the EVAP canister?

YES >> GO TO 11. NO >> GO TO 13.



# 11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.0 kg (4.0 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

>> Repair hose or replace EVAP canister.

# 13. CHECK INTERMITTENT INCIDENT

**EC-373** Revision: 2009 June 2010 M35/M45

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Refer to EC-154, "Description".

#### >> INSPECTION END

# Component Inspection

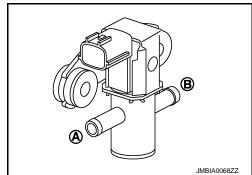
INFOID:0000000005353565

# 1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

### (P)With CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Turn ignition switch ON.
- 5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III.
- Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG VOL CONT/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

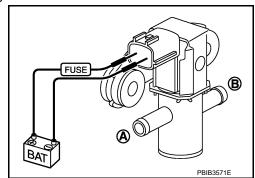
Condition (PURG VOL CONT/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



#### **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.
- 4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed



#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid

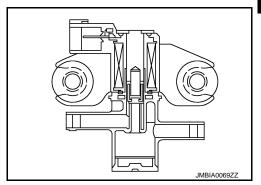
< COMPONENT DIAGNOSIS >

[VQ35HR]

# P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description INFOID.0000000005353566

The EVAP canister purge volume control solenoid valve is used to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



DTC Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	Harness or connectors     (The solenoid valve circuit is open or shorted.)     EVAP canister purge volume control solenoid valve
P0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	Harness or connectors     (The solenoid valve circuit is shorted.)     EVAP canister purge volume control solenoid valve

# DTC CONFIRMATION PROCEDURE

### 1.CONDITIONING

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

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

### **TESTING CONDITION:**

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

>> GO TO 2.

# 2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for at least 13 seconds.
- 2. Check 1st trip DTC.

## Is 1st trip DTC detected?

YES >> Go to EC-376, "Diagnosis Procedure".

NO >> INSPECTION END

Revision: 2009 June **EC-375** 2010 M35/M45

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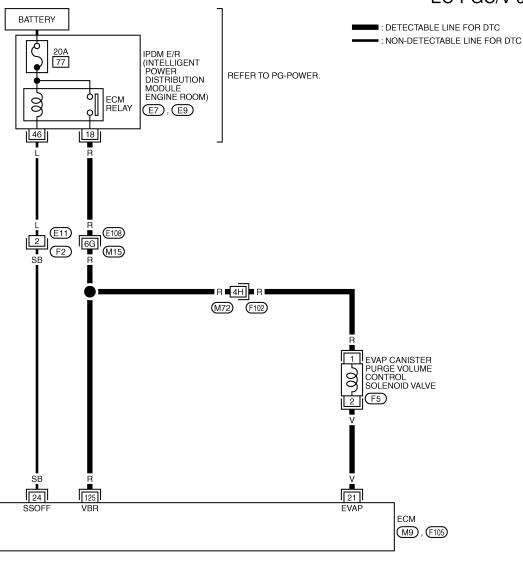
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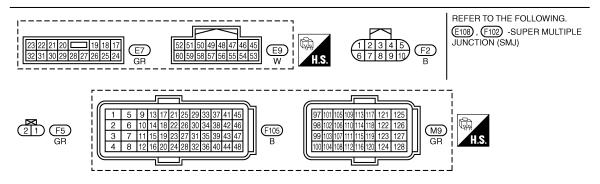
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TBWT2445E

INFOID:0000000005353569

# Diagnosis Procedure

# 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.
- Turn ignition switch ON.

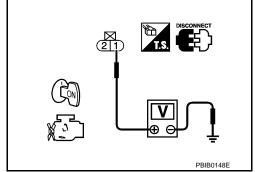
Revision: 2009 June **EC-376** 2010 M35/M45

### < COMPONENT DIAGNOSIS >

[VQ35HR]

Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

	e volume control so- I valve	Ground	Voltage	
Connector Terminal				
F5	F5 1		Battery voltage	



Is the inspection result normal?

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

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness connectors F102, M72
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

# 3.check evap canister purge volume control solenoid valve output signal circuit FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F5	2	F105	21	Existed

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

#### Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 4.

YES-2 >> Without CONSULT-III: GO TO 5.

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

# $oldsymbol{4}.$ CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

# (P)With CONSULT-III

- Reconnect all harness connectors disconnected.
- Start engine. 2.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

#### Does engine speed vary according to the valve opening?

YES >> GO TO 6.

NO >> GO TO 5.

# 5.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

### Refer to EC-378, "Component Inspection".

## Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace EVAP canister purge volume control solenoid valve.

**EC-377** Revision: 2009 June 2010 M35/M45

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# 6. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

# Component Inspection

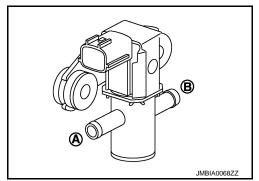
INFOID:0000000005353570

# 1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

### (P)With CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Turn ignition switch ON.
- 5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III.
- Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG VOL CONT/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

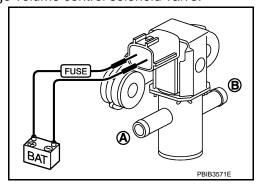
Condition (PURG VOL CONT/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



### **⋈**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.
- 4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed



#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve

[VQ35HR]

# P0447 EVAP CANISTER VENT CONTROL VALVE

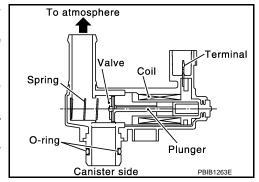
Description

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0447	EVAP canister vent control valve circuit open	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	Harness or connectors     (The valve circuit is open or shorted.)     EVAP canister vent control valve

#### DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

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

>> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and wait at least 8 seconds.
- Check 1st trip DTC.

### Is 1st trip DTC detected?

YES >> Go to EC-380, "Diagnosis Procedure".

NO >> INSPECTION END

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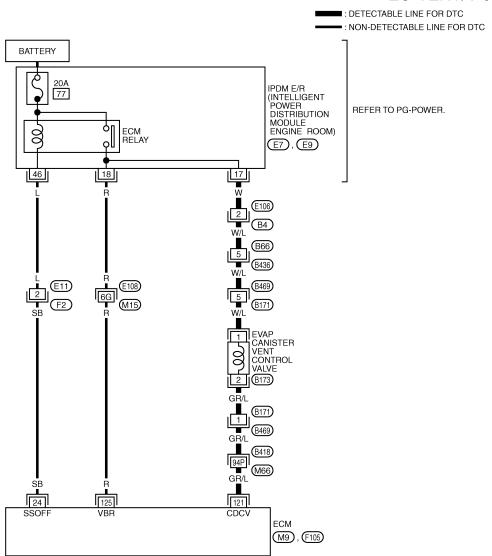
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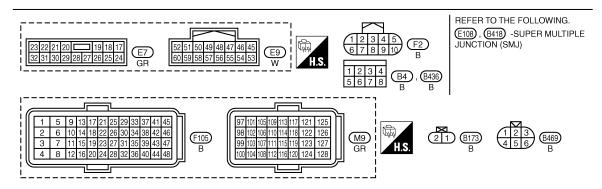
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[VQ35HR]

Wiring Diagram







TBWT2446E

# Diagnosis Procedure

INFOID:0000000005353574

1.INSPECTION START

Will CONSULT-III be used? Will CONSULT-III be used?

# < COMPONENT DIAGNOSIS >

[VQ35HR]

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

2.check evap canister vent control valve circuit

### (P)With CONSULT-III

- Turn ignition switch OFF and then ON.
- Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-III.
- Touch "ON/OFF" on CONSULT-III screen.
- 4. Check for operating sound of the valve.

### Clicking sound should be heard.

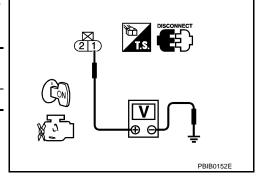
#### Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 3.

# 3.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect EVAP canister vent control valve harness connector.
- Turn ignition switch ON.
- 4. Check the voltage between EVAP canister vent control valve harness connector and ground.

EVAP canister vent control valve		Ground	Voltage
Connector	Terminal	Oround	voilage
B173	1	Ground	Battery voltage



### Is the inspection result normal?

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

# 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B4, E106
- Harness connectors B66, B436
- Harness connectors B171, B469
- Harness for open or short between EVAP canister vent control valve and IPDM E/R

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

# $5. \mathsf{check}$ evap canister vent control valve output signal circuit for open and short

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between EVAP canister vent control valve harness connector and ECM harness connector.

EVAP canister vent control valve		EC	CM	Continuity	
	Connector	Terminal	Connector	Terminal	Continuity
	B173	2	M9	121	Existed

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

#### Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

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### < COMPONENT DIAGNOSIS >

[VQ35HR]

# 6. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors B171, B469
- Harness connectors B418. M66
- Harness for open or short between EVAP canister vent control valve and ECM
  - >> Repair open circuit, short to ground or short to power in harness or connectors.

# 7. CHECK RUBBER TUBE FOR CLOGGING

- 1. Disconnect rubber tube connected to EVAP canister vent control valve.
- 2. Check the rubber tube for clogging.

### 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-382, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP canister vent control valve.

# 9. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

# Component Inspection

INFOID:0000000005353575

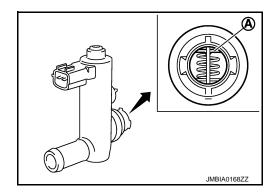
# 1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister.
- 3. Check portion (A) of EVAP canister vent control valve for rust.

#### Is it rusted?

YES >> Replace EVAP canister vent control valve

NO >> GO TO 2.



# 2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

### (II) With CONSULT-III

- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

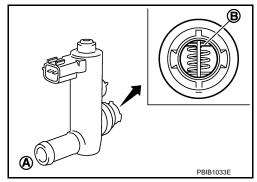
### < COMPONENT DIAGNOSIS >

[VQ35HR]

Check air passage continuity and operation delay time. Check that new O-ring is installed properly.

VENT CONTROL/V Condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.



### Without CONSULT-III

- 1. Disconnect EVAP canister vent control valve harness connector.
- 2. Check air passage continuity and operation delay time under the following conditions.

Check that new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

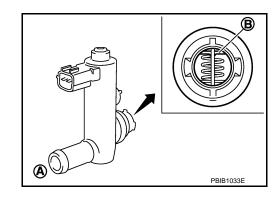
# 3.CHECK EVAP CANISTER VENT CONTROL VALVE-III

## (P)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.
- Check air passage continuity and operation delay time. Check that new O-ring is installed properly.

VENT CONTROL/V Condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.



# Without CONSULT-III

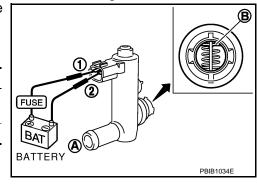
- Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- Check air passage continuity and operation delay time under the following conditions.

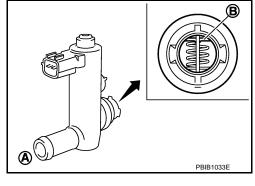
Check that new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?





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< COMPONENT DIAGNOSIS > [VQ35HR]

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve

[VQ35HR]

# P0448 EVAP CANISTER VENT CONTROL VALVE

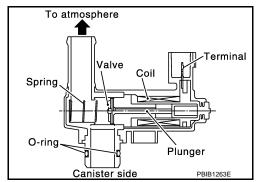
Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid valve is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System" diagnosis.



DTC Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0448	EVAP canister vent control valve close	EVAP canister vent control valve remains closed under specified driving conditions.	EVAP canister vent control valve     EVAP control system pressure sensor and the circuit     Blocked rubber tube to EVAP canister vent control valve     EVAP canister is saturated with water	

#### DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

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

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

>> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 5 seconds.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and let it idle for at least 1 minute.
- 4. Repeat next procedures 3 times.
- Increase the engine speed up to between 3,000 and 3,500 rpm and maintain that speed for 2 minutes and 50 seconds to 3 minutes.

#### Do not exceed 3 minutes.

- Fully released accelerator pedal and keep engine idle for approximately 5 seconds.
- 5. Repeat next procedure 20 times.
- Quickly increase the engine speed up to between 4,000 and 4,500 rpm and maintain that speed for 25 to 30 seconds.

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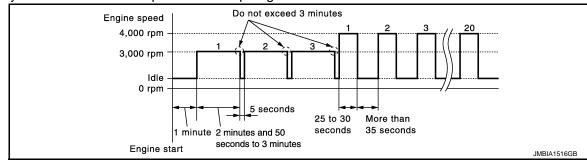
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### < COMPONENT DIAGNOSIS >

[VQ35HR]

Fully released accelerator pedal and keep engine idle for at least 35 seconds.



6. Check 1st trip DTC.

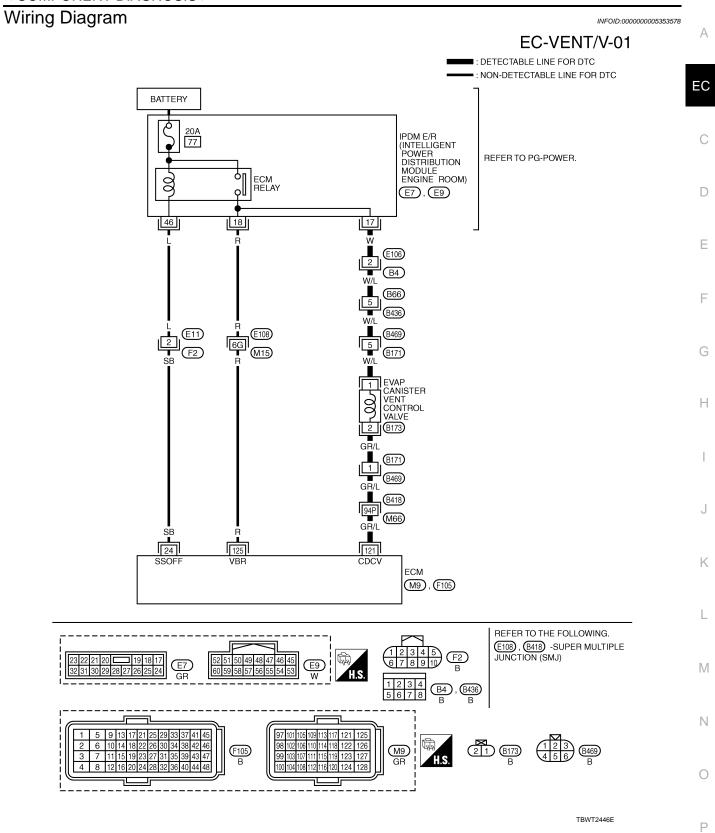
### Is 1st trip DTC detected?

YES >> Go to EC-387, "Diagnosis Procedure".

NO >> INSPECTION END

[VQ35HR]

INFOID:0000000005353579



# Diagnosis Procedure

# 1. CHECK RUBBER TUBE

- 1. Turn ignition switch OFF.
- 2. Disconnect rubber tube connected to EVAP canister vent control valve.
- Check the rubber tube for clogging.

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#### < COMPONENT DIAGNOSIS >

[VQ35HR]

Is the inspection result normal?

YES >> GO TO 2.

NO >> Clean rubber tube using an air blower.

2.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-389, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace EVAP canister vent control valve.

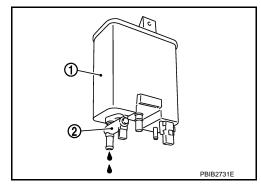
3. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- Check if water will drain from the EVAP canister (1).

2 : EVAP canister vent control valve

Does water drain from EVAP canister?

YES >> GO TO 4. NO >> GO TO 6.



# 4. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.0 kg (4.0 lb).

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

# 6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

- Disconnect EVAP control system pressure sensor harness connector.
- Check connectors for water.

#### Water should not exist.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace EVAP control system pressure sensor.

7.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-394, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP control system pressure sensor.

**8.**CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

>> INSPECTION END

# Component Inspection

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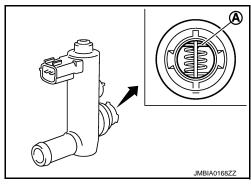
# 1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

- Turn ignition switch OFF.
- Remove EVAP canister vent control valve from EVAP canister.
- Check portion (A) of EVAP canister vent control valve for being rusted.

### Is it rusted?

YES >> Replace EVAP canister vent control valve

NO >> GO TO 2.



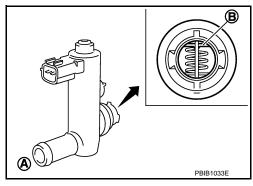
# 2.CHECK EVAP CANISTER VENT CONTROL VALVE-II

### (P)With CONSULT-III

- Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 4. Check air passage continuity and operation delay time. Check new O-ring is installed properly.

VENT CONTROL/V Condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.



#### Without CONSULT-III

- 1. Disconnect EVAP canister vent control valve harness connector.
- 2. Check air passage continuity and operation delay time under the following conditions.

Check new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

3.CHECK EVAP CANISTER VENT CONTROL VALVE-III

### (P)With CONSULT-III

- Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

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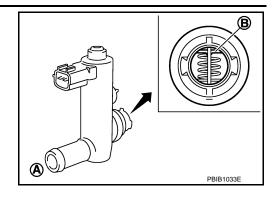
### < COMPONENT DIAGNOSIS >

[VQ35HR]

Check air passage continuity and operation delay time.
 Check new O-ring is installed properly.

VENT CONTROL/V Condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.



### **Without CONSULT-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.

Check new O-ring is installed properly.

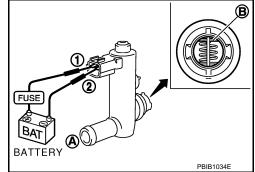
Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed



### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve



< COMPONENT DIAGNOSIS >

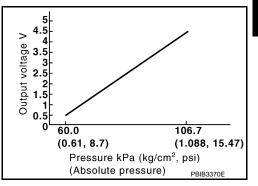
[VQ35HR]

INFOID:0000000005353582

# P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description INFOID:0000000005353581

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



**DTC Logic** 

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0451	EVAP control system pressure sensor performance	ECM detects a sloshing signal from the EVAP control system pressure sensor	Harness or connectors     (EVAP control system pressure sensor circuit is shorted.)     [Crankshaft position (CKP) sensor circuit is shorted.]     [Camshaft position (CMP) sensor (bank 2) circuit is shorted.]     [Exhaust valve timing (EVT) control position sensor (bank 2) circuit is shorted.]     (Battery current sensor circuit is shorted.)     [Accelerator pedal position (APP) sensor 2 circuit is shorted.]     (Refrigerant pressure sensor circuit is shorted.)     EVAP control system pressure sensor     CKP sensor     CKP sensor     CMP sensor (bank 2)     EVT control position sensor (bank 2)     Battery current sensor     APP sensor     Refrigerant pressure sensor

### DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

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

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

>> GO TO 2.

# 2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 40 seconds.

NOTE:

Do not depress accelerator pedal even slightly.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

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### < COMPONENT DIAGNOSIS >

[VQ35HR]

YES >> Go to EC-392, "Diagnosis Procedure".

NO >> INSPECTION END

# Diagnosis Procedure

INFOID:0000000005353583

# 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

### Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connections.

# 2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

- 1. Disconnect EVAP control system pressure sensor harness connector.
- 2. Check that water is not inside connectors.

#### Is the inspection result normal?

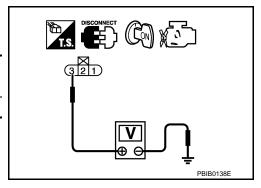
YES >> GO TO 3.

NO >> Repair or replace harness connector.

# 3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-I

- 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 (V)	
Connector	Terminal	Oloulia		
B172	3	Ground	Approx. 5	



### Is the inspection result normal?

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

# 4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the harness continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control syste	em pressure sensor	ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
B172	3	M9	107	Existed	

### Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

### 5. DETECT MALFUNCTIONING PART

### Check the following.

- 1. Harness connectors B171, B469
- 2. Harness connectors B418, M66
- Harness for open between EVAP control system pressure sensor and ECM

>> Repair open circuit.

< COMPONENT DIAGNOSIS >

[VQ35HR]

# 6.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor			
Connector	Terminal	Name	Connector	Terminal	
F105	46	Crankshaft position (CKP) sensor	F52	1	
	64	Camshaft position (CMP) sensor (bank 2)	F32	1	
F106		Exhaust valve timing (EVT) control position sensor (bank 2)	F83	1	
		Battery current sensor	E67	1	
M9	103	Accelerator pedal position (APP) sensor	E113	5	
	107	EVAP control system pressure sensor	B172	3	
_	111	Refrigerant pressure sensor	E66	1	
Ic the inco	ootion rocu	ult normal?			

#### 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.

- CKP sensor (Refer to <u>EC-345</u>, "Component Inspection".)
- CMP sensor (bank 2) (Refer to EC-352, "Component Inspection".)
- EVT control position sensor (bank 2) (Refer to EC-459, "Component Inspection".)
- Battery current sensor (Refer to <u>EC-502, "Component Inspection".)</u>
  Refrigerant pressure sensor (Refer to <u>ATC-80, "Magnet Clutch Circuit".)</u>

#### Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace malfunctioning component.

# 8. CHECK APP SENSOR

Refer to EC-561, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 9.

# 9. REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly
- Go to EC-562, "Special Repair Requirement".

### >> INSPECTION END

# 10.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-394, "Component Inspection".

### Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace EVAP control system pressure sensor.

# 11. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

### >> INSPECTION END

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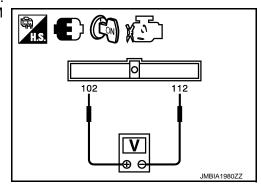
[VQ35HR]

# Component Inspection

INFOID:0000000005353584

# 1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Remove EVAP control system pressure sensor with its harness connector.
  - Always replace O-ring with a new one.
- 3. Install a vacuum pump to EVAP control system pressure sensor.
- 4. Turn ignition switch ON and check output voltage between ECM harness connector terminals under the following conditions.



ECM			Condition	
Connector	+	_	Condition [Applied vacuum kPa (kg/cm <sup>2</sup> , psi)]	Voltage (V)
	Terminal	Terminal		
M9	102 112	Not applied	1.8 - 4.8	
IVIS		02   112	-26.7 (-0.272, -3.87)	2.1 to 2.5 lower than above value

#### **CAUTION:**

- · Always calibrate the vacuum pump gauge when using it.
- Never apply below -93.3 kPa (-0.952 kg/cm<sup>2</sup>, -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm<sup>2</sup>, 14.69 psi).

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP control system pressure sensor

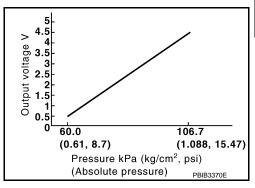
< COMPONENT DIAGNOSIS >

[VQ35HR]

# P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description INFOID:0000000005353585

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



**DTC Logic** INFOID:0000000005353586

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452	EVAP control system pressure sensor low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors     (EVAP control system pressure sensor circuit is open or shorted.)     [Crankshaft position (CKP) sensor circuit is shorted.]     [Camshaft position (CMP) sensor (bank 2) circuit is shorted.]     [Exhaust valve timing (EVT) control position sensor (bank 2) circuit is shorted.]     (Battery current sensor circuit is shorted.)     [Accelerator pedal position (APP) sensor 2 circuit is shorted.]     (Refrigerant pressure sensor circuit is shorted.)     EVAP control system pressure sensor     CKP sensor     CMP sensor (bank 2)     EVT control position sensor (bank 2)     Battery current sensor     APP sensor     Refrigerant pressure sensor

### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

# 2.PERFORM DTC CONFIRMATION PROCEDURE

### (P)With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds. 2.
- Turn ignition switch ON.

**EC-395** Revision: 2009 June 2010 M35/M45

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### < COMPONENT DIAGNOSIS >

[VQ35HR]

- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Select "DATA MONITOR" mode with CONSULT-III.
- 7. Check that "FUEL T/TMP SE" is more than 0°C (32°F).
- Start engine and wait at least 20 seconds.
- 9. Check 1st trip DTC.

# **With GST**

- 1. Start engine and warm it up to normal operating temperature.
- 2. Set voltmeter probes to ECM harness connector terminals under the following conditions.

ECM				
Connector	+	_		
	Terminal	Terminal		
M9	106 (Fuel tank temperature sensor signal)	128		

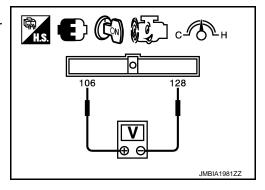


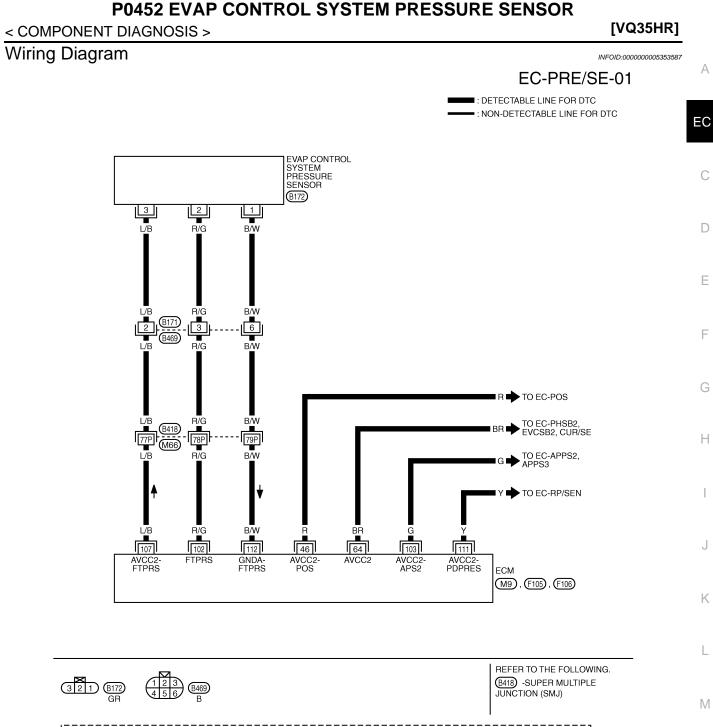
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Turn ignition switch OFF and wait at least 10 seconds.
- 7. Start engine and wait at least 20 seconds.
- 8. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-397, "Diagnosis Procedure".

NO >> INSPECTION END





# M9) (F105)

### Diagnosis Procedure

# 1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

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# COMPONENT DIAGNOSIS >

YES >> GO TO 2.

NO >> Repair or replace ground connections.

### 2. CHECK CONNECTOR

- 1. Disconnect EVAP control system pressure sensor harness connector.
- 2. Check that water is not inside connectors.

#### Is the inspection result normal?

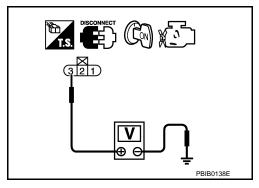
YES >> GO TO 3.

NO >> Repair or replace harness connector.

### 3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-I

- 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 (V)	
Connector	Connector Terminal		voltage (v)	
B172	3	Ground	Approx. 5	



[VQ35HR]

#### Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 4.

### 4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system	m pressure sensor	EC	Continuity	
Connector	Terminal	Connector	Connector Terminal	
B172	3	M9	107	Existed

### Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

### 5. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors B171, B469
- Harness connectors B418, M66
- Harness for open between ECM and EVAP control system pressure sensor

### >> Repair open circuit.

### 6. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

ECM		Sensor				
Connector Terminal		Name	Connector	Terminal		
F105	46	Crankshaft position (CKP) sensor	F52	1		
		Camshaft position (CMP) sensor (bank 2)	F32	1		
F106	F106 64	Exhaust valve timing (EVT) control position sensor (bank 2)	F83	1		
		Battery current sensor	E67	1		
	103	Accelerator pedal position (APP) sensor	E113	5		
M9	107	EVAP control system pressure sensor	B172	3		
	111	Refrigerant pressure sensor	E66	1		

#### 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.

- CKP sensor (Refer to <u>EC-345</u>, "Component Inspection".)
- CMP sensor (bank 2) (Refer to EC-352, "Component Inspection".)
- EVT control position sensor (bank 2) (Refer to EC-459, "Component Inspection".)
- Battery current sensor (Refer to EC-502, "Component Inspection".)
- Refrigerant pressure sensor (Refer to <u>ATC-80, "Magnet Clutch Circuit"</u>.)

### Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace malfunctioning component.

### 8.CHECK APP SENSOR

### Refer to EC-561, "Component Inspection".

### Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 9.

### 9. REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly
- Go to EC-562, "Special Repair Requirement".

#### >> INSPECTION END

### $10. \mathsf{check}$ evap control system pressure sensor ground circuit for open and SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system	n pressure sensor	EC	Continuity		
Connector	Terminal	Connector Terminal		Continuity	
B172	1	M9	112	Existed	

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

#### Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 11.

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### 11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B171, B469
- Harness connectors B418, M66
- Harness for open or short between EVAP control system pressure sensor and ECM
  - >> Repair open circuit, short to ground or short to power in harness or connectors.

# 12.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system	m pressure sensor	EC	Continuity	
Connector	Terminal	Connector	Connector Terminal	
B172	2	M9	102	Existed

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

#### Is the inspection result normal?

YES >> GO TO 14. NO >> GO TO 13.

### 13. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B171, B469
- Harness connectors B418, M66
- · Harness for open or short between EVAP control system pressure sensor and ECM
  - >> Repair open circuit, short to ground or short to power in harness or connectors.

### 14. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-400, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace EVAP control system pressure sensor.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

>> INSPECTION END

## Component Inspection

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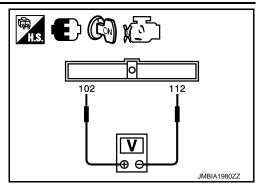
### 1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

- 1. Turn ignition switch OFF.
- 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.

### < COMPONENT DIAGNOSIS >

[VQ35HR]

4. Turn ignition switch ON and check output voltage between ECM harness connector terminals under the following conditions.



ECM			Condition		
Connector	+	_	[Applied vacuum kPa (kg/cm², psi)]	Voltage (V)	
Connector	Terminal	Terminal			
M9	102	112	Not applied	1.8 - 4.8	
IVIÐ	102 112		-26.7 (-0.272, -3.87)	2.1 to 2.5 lower than above value	

#### **CAUTION:**

- Always calibrate the vacuum pump gauge when using it.
- Never apply below -93.3 kPa (-0.952 kg/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

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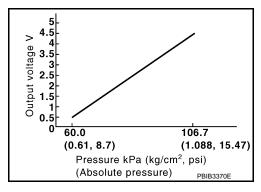
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### P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

**Description** 

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



**DTC Logic** 

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0453	EVAP control system pressure sensor high input	An excessively high voltage from the sensor is sent to ECM.	Harness or connectors     (EVAP control system pressure sensor circuit is open or shorted.)     [Crankshaft position (CKP) sensor circuit is shorted.]     [Camshaft position (CMP) sensor (bank 2) circuit is shorted.]     [Exhaust valve timing (EVT) control position sensor (bank 2) circuit is shorted.]     (Battery current sensor circuit is shorted.)     [Accelerator pedal position (APP) sensor 2 circuit is shorted.]     (Refrigerant pressure sensor circuit is shorted.)     EVAP control system pressure sensor     CKP sensor     CMP sensor (bank 2)     EVT control position sensor (bank 2)     Battery current sensor     APP sensor     Refrigerant pressure sensor     EVAP canister vent control valve     EVAP canister     Rubber hose from EVAP canister vent control valve to vehicle frame

### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

### 2.PERFORM DTC CONFIRMATION PROCEDURE

# < COMPONENT DIAGNOSIS >

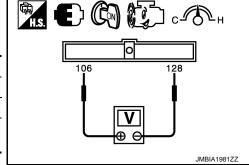
### (P)With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Select "DATA MONITOR" mode with CONSULT-III.
- 7. Check that "FUEL T/TMP SE" is more than 0°C (32°F).
- 8. Start engine and wait at least 20 seconds.
- 9. Check 1st trip DTC.

### With GST

- 1. Start engine and warm it up to normal operating temperature.
- Set voltmeter probes to ECM harness connector terminals under the following conditions.

ECM						
Connector	+	_				
Connector	Terminal	Terminal				
M9	106 (Fuel tank temperature sensor signal)	128				



- Check that the voltage is less than 4.2 V.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 6. Turn ignition switch OFF and wait at least 10 seconds.
- 7. Start engine and wait at least 20 seconds.
- 8. Check 1st trip DTC.

### Is 1st trip DTC detected?

YES >> Go to EC-404, "Diagnosis Procedure".

NO >> INSPECTION END

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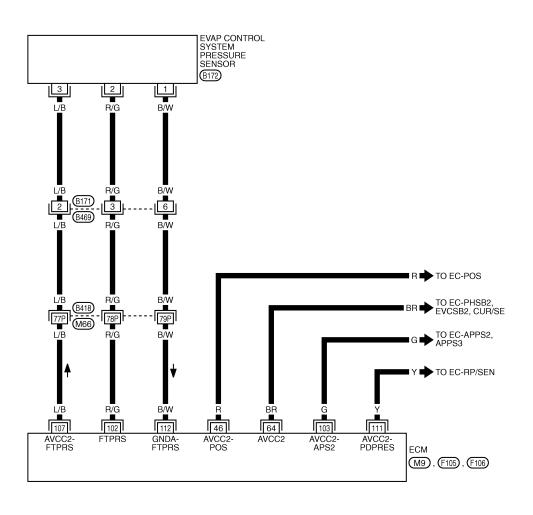
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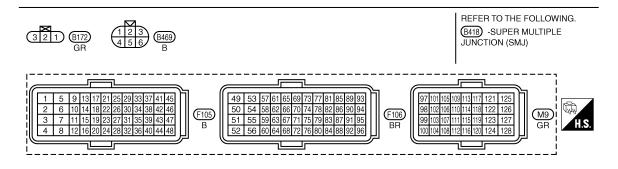
Wiring Diagram

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### EC-PRE/SE-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





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### Diagnosis Procedure

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### 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connections M16, M70. Refer to <u>EC-158, "Ground Inspection"</u>.

Is the inspection result normal?

# < COMPONENT DIAGNOSIS >

YES >> GO TO 2.

NO >> Repair or replace ground connections.

### 2. CHECK CONNECTOR

- 1. Disconnect EVAP control system pressure sensor harness connector.
- 2. Check that water is not inside connectors.

### Is the inspection result normal?

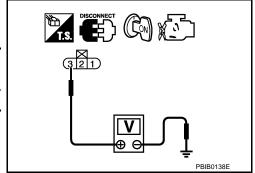
YES >> GO TO 3.

NO >> Repair or replace harness connector.

### 3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch ON.
- 2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control system	Ground	Voltage (V)	
Connector	Oround	voltage (v)	
B172	3	Ground	Approx. 5



#### Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 4.

### 4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control syster	ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity
B172	3	M9	107	Existed

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

### 5. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors B171, B469
- Harness connectors B418, M66
- Harness for open between ECM and EVAP control system pressure sensor

>> Repair open circuit.

### 6.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

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#### < COMPONENT DIAGNOSIS >

ECM		Sensor		
Connector Terminal Name		Name	Connector	Terminal
F105	46	Crankshaft position (CKP) sensor	F52	1
		Camshaft position (CMP) sensor (bank 2)	F32	1
F106	64	Exhaust valve timing (EVT) control position sensor (bank 2)	F83	1
		Battery current sensor	E67	1
	103	Accelerator pedal position (APP) sensor	E113	5
M9	107	EVAP control system pressure sensor	B172	3
	111	Refrigerant pressure sensor	E66	1

### 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.

- CKP sensor (Refer to <u>EC-345</u>, "Component Inspection".)
- CMP sensor (bank 2) (Refer to EC-352, "Component Inspection".)
- EVT control position sensor (bank 2) (Refer to EC-459, "Component Inspection".)
- Battery current sensor (Refer to EC-502, "Component Inspection".)
- Refrigerant pressure sensor (Refer to ATC-80, "Magnet Clutch Circuit".)

### Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace malfunctioning component.

### 8.CHECK APP SENSOR

### Refer to EC-561, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 20.

NO >> GO TO 9.

### 9. REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly
- Go to EC-562, "Special Repair Requirement".

#### >> INSPECTION END

### 10.check evap control system pressure sensor ground circuit for open and SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system	EC	М	Continuity	
Connector	Connector Terminal		Terminal	Continuity
B172	1	M9	112	Existed

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

### Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 11.

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR [VQ35HR] < COMPONENT DIAGNOSIS > 11. DETECT MALFUNCTIONING PART Check the following. Harness connectors B171, B469 Harness connectors B418, M66 EC Harness for open or short between EVAP control system pressure sensor and ECM >> Repair open circuit, short to ground or short to power in harness or connectors. 12.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT Check the continuity between EVAP control system pressure sensor harness connector and ECM har-D ness connector. Е **ECM** EVAP control system pressure sensor Continuity Connector Terminal Connector Terminal B172 M9 102 Existed 2. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 14. NO >> GO TO 13. 13. DETECT MALFUNCTIONING PART Check the following. Harness connectors B171, B469 Harness connectors B418, M66 Harness for open or short between EVAP control system pressure sensor and ECM >> Repair open circuit, short to ground or short to power in harness or connectors. 14.CHECK RUBBER TUBE Disconnect rubber tube connected to EVAP canister vent control valve. Check the rubber tube for clogging. Is the inspection result normal? YES >> GO TO 15. NO >> Clean the rubber tube using an air blower, repair or replace rubber tube. 15. CHECK EVAP CANISTER VENT CONTROL VALVE Refer to EC-382, "Component Inspection". Is the inspection result normal? YES >> GO TO 16. NO >> Replace EVAP canister vent control valve. N 16.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR Refer to EC-408, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 17.

NO >> Replace EVAP control system pressure sensor.

### 17.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

 Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. Р

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### < COMPONENT DIAGNOSIS >

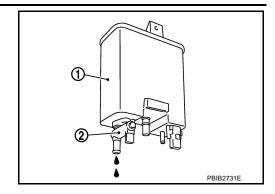
[VQ35HR]

2. Check if water will drain from the EVAP canister (1).

2 : EVAP canister vent control valve

#### Does water drain from EVAP canister?

YES >> GO TO 18. NO >> GO TO 20.



### 18. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.0 kg (4.0 lb).

Is the inspection result normal?

YES >> GO TO 20. NO >> GO TO 19.

19. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

### 20. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

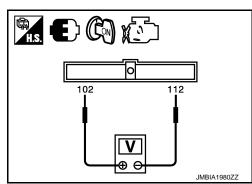
>> INSPECTION END

### 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.
- 4. Turn ignition switch ON and check output voltage between ECM harness connector terminals under the following conditions.



< COMPONENT DIAGNOSIS >

[VQ35HR]

ECM		Ground	Condition	
Connector	+	_	Condition [Applied vacuum kPa (kg/cm <sup>2</sup> , psi)]	Voltage (V)
Connector	Terminal	Terminal		
M9	102	112	Not applied	1.8 - 4.8
IVIS	102	112	-26.7 (-0.272, -3.87)	2.1 to 2.5 lower than above value

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#### **CAUTION:**

- Always calibrate the vacuum pump gauge when using it.
- Never apply below -93.3 kPa (-0.952 kg/cm<sup>2</sup>, -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm<sup>2</sup>, 14.69 psi).

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP control system pressure sensor

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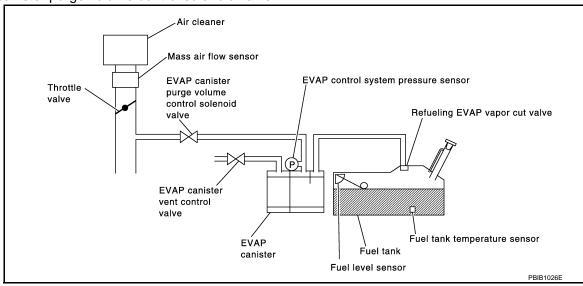
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DTC Logic

#### DTC DETECTION LOGIC

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0455	EVAP control system gross leak detected	EVAP control system has a very large leak such as fuel filler cap fell off, EVAP control system does not operate properly.	Fuel filler cap remains open or does not close. Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Foreign matter caught in fuel filler cap. Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. Foreign matter caught in EVAP canister vent control valve. EVAP canister or fuel tank leaks EVAP purge line (pipe and rubber tube) leaks EVAP purge line rubber tube bent. Loose or disconnected rubber tube EVAP canister vent control valve and the circuit EVAP canister purge volume control solenoid valve and the circuit Fuel tank temperature sensor O-ring of EVAP canister vent control valve is missing or damaged. EVAP control system pressure sensor Refueling EVAP vapor cut valve ORVR system leaks

#### **CAUTION:**

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.
- If the fuel filler cap is not tightened properly, the MIL may illuminate.
- Use only a genuine NISSAN rubber tube as a replacement.

### DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

### **CAUTION:**

P0455 EVAP CONTROL SYSTEM [VQ35HR] < COMPONENT DIAGNOSIS > Never remove fuel filler cap during the DTC Confirmation Procedure. If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test. 1. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. EC Turn ignition switch OFF and wait at least 10 seconds. NOTE: Check that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly. Will CONSULT-III be used? YES >> GO TO 2. NO >> GO TO 4. D 2.perform dtc confirmation procedure With CONSULT-III **TESTING CONDITION:** Е • Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface. Open engine hood before conducting the following procedures. F 1. Tighten fuel filler cap securely until ratcheting sound is heard. 2. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III. 5. Check that the following conditions are met. COOLAN TEMP/S: 0 - 70°C (32 - 158°F) INT/A TEMP SE: 0 - 60°C (32 - 140°F) Select "EVP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III. Follow the instructions displayed. NOTE: If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to EC-22, "BASIC INSPECTION: Special Repair Requirement". Which is displayed on CONSULT-III screen? OK >> INSPECTION END NG >> GO TO 3. 3.CHECK DTC K Check DTC. Which DTC is detected? P0455 >> Go to EC-412, "Diagnosis Procedure". P0442 >> Go to EC-364, "Diagnosis Procedure". 4.PERFORM DTC CONFIRMATION PROCEDURE NOTE: Be sure to read the explanation of Driving Pattern in <u>EC-671, "How to Set SRT Code"</u> before driving vehicle. Start engine. 2. Drive vehicle according to Driving Pattern. 3. Stop vehicle. Turn ignition switch OFF and wait at least 10 seconds. 5. Turn ignition switch ON 6. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Р 8. Check 1st trip DTC. Is 1st trip DTC detected? YES-1 >> P0455: Go to EC-412, "Diagnosis Procedure".

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YES-2 >> P0442: Go to <u>EC-364, "Diagnosis Procedure"</u>. YES-3 >> P0441: Go to EC-360, "Diagnosis Procedure".

>> INSPECTION END

NO

#### < COMPONENT DIAGNOSIS >

[VQ35HR] INFOID:0000000005353596

### 1.CHECK FUEL FILLER CAP DESIGN

Turn ignition switch OFF.

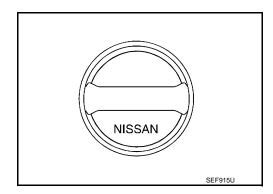
**Diagnosis Procedure** 

Check for genuine NISSAN fuel filler cap design.

### Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace with genuine NISSAN fuel filler cap.



### 2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

#### Is the inspection result normal?

YES >> GO TO 3.

NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Retighten until ratcheting sound is heard.

### 3.CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

### f 4.CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-414, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 5.

>> Replace fuel filler cap with a genuine one. NO

### CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection.

Refer to EC-86, "System Diagram".

### Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or reconnect the hose.

### 6.CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 7.

### 7.CHECK EVAP CANISTER VENT CONTROL VALVE

#### Check the following.

- EVAP canister vent control valve is installed properly.
- Refer to EC-695, "Removal and Installation".
- EVAP canister vent control valve. Refer to EC-382, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace EVAP canister vent control valve and O-ring.

**EC-412** Revision: 2009 June 2010 M35/M45

[VQ35HR] < COMPONENT DIAGNOSIS > 8. CHECK FOR EVAP LEAK Refer to EC-693, "Inspection". Is there any leak in EVAP line? >> Repair or replace malfunctioning part. EC NO-1 >> With CONSULT-III: GO TO 9. NO-2 >> Without CONSULT-III: GO TO 10. 9.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION (P)With CONSULT-III Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP ser-D vice port. Start engine and let it idle. 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode. 4. Touch "Qu" on CONSULT-III screen to increase "PURG VOL CONT/V" opening to 100%. Е Check vacuum hose for vacuum. Vacuum should exist. Is the inspection result normal? YES >> GO TO 12. NO >> GO TO 11. 10.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION Without CONSULT-III Н 1. Start engine and warm it up to normal operating temperature. Stop engine. 3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. Vacuum should exist. Is the inspection result normal? YES >> GO TO 13. NO >> GO TO 11. 11. CHECK VACUUM HOSE Check vacuum hoses for clogging or disconnection. Refer to EC-86, "System Diagram". Is the inspection result normal? YES-1 >> With CONSULT-III: GO TO 12. YES-2 >> Without CONSULT-III: GO TO 13. >> Repair or reconnect the hose. 12.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE Ν (P)With CONSULT-III Start engine. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening. Does engine speed vary according to the valve opening? YES >> GO TO 14. Р NO >> GO TO 13. 13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE Refer to EC-374, "Component Inspection". Is the inspection result normal? YES >> GO TO 14.

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>> Replace EVAP canister purge volume control solenoid valve.

NO

< COMPONENT DIAGNOSIS >

[VQ35HR]

### 14. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-311, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace "fuel level sensor unit and fuel pump (main)".

### 15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-394, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace EVAP control system pressure sensor.

### 16. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kinks, looseness and improper connection. For location, refer to EC-630, "Description".

#### Is the inspection result normal?

YES >> GO TO 17.

NO >> Repair or replace hoses and tubes.

### 17. CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kinks, cracks, looseness and improper connection.

### Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair or replace hose, tube or filler neck tube.

### 18. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-633, "Component Inspection".

### Is the inspection result normal?

YES >> GO TO 19.

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

### 19. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

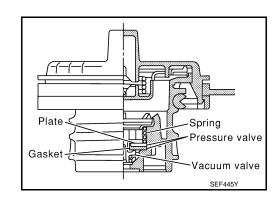
#### >> INSPECTION END

### Component Inspection

INFOID:0000000005353597

### 1. CHECK FUEL FILLER CAP

- 1. Turn ignition switch OFF.
- 2. Remove fuel filler cap.
- 3. Wipe clean valve housing.



#### < COMPONENT DIAGNOSIS >

[VQ35HR]

4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.

5. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm<sup>2</sup>, 2.22 -

2.90 psi)

Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm<sup>2</sup>,

-0.87 to -0.48 psi)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

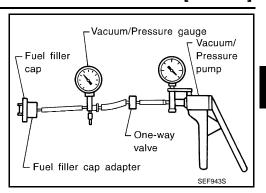
2.REPLACE FUEL FILLER CAP

Replace fuel filler cap.

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.

>> INSPECTION END



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DTC Logic

#### DTC DETECTION LOGIC

#### NOTE:

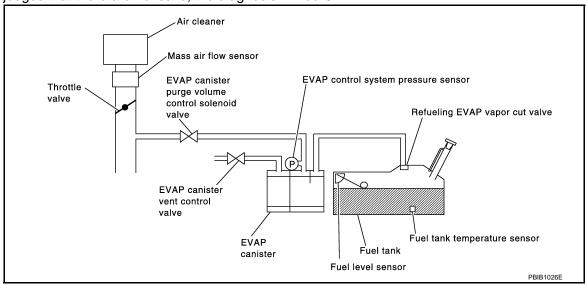
### If DTC P0456 is displayed with DTC P0442, first perform the trouble diagnosis for DTC P0456.

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the negative pressure.

If ECM judges a leak which corresponds to a very small leak, the very small leak P0456 will be detected.

If ECM judges a leak equivalent to a small leak, EVAP small leak P0442 will be detected.

If ECM judges that there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0456	Evaporative emission control system very small leak (negative pressure check)	EVAP system has a very small leak.     EVAP system does not operate properly.	<ul> <li>Incorrect fuel tank vacuum relief valve</li> <li>Incorrect fuel filler cap used</li> <li>Fuel filler cap remains open or does not close.</li> <li>Foreign matter caught in fuel filler cap.</li> <li>Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>Foreign matter caught in EVAP canister vent control valve.</li> <li>EVAP canister or fuel tank leaks</li> <li>EVAP purge line (pipe and rubber tube) leaks</li> <li>EVAP purge line rubber tube bent</li> <li>Loose or disconnected rubber tube</li> <li>EVAP canister vent control valve and the circuit</li> <li>EVAP canister purge volume control solenoid valve and the circuit</li> <li>Fuel tank temperature sensor</li> <li>O-ring of EVAP canister vent control valve is missing or damaged</li> <li>EVAP canister is saturated with water</li> <li>EVAP control system pressure sensor</li> <li>Refueling EVAP vapor cut valve</li> <li>ORVR system leaks</li> <li>Fuel level sensor and the circuit</li> <li>Foreign matter caught in EVAP canister purge volume control solenoid valve</li> </ul>

#### **CAUTION:**

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.
- If the fuel filler cap is not tightened properly, the MIL may illuminate.

### < COMPONENT DIAGNOSIS >

Use only a genuine NISSAN rubber tube as a replacement.

### DTC CONFIRMATION PROCEDURE

### 1. INSPECTION START

Will CONSULT-III be used?

Will CONSULT-III be used?

YES >> GO TO 2.

NO >> GO TO 4.

### 2.PRECONDITIONING

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

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

#### NOTE:

After repair, check that the hoses and clips are installed properly.

#### **TESTING CONDITION:**

- Open engine hood before conducting the following procedure.
- If any of following conditions are met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.
- Fuel filler cap is removed.
- Fuel is refilled or drained.
- EVAP component part/parts is/are removed.
- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.
- Check that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

>> GO TO 3.

### 3.perform dtc confirmation procedure

#### (P)With CONSULT-III

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Check that the following conditions are met.

**FUEL LEVEL SE: 0.25 - 1.4 V** 

**COOLAN TEMP/S: 0 - 32°C (32 - 90°F) FUEL T/TMP SE: 0 - 35°C (32 - 95°F)** INT A/TEMP SE: More than 0°C (32°F)

If NG, turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle), or refill/drain fuel until the output voltage of the "FUEL LEVEL SE" meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Select "EVP V/S LEAK P0456/P1456" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.

Follow the instructions displayed.

#### NOTE:

If the engine speed cannot be maintained within the range displayed on CONSULT-III screen, go to EC-22, "BASIC INSPECTION: Special Repair Requirement".

### Which is displayed on CONSULT-III screen?

OK >> INSPECTION END

NG >> Go to EC-418, "Diagnosis Procedure".

### 4. PERFORM COMPONENT FUNCTION CHECK

#### ■With GST

Perform component function check. Refer to EC-418, "Component Function Check".

Use component function check to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

**EC-417** Revision: 2009 June 2010 M35/M45

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#### < COMPONENT DIAGNOSIS >

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-418, "Diagnosis Procedure".

### Component Function Check

INFOID:0000000005353599

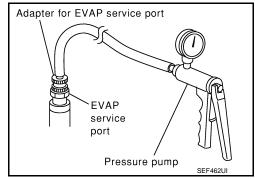
### 1. PERFORM COMPONENT FUNCTION CHECK

### **With GST**

### **CAUTION:**

- Never use compressed air, doing so may damage the EVAP system.
- · Never start engine.
- Never exceed 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi).
- Attach the EVAP service port adapter securely to the EVAP service port (commercial service tool).
- 2. Set the pressure pump and a hose.
- 3. Also set a vacuum gauge via 3-way connector and a hose.
- 4. Turn ignition switch ON.
- 5. Connect GST and select Service \$08.
- 6. Using Service \$08 control the EVAP canister vent control valve (close).
- 7. Apply pressure and check the following conditions are satisfied.

Pressure to be applied: 2.7 kPa (0.028 kg/cm<sup>2</sup>, 0.39 psi) Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (0.004 kg/cm<sup>2</sup>, 0.06 psi).



### Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-418, "Diagnosis Procedure".

### 2. RELEASE PRESSURE

- 1. Disconnect GST.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Restart engine and let it idle for 90 seconds.
- 7. Keep engine speed at 2,000 rpm for 30 seconds.
- 8. Turn ignition switch OFF.

#### NOTE:

For more information, refer to GST Instruction Manual.

>> INSPECTION END

### Diagnosis Procedure

INFOID:0000000005353600

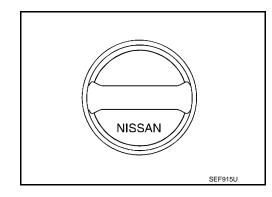
### 1. CHECK FUEL FILLER CAP DESIGN

- 1. Turn ignition switch OFF.
- 2. Check for genuine NISSAN fuel filler cap design.

### Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace with genuine NISSAN fuel filler cap.



#### < COMPONENT DIAGNOSIS >

[VQ35HR]

# 2.check fuel filler cap installation

Check that the cap is tightened properly by rotating the cap clockwise.

#### Is the inspection result normal?

YES >> GO TO 3.

NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Retighten until ratcheting sound is heard.

### 3 . CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

### Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

### 4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-421, "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-693, "Inspection".

#### Is there any leak in EVAP line?

>> Repair or replace malfunctioning part.

NO >> GO TO 6.

### 6.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

EVAP canister vent control valve is installed properly.

Refer to EC-695, "Removal and Installation".

EVAP canister vent control valve.

Refer to EC-382, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace EVAP canister vent control valve and O-ring.

### 7.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

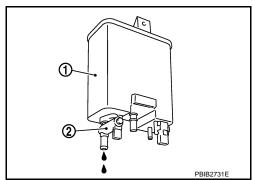
- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- Check if water will drain from EVAP canister (1).
  - 2 : EVAP canister vent control valve

#### Does water drain from the EVAP canister?

YES >> GO TO 8.

NO-1 >> With CONSULT-III: GO TO 10.

NO-2 >> Without CONSULT-III: GO TO 11.



### 8.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

#### The weight should be less than 2.0 kg (4.0 lb).

#### Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 10.

YES-2 >> Without CONSULT-III: GO TO 11.

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### PU430 EVAP CONTROL STSTE

NO >> GO TO 9.

### 9.detect malfunctioning part

< COMPONENT DIAGNOSIS >

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection
  - >> Repair hose or replace EVAP canister.

### 10.check evap canister purge volume control solenoid valve operation

### (P)With CONSULT-III

- 1. Disconnect vacuum hose connected to EVAP service port and EVAP canister purge volume control solenoid valve from EVAP service port.
- Start engine and let it idle.
- 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode.
- 4. Touch "Qu" on CONSULT-III screen to increase "PURG VOL CONT/V" opening to 100%.
- Check vacuum hose for vacuum.

#### Vacuum should exist.

### Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 12.

### 11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

#### Without CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- Stop engine.
- Disconnect vacuum hose connected to EVAP service port and EVAP canister purge volume control solenoid valve from EVAP service port.
- 4. Start engine and let it idle for at least 80 seconds.
- 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

#### Vacuum should exist.

### Is the inspection result normal?

YES >> GO TO 14. NO >> GO TO 12.

### 12. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-86, "System Diagram".

#### Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or reconnect the hose.

### 13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### Refer to EC-374, "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-311, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace "fuel level sensor unit and fuel pump (main)".

### 15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

### Refer to EC-394, "Component Inspection".

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[VQ35HR]

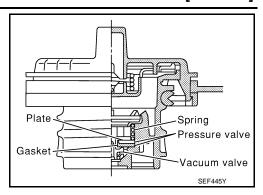
< COMPONENT DIAGNOSIS >	[VQ35HR]
Is the inspection result normal?	
YES >> GO TO 16.	А
NO >> Replace EVAP control system pressure sensor.	
16.CHECK EVAP PURGE LINE	EC
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper Refer to <a href="EC-86">EC-86</a> , "System Diagram".	connection.
Is the inspection result normal?	С
YES >> GO TO 17. NO >> Repair or reconnect the hose.	
17. CLEAN EVAP PURGE LINE	
	D
Clean EVAP purge line (pipe and rubber tube) using air blower.	
00 T0 40	E
>> GO TO 18.	_
18.CHECK EVAP/ORVR LINE	
Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kinks, looseness connection. For location, refer to <a href="EC-630">EC-630</a> , "Description".	and improper F
Is the inspection result normal?	
YES >> GO TO 19. NO >> Repair or replace hoses and tubes.	G
19. CHECK RECIRCULATION LINE	
	— н
Check recirculation line between filler neck tube and fuel tank for clogging, kinks, cracks, le improper connection.	oseness and
Is the inspection result normal?	
YES >> GO TO 20.	1
NO >> Repair or replace hose, tube or filler neck tube.	
20.check refueling evap vapor cut valve	.1
Refer to EC-633, "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 21.	K
NO >> Replace refueling EVAP vapor cut valve with fuel tank.	
21.check fuel level sensor	I
Refer to DI-24, "Electrical Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 22.	M
NO >> Replace "fuel level sensor unit and fuel pump (main)".	
22. CHECK INTERMITTENT INCIDENT	
Refer to EC-154, "Description".	N
>> INSPECTION END	0
Component Inspection	INFOID:0000000005353601
1.CHECK FUEL FILLER CAP	Р
Turn ignition switch OFF.     Remove fuel filler con.	
2. Remove fuel filler cap.	

Revision: 2009 June **EC-421** 2010 M35/M45

### < COMPONENT DIAGNOSIS >

[VQ35HR]

3. Wipe clean valve housing.



4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.

5. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm<sup>2</sup>, 2.22 -

2.90 psi)

Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm<sup>2</sup>,

-0.87 to -0.48 psi)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE FUEL FILLER CAP

Fuel filler cap adapter

Vacuum/Pressure gauge
Vacuum/
Pressure
pump

One-way
valve

SEF943S

Replace fuel filler cap.

#### **CAUTION:**

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.

>> INSPECTION END

< COMPONENT DIAGNOSIS >

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INFOID:0000000005353604

### P0460 FUEL LEVEL SENSOR

Description INFOID:0000000005353602

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the "unified meter and A/C amp.". The "unified meter and A/C amp." sends the fuel level sensor signal to the ECM through the CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

### DTC DETECTION LOGIC

#### NOTE:

- If DTC 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 <a href="EC-444">EC-444</a>, "DTC Logic".

When the vehicle is parked, the fuel level in the fuel tank is naturally stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	<ul> <li>Harness or connectors         (The CAN communication line is open or shorted)</li> <li>Harness or connectors         (The sensor circuit is open or shorted)</li> <li>Unified meter and A/C amp.</li> <li>Fuel level sensor</li> </ul>

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

>> GO TO 2.

### 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and wait maximum of 2 consecutive minutes.
- Check 1st trip DTC.

### Is 1st trip DTC detected?

YES >> Go to EC-423, "Diagnosis Procedure".

NO >> INSPECTION END

### Diagnosis Procedure

1. CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to DI-18, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to DI-22, "Fuel Level Sensor Signal Inspection".

### 2. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

Revision: 2009 June **EC-423** 2010 M35/M45

>> INSPECTION END

< COMPONENT DIAGNOSIS >

[VQ35HR]

### P0461 FUEL LEVEL SENSOR

Description INFOID:0000000005353605

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the "unified meter and A/C amp.". The "unified meter and A/C amp." sends the fuel level sensor signal to the ECM through CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic INFOID:0000000005353606

### DTC DETECTION LOGIC

### NOTE:

- If DTC P0461 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0461 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-444, "DTC Logic".

Driving long distances naturally affect fuel gauge level.

This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	(
P0461	Fuel level sensor circuit range/performance	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.	Harness or connectors     (The CAN communication line is open or shorted)     Harness or connectors     (The sensor circuit is open or shorted)     Unified meter and A/C amp.     Fuel level sensor	F

#### DTC CONFIRMATION PROCEDURE

### 1. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-425, "Component Function Check".

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

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-426, "Diagnosis Procedure".

### Component Function Check

### 1.PRECONDITIONING

#### WARNING:

When performing the following procedure, always observe the handling of the fuel. Refer to FL-10, "Component".

### **TESTING CONDITION:**

Before starting component function check, preparation of draining fuel and refilling fuel is required.

#### Will CONSULT-III be used?

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

### 2.PERFORM COMPONENT FUNCTION CHECK

#### With CONSULT-III

### NOTE:

Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/ 8 Imp gal) in advance.

Prepare a fuel container and a spare hose.

**EC-425** Revision: 2009 June 2010 M35/M45

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### P0461 FUEL LEVEL SENSOR

#### < COMPONENT DIAGNOSIS >

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- Release fuel pressure from fuel line, refer to <u>EC-692, "Inspection"</u>.
- 3. Remove the fuel feed hose on the fuel level sensor unit.
- 4. Connect a spare fuel hose where the fuel feed hose was removed.
- 5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.
- 6. Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-III.
- 7. Check "FUEL LEVEL SE" output voltage and note it.
- 8. Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-III.
- 9. Touch "ON" and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
- 10. Check "FUEL LEVEL SE" output voltage and note it.
- 11. Fill fuel into the fuel tank for 30  $\ell$  (7-7/8 US gal, 6-5/8 Imp gal).
- 12. Check "FUEL LEVEL SE" output voltage and note it.
- 13. Confirm whether the voltage changes more than 0.03 V during step 7 to 10 and 10 to 12.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-426, "Diagnosis Procedure".

### 3.perform component function check

#### Without CONSULT-III

#### NOTE:

# Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 $\,\ell$ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

- 1. Prepare a fuel container and a spare hose.
- 2. Release fuel pressure from fuel line. Refer to <a>EC-692</a>, "Inspection".
- 3. Remove the fuel feed hose on the fuel level sensor unit.
- 4. Connect a spare fuel hose where the fuel feed hose was removed.
- 5. Turn ignition switch ON.
- 6. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
- 7. Confirm that the fuel gauge indication varies.
- 8. Fill fuel into the fuel tank for 30  $\ell$  (7-7/8 US gal, 6-5/8 Imp gal).
- 9. Confirm that the fuel gauge indication varies.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-426, "Diagnosis Procedure".

### Diagnosis Procedure

INFOID:0000000005353608

### 1.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

### Refer to DI-18, "CONSULT-III Function (METER/M&A)".

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to DI-22, "Fuel Level Sensor Signal Inspection".

### 2.CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

>> INSPECTION END

< COMPONENT DIAGNOSIS >

[VQ35HR]

### P0462, P0463 FUEL LEVEL SENSOR

Description INFOID:0000000005353609

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the "unified meter and A/C amp.". The "unified meter and A/C amp." sends the fuel level sensor signal to the ECM through CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

**DTC Logic** INFOID:0000000005353610

### DTC DETECTION LOGIC

### NOTE:

- If DTC P0462 or P0463 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0462 or P0463 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607.Refer to EC-444, "DTC Logic".

This diagnosis indicates the former, to detect open or short circuit malfunction.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0462	Fuel level sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors     (The CAN communication line is open or
P0463	Fuel level sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	shorted)  • Harness or connectors (The sensor circuit is open or shorted)  • Unified meter and A/C amp.  • Fuel level sensor

### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

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

>> GO TO 2.

### 2 .PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 5 seconds.
- Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-427, "Diagnosis Procedure".

>> INSPECTION END NO

### Diagnosis Procedure

 ${f 1}$  .CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to DI-18, "CONSULT-III Function (METER/M&A)".

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to DI-22, "Fuel Level Sensor Signal Inspection".

### 2.CHECK INTERMITTENT INCIDENT

**EC-427** Revision: 2009 June 2010 M35/M45

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INFOID:0000000005353611

### P0462, P0463 FUEL LEVEL SENSOR

< COMPONENT DIAGNOSIS >

[VQ35HR]

Refer to EC-154, "Description".

>> INSPECTION END

### P0500 VSS

Description INFOID:0000000005353612

The vehicle speed signal is sent to the "unified meter and A/C amp." from the "ABS actuator and electric unit (control unit)" by CAN communication line. The "unified meter and A/C amp." then sends a signal to the ECM by CAN communication line.

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DTC Logic

INFOID:0000000005353613

#### DTC DETECTION LOGIC

If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

 If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-444, "DTC Logic".

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DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500	Vehicle speed sensor	The vehicle speed signal sent to ECM is almost 0 km/h (0 MPH) even when vehicle is being driven.	Harness or connectors     (The CAN communication line is open or shorted)     Harness or connectors     (The vehicle speed signal circuit is open or shorted)     Wheel sensor     Unified meter and A/C amp.     ABS actuator and electric unit (control unit)

#### DTC CONFIRMATION PROCEDURE

### 1. INSPECTION START

Will CONSULT-III be used?

#### Will CONSULT-III be used?

YES >> GO TO 2.

>> GO TO 5. NO

### 2.PRECONDITIONING

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

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

>> GO TO 3.

# 3.CHECK VEHICLE SPEED SIGNAL

### NOTE:

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

### (P)With CONSULT-III

- Start engine (VDC switch OFF).
- Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT-III. The vehicle speed on CON-SULT-III should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

### Is the inspection result normal?

YES >> GO TO 4.

NO >> Go to EC-430, "Diagnosis Procedure".

### 4. PERFORM DTC CONFIRMATION PROCEDURE

- Select "DATA MONITOR" mode with CONSULT-III.
- Warm engine up to normal operating temperature.

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Maintain the following conditions for at least 50 consecutive seconds.

#### **CAUTION:**

Always drive vehicle at a safe speed.

ENG SPEED	1,650 - 6,000 rpm (with 2WD) 1,800 - 6,000 rpm (with 4WD)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	6.5 - 31.8 msec (with 2WD) 5 - 31.8 msec (with 4WD)
Selector lever	Except P or N position
PW/ST SIGNAL	OFF

### 4. Check 1st trip DTC.

### Is 1st trip DTC detected?

YES >> Go to EC-430, "Diagnosis Procedure".

NO >> INSPECTION END

### 5. PERFORM COMPONENT FUNCTION CHECK

#### 

Perform component function check. Refer to EC-430, "Component Function Check".

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

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-430, "Diagnosis Procedure".

### Component Function Check

INFOID:0000000005353614

### 1. PERFORM COMPONENT FUNCTION CHECK

### **With GST**

- 1. Lift up drive wheels.
- 2. Start engine.
- Read vehicle speed signal in Service \$01 with GST.

The vehicle speed signal on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-430, "Diagnosis Procedure".

### Diagnosis Procedure

INFOID:0000000005353615

### 1. CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

Refer to BRC-12, "Fail-safe".

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning part.

2.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to DI-18, "CONSULT-III Function (METER/M&A)".

>> INSPECTION END

### P0506 ISC SYSTEM

Description INFOID:0000000005353616

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 detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration and engine load (air conditioner, power steering and cooling fan operation, etc.).

**DTC** Logic INFOID:0000000005353617

### DTC DETECTION LOGIC

#### NOTE:

If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0506	Idle speed control sys- tem RPM lower than ex- pected	The idle speed is less than the target idle speed by 100 rpm or more.	Electric throttle control actuator     Intake air leak

### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

If the target idle speed is out of the specified value, perform EC-27, "IDLE AIR VOLUME LEARNING: Special Repair Requirement", before conducting DTC Confirmation Procedure.

#### **TESTING CONDITION:**

- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.
- Always perform the test at a temperature above –10°C(14°F).

>> GO TO 2.

### 2.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- Restart engine and run it for at least 1 minute at idle speed.
- Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-431, "Diagnosis Procedure".

>> INSPECTION END NO

### Diagnosis Procedure

### 1.CHECK INTAKE AIR LEAK

- Start engine and let it idle.
- Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

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INFOID:0000000005353618

### **P0506 ISC SYSTEM**

### < COMPONENT DIAGNOSIS >

[VQ35HR]

YES >> Discover air leak location and repair.

NO >> GO TO 2.

### 2.REPLACE ECM

- 1. Stop engine.
- 2. Replace ECM.
- 3. Go to EC-25, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

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## P0507 ISC SYSTEM

Description INFOID:0000000005353619

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 detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic INFOID:0000000005353620

### DTC DETECTION LOGIC

NOTE:

If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0507	Idle speed control sys- tem RPM higher than expected	The idle speed is more than the target idle speed by 200 rpm or more.	Electric throttle control actuator     Intake air leak     PCV system

## DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

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

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

If the target idle speed is out of the specified value, perform EC-27, "IDLE AIR VOLUME LEARNING: Special Repair Requirement", before conducting DTC Confirmation Procedure.

#### **TESTING CONDITION:**

- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.
- Always perform the test at a temperature above –10°C(14°F).

>> GO TO 2.

# 2.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and run it for at least 1 minute at idle speed.
- Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-433, "Diagnosis Procedure".

>> INSPECTION END NO

# Diagnosis Procedure

1. CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

Is the inspection result normal?

YES >> GO TO 2.

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INFOID:0000000005353621

### **P0507 ISC SYSTEM**

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

NO >> Repair or replace malfunctioning part.

# 2. CHECK INTAKE AIR LEAK

- 1. Start engine and let it idle.
- 2. Listen for an intake air leak after the mass air flow sensor.

#### Is intake air leak detected?

YES >> Discover air leak location and repair.

NO >> GO TO 3.

# 3. REPLACE ECM

- 1. Stop engine.
- 2. Replace ECM.
- 3. Go to EC-25, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

### P0550 PSP SENSOR

< COMPONENT DIAGNOSIS > [VQ35HR]

## P0550 PSP SENSOR

Description

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load.

This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.

DTC Logic

#### DTC DETECTION LOGIC

NOTE:

If DTC P0550 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-445, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0550	Power steering pressure sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	Harness or connectors     (The sensor circuit is open or shorted)     Power steering pressure sensor

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

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

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

>> GO TO 2.

# 2.perform dtc confirmation procedure

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

### Is 1st trip DTC detected?

YES >> Go to EC-436, "Diagnosis Procedure".

NO >> INSPECTION END

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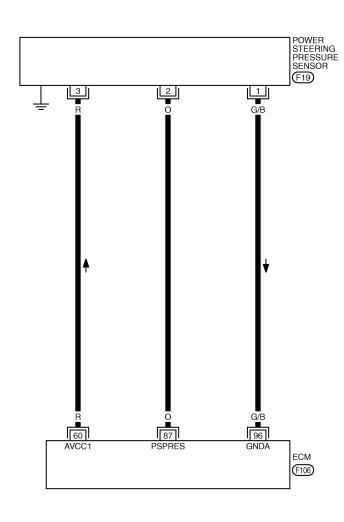
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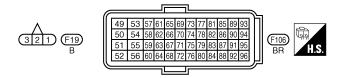
Wiring Diagram

INFOID:0000000005353624

### EC-PS/SEN-01

: DETECTABLE LINE FOR DTC : NON-DETECTABLE LINE FOR DTC





TBWT2448E

# Diagnosis Procedure

#### INFOID:0000000005353625

# 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

Is the inspection result normal?

### < COMPONENT DIAGNOSIS >

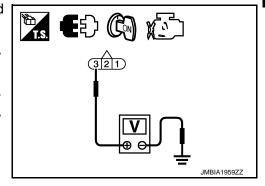
YES >> GO TO 2.

NO >> Repair or replace ground connections.

# 2.check power steering pressure (PSP) sensor power supply circuit

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

PSP :	sensor	Ground Vol	Voltage (V)	
Connector	Connector Terminal		vollage (v)	
F19	3	Ground	Approx. 5	



#### Is the inspection result normal?

YES >> GO TO 3.

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

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

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

PSP sensor		EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F19	1	F106	96	Existed

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

#### Is the inspection result normal?

YES >> GO TO 4.

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

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

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

PSP sensor		EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F19	2	F106	87	Existed

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

## Is the inspection result normal?

YES >> GO TO 5.

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

## 5. CHECK PSP SENSOR

Refer to EC-438, "Component Inspection".

### Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace PSP sensor.

### 6.CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description",

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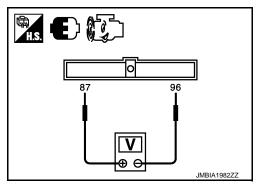
#### >> INSPECTION END

## Component Inspection

INFOID:0000000005353626

# 1.CHECK POWER STEERING PRESSURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and let it idle.
- 4. Check the voltage between ECM harness connector terminals under the following conditions.



ECM						
Connector         + -           Terminal         Terminal		_	Condition		Voltage (V)	
		Terminal				
F106	87	96	Steering wheel	Being turned	0.5 - 4.5	
F100	67	90	Steering wheel	Not being turned	0.4 - 0.8	

### Is the inspection result normal?

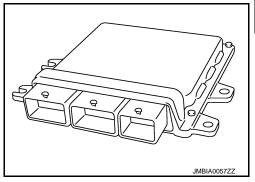
YES >> INSPECTION END

NO >> Replace power steering pressure sensor.

## P0603 ECM POWER SUPPLY

Description

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc.



DTC Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0603	ECM power supply circuit	ECM back up RAM system does not function properly.	Harness or connectors [ECM power supply (back up) circuit is open or shorted.]     ECM

#### DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

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

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 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 second.
- 2. Turn ignition switch OFF and wait at least 5 minutes.
- 3. Turn ignition switch ON, wait at least 10 seconds.
- 4. Repeat steps 2 and 3 for five times.
- Check 1st trip DTC.

### Is 1st trip DTC detected?

YES >> Go to EC-440, "Diagnosis Procedure".

NO >> INSPECTION END

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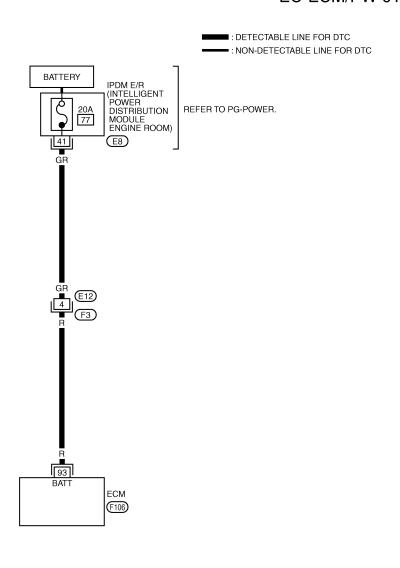
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Wiring Diagram

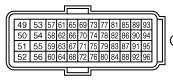
IFOID:0000000005353629

## EC-ECM/PW-01











TBWT2449E

# Diagnosis Procedure

INFOID:0000000005353630

# 1. CHECK ECM POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.

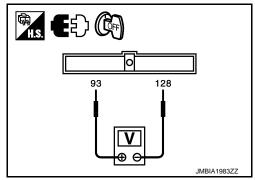
### P0603 ECM POWER SUPPLY

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

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

	+		_	Voltage
Connector	Terminal	Connector	Terminal	
F106	93	M6	128	Battery voltage



Is the inspection result normal?

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

# 2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F12, F3
- 20 A fuse (No. 77)
- IPDM E/R harness connector E8
- Harness for open or short between ECM and battery

>> Repair or replace harness or connectors.

# 3.check intermittent incident

Refer to EC-154, "Description".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace harness or connectors.

## 4. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- 2. Erase DTC.
- Perform DTC Confirmation Procedure.

See EC-439, "DTC Logic".

#### Is the 1st trip DTC P0603 displayed again?

YES >> GO TO 5.

NO >> INSPECTION END

# 5.REPLACE ECM

- Replace ECM.
- Go to EC-25, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Special Repair Requirement".

>> INSPECTION END

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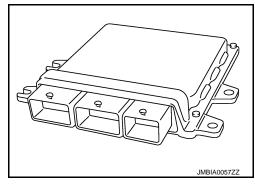
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## P0605 ECM

Description INFOID:0000000005353631

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



DTC Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
		A)	ECM calculation function is malfunctioning.	
P0605	Engine control module	B)	ECM EEP-ROM system is malfunctioning.	• ECM
		C)	ECM self shut-off function is malfunctioning.	

### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

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

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

>> GO TO 2.

# 2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Turn ignition switch ON.
- Check 1st trip DTC.

### Is 1st trip DTC detected?

YES >> Go to EC-443, "Diagnosis Procedure".

NO >> GO TO 3.

# 3.perform dtc confirmation procedure for malfunction b

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Turn ignition switch OFF, wait at least 10 seconds, and then turn it ON.
- Check 1st trip DTC.

### Is 1st trip DTC detected?

YES >> Go to EC-443, "Diagnosis Procedure".

NO >> GO TO 4.

## 4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Turn ignition switch OFF, wait at least 10 seconds, and then turn it ON.
- Repeat step 2 for 32 times.
- Check 1st trip DTC.

## Is 1st trip DTC detected?

## **P0605 ECM**

[VQ35HR] < COMPONENT DIAGNOSIS > YES >> Go to EC-443, "Diagnosis Procedure". NO >> INSPECTION END Α Diagnosis Procedure INFOID:0000000005353633 1. INSPECTION START EC Turn ignition switch ON. Erase DTC. C 3. Perform DTC Confirmation Procedure. See EC-442, "DTC Logic". Is the 1st trip DTC P0605 displayed again?  $\mathsf{D}$ YES >> GO TO 2. NO >> INSPECTION END 2.REPLACE ECM Е 1. Replace ECM. 2. Go to EC-25, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Special Repair Requirement". F >> INSPECTION END Н K L M Ν 0 Р

**EC-443** Revision: 2009 June 2010 M35/M45

### 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

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0607	CAN communication bus	When detecting error during the initial diagnosis of CAN controller of ECM.	• ECM

#### DTC CONFIRMATION PROCEDURE

# 1. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- Check DTC.

#### Is DTC detected?

YES >> Go to EC-444, "Diagnosis Procedure".

NO >> INSPECTION END

## Diagnosis Procedure

INFOID:0000000005353636

## 1. INSPECTION START

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure.
- See EC-444, "DTC Logic".
- 4. Check DTC.

### Is the DTC P0607 displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

## 2.REPLACE ECM

- 1. Replace ECM.
- 2. Go to EC-25, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Special Repair Requirement".
  - >> INSPECTION END

### P0643 SENSOR POWER SUPPLY

< COMPONENT DIAGNOSIS >

[VQ35HR]

## P0643 SENSOR POWER SUPPLY

DTC Logic

#### DTC DETECTION LOGIC

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DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0643	Sensor power supply circuit short	ECM detects that the voltage of power source for sensor is excessively low or high.	Harness or connectors     [Accelerator pedal position (APP) sensor 1 circuit is shorted.]     [Throttle position (TP) sensor circuit is shorted.]     [Camshaft position (CMP) sensor (bank 1) circuit is shorted.]     [Exhaust valve timing (EVT) control position sensor (bank 1) circuit is shorted.]     [Power steering pressure (PSP) sensor circuit is shorted.]     • APP sensor     • TP sensor     • CMP sensor (bank 1)     • EVT control position sensor (bank 1)     • PSP sensor

#### DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

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

>> GO TO 2.

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# 2. PERFORM DTC CONFIRMATION PROCEDURE

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

### Is DTC detected?

YES >> Go to EC-446, "Diagnosis Procedure".

NO >> INSPECTION END

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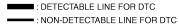
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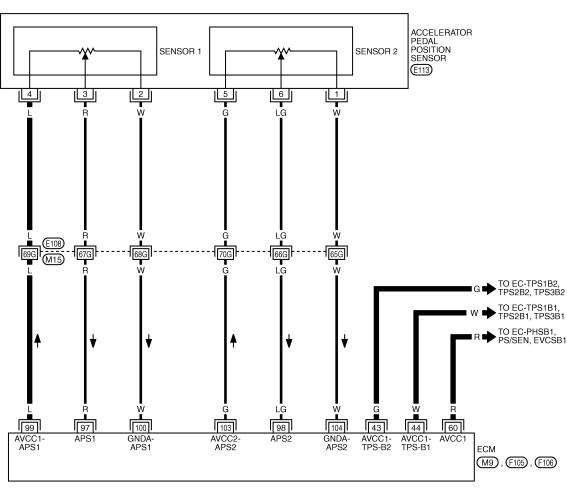
Revision: 2009 June **EC-445** 2010 M35/M45

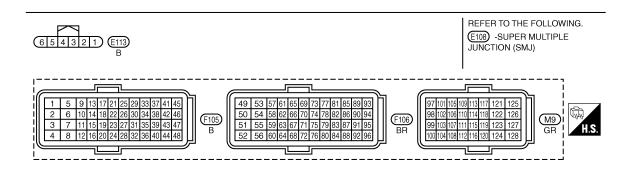
Wiring Diagram

INFOID:0000000005353638

## EC-SEN/PW-01







TBWT2450E

# Diagnosis Procedure

INFOID:0000000005353639

# 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

### P0643 SENSOR POWER SUPPLY

# < COMPONENT DIAGNOSIS >

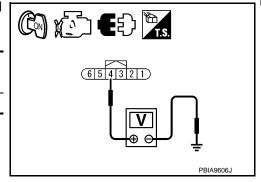
YES >> GO TO 2.

NO >> Repair or replace ground connections.

# 2.CHECK ACCELERATOR PEDAL POSITION (APP) SENSOR 1 POWER SUPPLY CIRCUIT

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

APP se	ensor	Ground	Voltage (V)
Connector	Terminal	Olouliu	vollage (v)
E113	4	Ground	Approx. 5



Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 3.

## 3.CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

E	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
F105	43	Electric throttle control actuator (bank 2)	F51	1
F 105	44	Electric throttle control actuator (bank 1)	F31	6
F106 60		Camshaft position (CMP) sensor (bank 1)	F4	1
		Exhaust valve timing (EVT) control position sensor (bank 1)	F82	1
		Power steering pressure (PSP) sensor	F19	3
M9	99	APP sensor	E113	4

#### Is the inspection result normal?

YES >> GO TO 4.

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

## 4. CHECK COMPONENTS

Check the following.

- CMP sensor (bank 1) (Refer to EC-352, "Component Inspection".)
- EVT control position sensor (bank 1) (Refer to <u>EC-459</u>, "Component Inspection".)
- PSP sensor (Refer to <u>EC-438</u>, "Component Inspection".)

### Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning component.

## ${f 5.}$ CHECK THROTTLE POSITION (TP) SENSOR

Refer to EC-228, "Component Inspection".

### Is the inspection result normal?

>> GO TO 9. YES NO >> GO TO 6.

# **O**.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator.

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### **P0643 SENSOR POWER SUPPLY**

### < COMPONENT DIAGNOSIS >

[VQ35HR]

2. Go to EC-229, "Special Repair Requirement".

#### >> INSPECTION END

## 7. CHECK APP SENSOR

Refer to EC-561, "Component Inspection".

#### Is the inspection result normal?

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

# 8.REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly.
- 2. Go to EC-562, "Special Repair Requirement".

#### >> INSPECTION END

# 9. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

>> INSPECTION END

## P0850 PNP SWITCH

Description INFOID:0000000005353640

When the selector lever position is P or N, park/neutral position (PNP) signal from the TCM is sent to ECM.

DTC Logic INFOID:0000000005353641

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0850	Park/neutral position switch	The signal of the park/neutral position (PNP) signal does not change during driving after the engine is started.	Harness or connectors     (The PNP signal circuit is open or shorted.)     TCM

### DTC CONFIRMATION PROCEDURE

## 1.INSPECTION START

Will CONSULT-III be used?

### Will CONSULT-III be used?

YES >> GO TO 2.

NO >> GO TO 5.

# 2.PRECONDITIONING

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

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

>> GO TO 3.

## 3.CHECK PNP SIGNAL

#### (P)With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-III. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known-good signal
N or P position	ON
Except above position	OFF

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Go to EC-451, "Diagnosis Procedure".

## 4. PERFORM DTC CONFIRMATION PROCEDURE

- Select "DATA MONITOR" mode with CONSULT-III.
- Start engine and warm it up to normal operating temperature.
- Maintain the following conditions for at least 50 consecutive seconds. **CAUTION:**

Always drive vehicle at a safe speed.

ENG SPEED	1,400 - 6,375 rpm
COOLAN TEMP/S	More than 70 °C (158 °F)
B/FUEL SCHDL	2.0 - 31.8 msec

**EC-449** Revision: 2009 June 2010 M35/M45

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### P0850 PNP SWITCH

#### < COMPONENT DIAGNOSIS >

VHCL SPEED SE More than 64 km/h (40 mph)

Selector lever Suitable position

## 4. Check 1st trip DTC.

### Is 1st trip DTC detected?

YES >> Go to EC-451, "Diagnosis Procedure".

NO >> INSPECTION END

# 5.PERFORM COMPONENT FUNCTION CHECK

#### ■With GST

Perform component function check. Refer to EC-450, "Component Function Check".

#### NOTE:

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

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-451, "Diagnosis Procedure".

## Component Function Check

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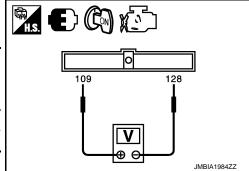
[VQ35HR]

# 1. PERFORM COMPONENT FUNCTION CHECK

## 

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals under the following conditions.

ECM					
Connector	+	_	Condition		Voltage (V)
Connector	Terminal	Terminal			
M9	109	128	Selector lever		Battery voltage
IVIS	109	120	Selector level	Except above	Approx. 0



#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-451, "Diagnosis Procedure".

Wiring Diagram

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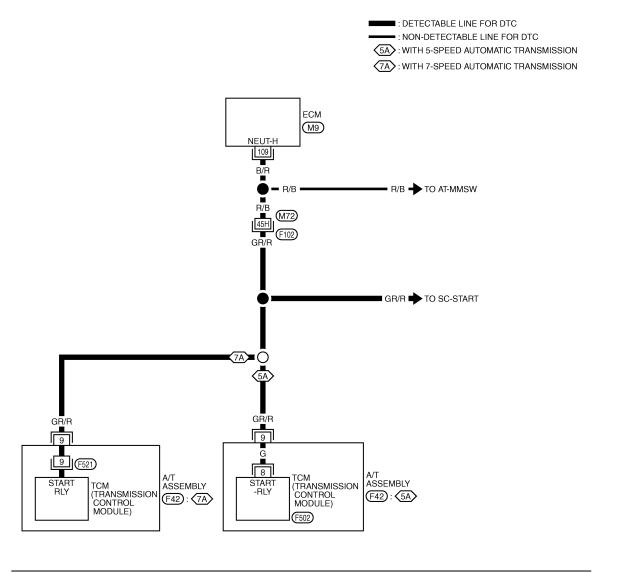
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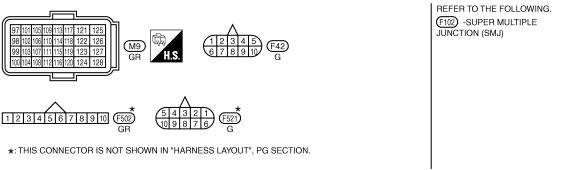
INFOID:0000000005353644

INFOID:0000000005353643



### EC-TR/SW-01





# Diagnosis Procedure

1. CHECK DTC WITH TCM

Refer to AT-47, "OBD-II Diagnostic Trouble Code (DTC)".

Is the inspection result normal?

### P0850 PNP SWITCH

## < COMPONENT DIAGNOSIS >

[VQ35HR]

YES >> GO TO 2.

NO >> Repair or replace malfunctioning part.

## 2.CHECK STARTING SYSTEM

Turn ignition switch OFF, then turn it to START.

#### Does starter motor operate?

YES >> GO TO 3.

NO >> Check DTC with BCM. Refer to SC-8, "System Description".

# 3.check park/neutral position (pnp) signal circuit for open and short

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

A/T assembly		EC	Continuity	
Connector	Terminal	Connector Terminal		Continuity
F42	9	M9	109	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 F102, M72
- Harness for open or short between A/T assembly and ECM

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

# 5. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

>> INSPECTION END

< COMPONENT DIAGNOSIS >

[VQ35HR]

## P1078, P1084 EVT CONTROL POSITION SENSOR

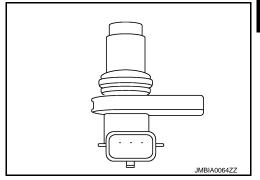
Description INFOID:0000000005353645

Exhaust valve timing (EVT) control position sensor detects the concave groove of the exhaust camshaft rear end.

This sensor signal is used for sensing a position of the exhaust camshaft.

This sensor uses a Hall IC.

Based on the position of the exhaust camshaft, ECM controls exhaust valve timing control magnet retarder to optimize the shut/ open timing of exhaust valve for the driving condition.



**DTC** Logic INFOID:0000000005353646

#### DTC DETECTION LOGIC

NOTE:

If DTC P1078 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-445, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1078	Exhaust valve timing (EVT) control position sensor (bank 1) circuit		Harness or connectors     [EVT control position sensor (bank 1) circuit is open or shorted)     EVT control position sensor     Crankshaft position (CKP) sensor     Camshaft position (CMP) sensor (bank 1)     Accumulation of debris to the signal pick-up portion of the camshaft
P1084	Exhaust valve timing (EVT) control position sensor (bank 2) circuit	An excessively high or low voltage from the sensor is sent to ECM.	Harness or connectors     [EVT control position sensor (bank 2) circuit is open or shorted)     (CKP sensor circuit is shorted.)     [CMP sensor (bank 2) circuit is shorted.]     (Battery current sensor circuit is shorted.)     (APP sensor 2 circuit is shorted.)     (EVAP control system pressure sensor circuit is shorted.)     (Refrigerant pressure sensor circuit is shorted.)     (Refrigerant pressure sensor circuit is shorted.)     EVT control position sensor (bank 2)     CKP sensor     CMP sensor (bank 2)     Battery current sensor     Accelerator pedal position (APP) sensor     EVAP control system pressure sensor     Refrigerant pressure sensor     Accumulation of debris to the signal pick-up portion of the camshaft

### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

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

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

**EC-453** Revision: 2009 June 2010 M35/M45

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>> GO TO 2.

# 2.PERFORM DTC CONFIRMATION PROCEDURE

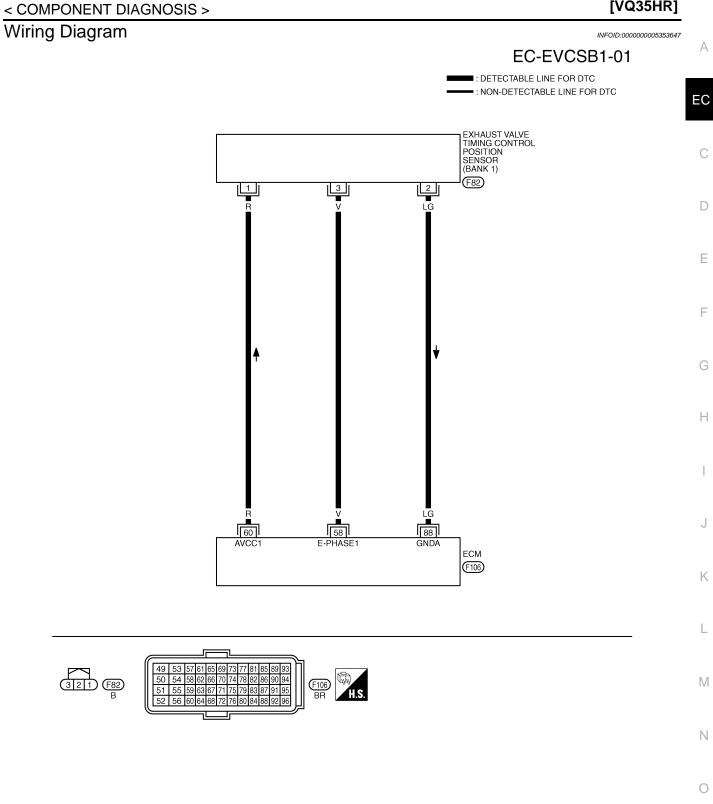
- Start engine and let it idle for 10 seconds.
   Check 1st trip DTC.

### Is 1st trip DTC detected?

>> Go to EC-456, "Diagnosis Procedure". YES

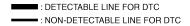
>> INSPECTION END NO

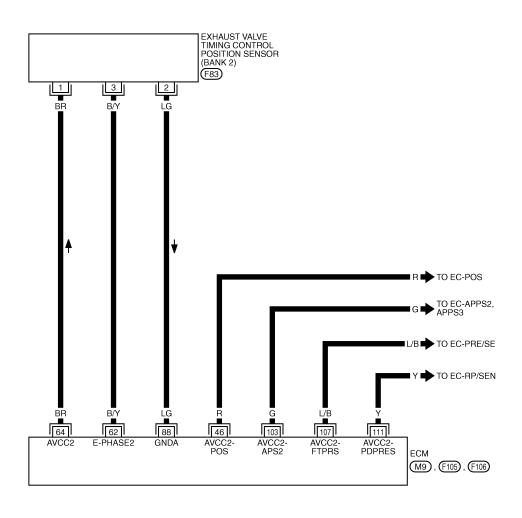
[VQ35HR]

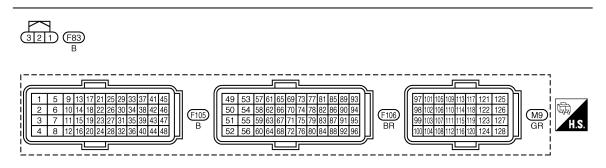


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### EC-EVCSB2-01







TBWT2453E

## Diagnosis Procedure

INFOID:0000000005353648

# 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

YES >> GO TO 2.

### < COMPONENT DIAGNOSIS >

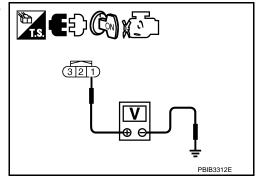
[VQ35HR]

NO >> Repair or replace ground connections.

# 2.check exhaust valve timing (evt) control position sensor power supply circuit-i

- Disconnect EVT control position sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between EVT control position sensor harness connector and ground.

DTC	EV	T control position	on sensor	Ground	Voltage (V)
DIC	Bank	Connector Terminal		Ground	voltage (v)
P1078	1	F82	1	Ground	Approx. 5
P1084	2	F83	1	Giouna	



#### Is the inspection result normal?

>> GO TO 8. YES

NO-1 >> P1078: Repair open circuit, short to ground or short to power in harness or connectors.

NO-2 >> P1084: GO TO 3.

# 3.CHECK EVT CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT-II

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- Check the continuity between EVT control position sensor harness connector and ECM harness connec-

EV.	EVT control position sensor			ECM		
Bank	Connector	Terminal	Connector	Terminal	Continuity	
2	F83	1	F106	64	Existed	

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

### f 4.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

E	ECM Sensor			
Connector	Terminal	Name	Connector	Terminal
F105	46	Crankshaft position (CKP) sensor	F52	1
		Camshaft position (CMP) sensor (bank 2)	F32	1
F106 64	EVT control position sensor (bank 2)	F83	1	
	Battery current sensor	E67	1	
	103	Accelerator pedal position (APP) sensor	E113	5
M9 107	EVAP control system pressure sensor	B172	3	
	111	Refrigerant pressure sensor	E66	1

#### Is the inspection result normal?

YES >> GO TO 5.

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

### CHECK COMPONENTS

Check the following.

CKP sensor (Refer to EC-345, "Component Inspection".)

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#### < COMPONENT DIAGNOSIS >

[VQ35HR]

- CMP sensor (bank 2) (Refer to EC-352, "Component Inspection".)
- Battery current sensor (Refer to EC-502, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-394, "Component Inspection".)
- Refrigerant pressure sensor (Refer to <u>ATC-80. "Magnet Clutch Circuit".)</u>

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning component.

## 6.CHECK APP SENSOR

### Refer to EC-561, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 7.

## 7.REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly.
- Go to EC-562, "Special Repair Requirement".

#### >> INSPECTION END

## 8.CHECK EVT CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between EVT control position sensor harness connector and ECM harness connector

DTC	EVT	control position	on sensor	ECM		Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P1078	1	F82	2	E106	QQ	Existed
P1084	2	F83	2	F106 88	00	LAISIEU

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

#### Is the inspection result normal?

YES >> GO TO 9.

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

# 9. CHECK EVT CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between exhaust valve timing control position sensor harness connector and ECM harness connector.

DTC	EVT	control position	on sensor	EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P1078	1	F82	3	F106	58	Existed
P1084	2	F83	3	F 100	62	Existed

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

#### Is the inspection result normal?

YES >> GO TO 10.

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

## 10. CHECK EVT CONTROL POSITION SENSOR

### Refer to EC-459, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace malfunctioning EVT control position sensor.

### < COMPONENT DIAGNOSIS >

[VQ35HR]

# 11. CHECK CKP SENSOR

Refer to EC-345, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace CKP sensor.

12. CHECK CMP SENSOR

Refer to EC-352, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace malfunctioning CMP sensor.

13. CHECK CAMSHAFT (EXH)

### Check the following.

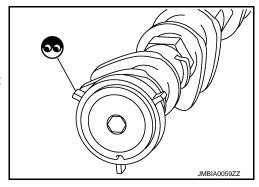
- · Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

#### Is the inspection result normal?

YES >> GO TO 14.

NO

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



# 14. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

>> INSPECTION END

## Component Inspection

INFOID:0000000005353649

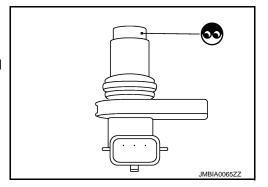
# 1. EXHAUST VALVE TIMING CONTROL POSITION SENSOR-I

- Turn ignition switch OFF.
- 2. Disconnect exhaust valve timing control position sensor harness connector.
- 3. Loosen the fixing bolt of the sensor.
- 4. Remove the sensor.
- 5. Visually check the sensor for chipping.

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning exhaust valve timing control position sensor.



# 2.exhaust valve timing control position sensor-ii

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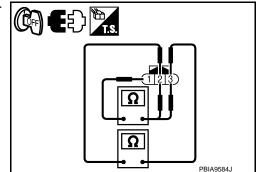
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## < COMPONENT DIAGNOSIS >

[VQ35HR]

Check resistance exhaust valve timing control position sensor terminals as shown below.

Terminals	Resistance
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or ∞ Ω [at 25°C (77°F)]
2 (+) - 3 (-)	



### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning exhaust valve timing control position sensor.

## P1148, P1168 CLOSED LOOP CONTROL

< COMPONENT DIAGNOSIS >

[VQ35HR]

# P1148, P1168 CLOSED LOOP CONTROL

DTC Logic

### DTC DETECTION LOGIC

#### NOTE:

DTC P1148 or P1168 is displayed with another DTC for air fuel ratio (A/F) sensor 1. Perform the trouble diagnosis for the corresponding DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1148	Closed loop control function (bank 1)	The closed loop control function for bank 1 does not operate even when vehicle is being driven in the specified condition.	Harness or connectors     (The A/F sensor 1 circuit is open or short ed.)	
P1168	Closed loop control function (bank 2)	The closed loop control function for bank 2 does not operate even when vehicle is being driven in the specified condition.	A/F sensor 1     A/F sensor 1 heater	

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## P1211 TCS CONTROL UNIT

**Description** 

The malfunction information related to TCS is transferred through the CAN communication line from "ABS actuator and electric unit (control unit)" to ECM.

Be sure to erase the malfunction information such as DTC not only for "ABS actuator and electric unit (control unit)" but also for ECM after TCS related repair.

DTC Logic

#### DTC DETECTION LOGIC

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	Trouble diagnosis name DTC detecting condition		Possible cause
P1211	TCS control unit	ECM receives malfunction information from "ABS actuator and electric unit (control unit)".	ABS actuator and electric unit (control unit)     TCS related parts

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

#### **TESTING CONDITION:**

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

>> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for at least 60 seconds.
- 2. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> EC-462, "Diagnosis Procedure"

NO >> INSPECTION END

## Diagnosis Procedure

Go to BRC-12.

### P1212 TCS COMMUNICATION LINE

< COMPONENT DIAGNOSIS >

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## P1212 TCS COMMUNICATION LINE

**Description** 

This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and "ABS actuator and electric unit (control unit)".

Be sure to erase the malfunction information such as DTC not only for "ABS actuator and electric unit (control unit)" but also for ECM after TCS related repair.

DTC Logic

#### DTC DETECTION LOGIC

#### NOTE:

- If DTC P1212 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1212 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-444</u>, "<u>DTC Logic"</u>.

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1212	TCS communication line	ECM cannot receive the information from "ABS actuator and electric unit (control unit)" continuously.	Harness or connectors     (The CAN communication line is open or shorted.)     ABS actuator and electric unit (control unit)     Dead (Weak) battery	

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

#### **TESTING CONDITION:**

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

>> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

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

#### Is 1st trip DTC detected?

YES >> Go to EC-463, "Diagnosis Procedure".

NO >> INSPECTION END

### Diagnosis Procedure

Go to BRC-12.

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Revision: 2009 June **EC-463** 2010 M35/M45

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< COMPONENT DIAGNOSIS >

[VQ35HR]

## P1217 ENGINE OVER TEMPERATURE

DTC Logic INFOID:000000005353657

#### DTC DETECTION LOGIC

#### NOTE:

- If DTC P1217 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1217 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-444, "DTC Logic".

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217	Engine over tempera- ture (Overheat)	<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>	Harness or connectors     (The cooling fan circuit is open or shorted.)     IPDM E/R     Cooling fan relay     Cooling fan control module     Cooling fan motor     Radiator hose     Radiator     Radiator cap     Water pump     Thermostat

### **CAUTION:**

When a malfunction is indicated, always replace the coolant. Refer to CO-10, "Changing Engine Coolant". Also, replace the engine oil. Refer to LU-7, "Changing Engine Oil".

- Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Always use coolant with the proper mixture ratio. Refer to MA-10, "Anti-Freeze Coolant Mixture Ratio".
- 2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

#### DTC CONFIRMATION PROCEDURE

## 1. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-464, "Component Function Check".

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

INFOID:0000000005353658

#### Is the inspection result normal?

YES >> INSPECTION END

>> Go to EC-465, "Diagnosis Procedure".

## Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK-I

#### **WARNING:**

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a guarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

#### < COMPONENT DIAGNOSIS >

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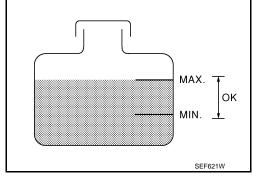
Check the coolant level in the reservoir tank and radiator.

Allow engine to cool before checking coolant level.

Is the coolant level in the reservoir tank and/or radiator below the proper range?

YES >> Go to EC-465, "Diagnosis Procedure".

NO >> GO TO 2.



# 2.PERFORM COMPONENT FUNCTION CHECK-II

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

YES >> Go to EC-465, "Diagnosis Procedure".

NO >> GO TO 3.

# 3. PERFORM COMPONENT FUNCTION CHECK-III

(P)With CONSULT-III

- 1. Turn ignition switch ON.
- Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT-III.
- Check that cooling fan speed varies according to the percentage.

Without CONSULT-III

Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PG-22, "Auto Active Test".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-465, "Diagnosis Procedure".

## Diagnosis Procedure

# 1. CHECK COOLING FAN OPERATION

(II) With CONSULT-III

- 1. Turn ignition switch ON.
- Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT-III.
- Check that cooling fan speed varies according to the percentage.

Without CONSULT-III

- Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PG-22, "Auto Active Test".
- Check that cooling fan operates.

Is the inspection result normal?

YES >> GO TO 2.

>> Go to EC-591, "Diagnosis Procedure". NO

2.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-10, "Inspection".

Is leakage detected?

YES >> GO TO 3.

NO >> GO TO 4.

3.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak.

- Hose
- Radiator
- Water pump

>> Repair or replace malfunctioning part.

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### < COMPONENT DIAGNOSIS >

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# 4. CHECK RADIATOR CAP

Check radiator cap. Refer to CO-15, "Checking Radiator Cap".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace radiator cap.

# 5. CHECK THERMOSTAT

Check thermostat. Refer to CO-26, "Component".

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace thermostat

## 6. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-222, "Component Inspection".

### Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace engine coolant temperature sensor.

# 7. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, check the following.

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	Blocked radiator     Blocked condenser     Blocked radiator grille     Blocked bumper	Visual	No blocking	_
	2	Coolant mixture	Coolant tester	_	MA-10, "Anti-Freeze Coolant Mixture Ratio"
	3	Coolant level	Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	MA-11, "Changing Engine Coolant"
	4	Radiator cap	Pressure tester	_	CO-15, "Checking Radia- tor Cap"
ON* <sup>2</sup>	5	Coolant leaks	Visual	No leaks	CO-10, "Inspection"
ON* <sup>2</sup>	6	Thermostat	Touch the upper and lower radiator hoses	Both hoses should be hot	CO-26, "Component"
ON*1	7	Cooling fan	CONSULT-III	Operating	EC-589, "Component Function Check"
OFF	8	Combustion gas leak	Color checker chemical tester 4 Gas analyzer	Negative	_
ON* <sup>3</sup>	9	Coolant temperature gauge	Visual	Gauge less than 3/4 when driving	_
		Coolant overflow to reservoir tank	Visual	No overflow during driving and idling	MA-11, "Changing Engine Coolant"
OFF*4	10	Coolant return from reservoir tank to radiator	Visual	Should be initial level in reservoir tank	MA-11, "Changing Engine Coolant"
OFF	11	Cylinder head	Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-96, "On-Vehicle Ser- vice"
	12	Cylinder block and pistons	Visual	No scuffing on cylinder walls or piston	EM-119, "Component"

<sup>\*1:</sup> Turn the ignition switch ON.

<sup>\*2:</sup> Engine running at 3,000 rpm for 10 minutes.

<sup>\*3:</sup> Drive at 90 km/h (56 MPH) for 30 minutes and then let idle for 10 minutes.

<sup>\*4:</sup> After 60 minutes of cool down time.

< COMPONENT DIAGNOSIS >

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For more information, refer to CO-7, "Troubleshooting Chart".

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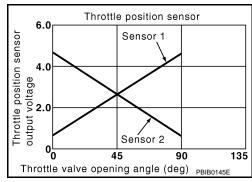
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## P1225, P1234 TP SENSOR

**Description** 

Electric throttle control actuator consists of throttle control motor, throttle position (TP) 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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1225	Closed throttle position learning per- formance (bank 1)	Closed throttle position learning value	Electric throttle control actuator [Throttle position (TP) sensor 1 and	
P1234	Closed throttle position learning per- formance (bank 2)	is excessively low.	2]	

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

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

>> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

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

### Is 1st trip DTC detected?

YES >> Go to EC-468, "Diagnosis Procedure".

NO >> INSPECTION END

## Diagnosis Procedure

INFOID:0000000005353662

# 1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- Turn ignition switch OFF.
- Remove the intake air duct.

## P1225, P1234 TP SENSOR

## < COMPONENT DIAGNOSIS >

[VQ35HR]

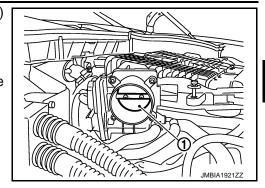
INFOID:0000000005353663

Check if foreign matter is caught between the throttle valve (1) and the housing.

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside.



# 2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace malfunctioning electric throttle control actuator.
- 2. Go to EC-469, "Special Repair Requirement".

>> INSPECTION END

## Special Repair Requirement

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

# 2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-27, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

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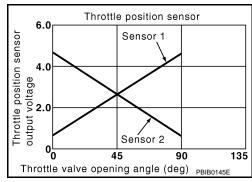
INFOID:0000000005353665

## P1226. P1235 TP SENSOR

Description INFOID:0000000005353664

Electric throttle control actuator consists of throttle control motor, throttle position (TP) 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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226	Closed throttle position learning performance (bank 1)	Closed throttle position learning is not performed	Electric throttle control actuator [Throttle position (TP) sensor 1
P1235	Closed throttle position learning performance (bank 2)	successfully, repeatedly.	and 2]

## DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

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

>> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- Repeat steps 2 and 3 for 32 times.
- 5. Check 1st trip DTC.

#### Is 1st trip DTC detected?

>> Go to EC-470, "Diagnosis Procedure". YES

NO >> INSPECTION END

## Diagnosis Procedure

# INFOID:0000000005353666

## ${f 1}$ .CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- Turn ignition switch OFF.
- Remove the intake air duct.

## **P1226, P1235 TP SENSOR**

## < COMPONENT DIAGNOSIS >

[VQ35HR]

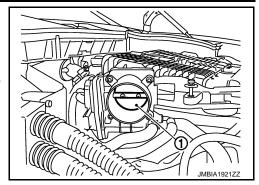
INFOID:0000000005353667

Check if foreign matter is caught between the throttle valve (1) and the housing.

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside.



# 2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace malfunctioning electric throttle control actuator.
- 2. Go to EC-471, "Special Repair Requirement".

>> INSPECTION END

## Special Repair Requirement

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

# 2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-27, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

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## P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< COMPONENT DIAGNOSIS >

[VQ35HR]

## P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

**Description** 

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.

The current opening angle of the throttle valve is detected by the throttle position sensor. The throttle position sensor provides feedback to the ECM, when open/closes the throttle valve in response to driving conditions via the throttle control motor.

DTC Logic

#### DTC DETECTION LOGIC

#### NOTE:

If DTC P1233 or P2101 is displayed with DTC P1238, P2119, first perform the trouble diagnosis for DTC P1238, P2119. Refer to EC-484, "DTC Logic".

If DTC P2101 or P2101 is displayed with DTC P1290, P2100, first perform the trouble diagnosis for DTC P1290, P2100. Refer to EC-492, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1233	Electric throttle control performance (bank 2)	Electric throttle control function does not oper-	Harness or connectors     (Throttle control motor circuit is open or
P2101	Electric throttle control performance (bank 1)	ate properly.	shorted)  • Electric throttle control actuator

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running.

>> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 2 seconds.
- 2. Start engine and let it idle for 5 seconds.
- Check DTC.

## Is DTC detected?

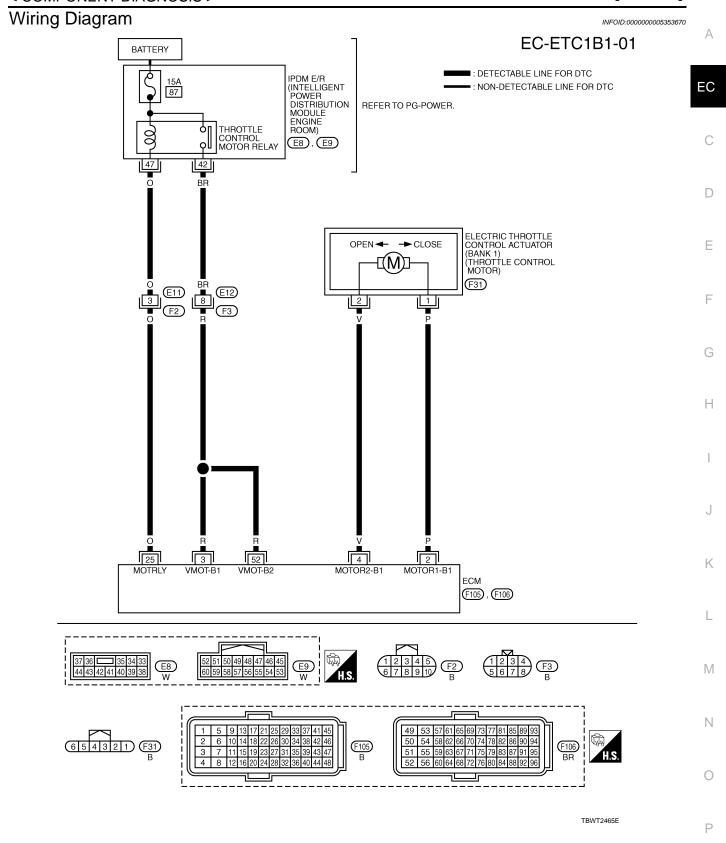
YES >> Go to EC-474, "Diagnosis Procedure".

NO >> INSPECTION END

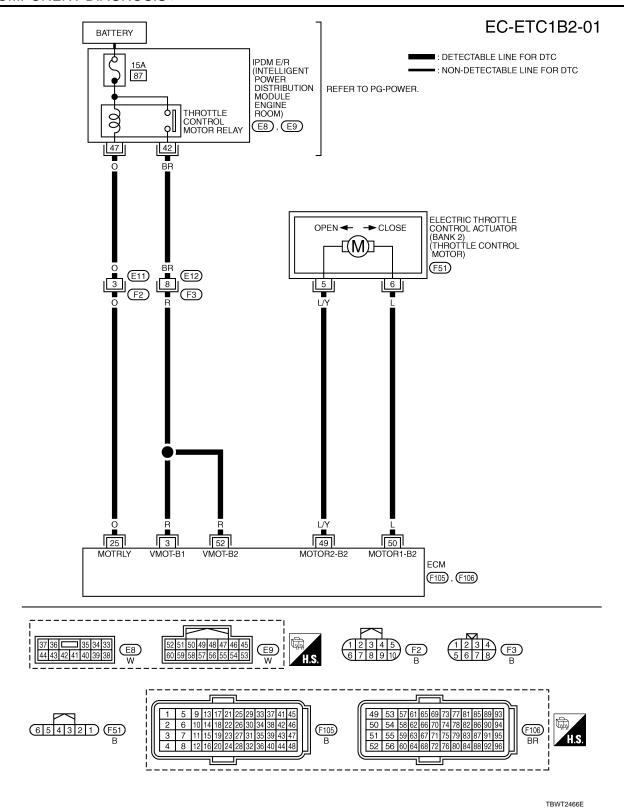
# P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< COMPONENT DIAGNOSIS >

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[VQ35HR]



# Diagnosis Procedure

INFOID:0000000005353671

## 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

YES >> GO TO 2.

## P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

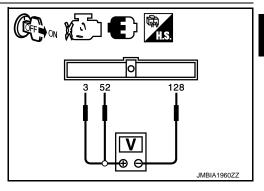
< COMPONENT DIAGNOSIS >

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NO >> Repair or replace ground connection.

# 2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

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



		E	CM			
DTC	+		-		Condition	Voltage (V)
	Connector	Terminal	Connector Terminal			
P1233	F106	F106 52		Ignition switch OFF	Approx. 0	
F 1233	F100	32	M9	128	Ignition switch ON	Battery voltage
D04.04	F40F	2	IVIS	120	Ignition switch OFF	Approx. 0
P2101	F105	3			Ignition switch ON	Battery voltage

#### Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 3.

# ${f 3.}$ CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Disconnect IPDM E/R harness connector E9.
- 4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

IPDM	E/R	EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E9	47	F105	25	Existed

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

## Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

## 4. DETECT MALFUNCTIONING PART

## Check the following.

- Harness connectors E11, F2
- Harness for open or short between ECM and IPDM E/R

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

# 5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

- 1. Disconnect IPDM E/R harness connector E8.
- 2. Check the continuity between IPDM E/R harness connector and ECM harness connector.

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DTC	IPDM	E/R	ECM		Continuity
ыс	Connector	Terminal	Connector	Terminal	Continuity
P1233	E8	42	F106	52	Existed
P2101	LO	42	F105	3	LAISIEU

3. 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 E12, F3
- Harness for open or short between ECM and IPDM E/R

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

## 7. CHECK FUSE

- 1. Disconnect 15 A fuse (No. 87) from IPDM E/R.
- Check if 15 A fuse is blown.

#### Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace 15 A fuse.

## 8. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace harness or connectors.

# 9.check throttle control motor output signal circuit for open or short

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

DTC	Electri	c throttle cont	rol actuator	ECM		Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
			5		49	Existed
P1233	2	F51	3	F106	50	Not existed
F 1233		101	6	1 100	49	Not existed
						50
			1		2	Existed
D2101	P2101 1 F31 =		'	F105	4	Not existed
F2101			2	1 103	2	Not existed
			2		4	Existed

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

#### Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace malfunctioning part.

# 10. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

## P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< COMPONENT DIAGNOSIS >

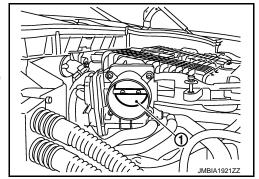
[VQ35HR]

- Remove the intake air duct.
- Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside.



# 11. CHECK THROTTLE CONTROL MOTOR

Refer to EC-477, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 13.

12. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace harness or connectors.

# 13. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- Replace malfunction electric throttle control actuator.
- Go to EC-478, "Special Repair Requirement".

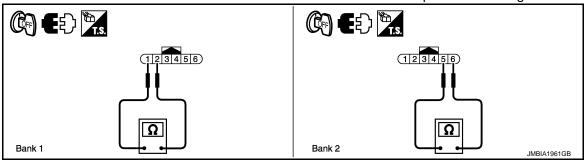
>> INSPECTION END

## Component Inspection

INFOID:0000000005353672

# 1.check throttle control motor

- Turn ignition switch OFF.
- 2. Disconnect electric throttle control actuator harness connector.
- Check resistance between electric throttle control actuator terminals as per the following.



Elect	tric throttle control actuator	Resistance
Bank	Terminals	Nesisiance
1	1 and 2	Approx. 1 - 15 Ω [at 25°C (77°F)]
2	5 and 6	Αρριοχ. 1 - 13 ω [at 25 C (77 F)]

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

# 2.replace electric throttle control actuator

**EC-477** Revision: 2009 June 2010 M35/M45

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# P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

< COMPONENT DIAGNOSIS >

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- 1. Replace malfunctioning electric throttle control actuator.
- 2. Go to EC-478, "Special Repair Requirement".

>> INSPECTION END

## Special Repair Requirement

INFOID:0000000005353673

# 1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

# 2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-27, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END

## P1236, P2118 THROTTLE CONTROL MOTOR

< COMPONENT DIAGNOSIS >

[VQ35HR]

## P1236, P2118 THROTTLE CONTROL MOTOR

Description INFOID:0000000005353674

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. The throttle position sensor provides feedback to the ECM, when opens/closes the throttle valve in response to driving conditions via the throttle control motor.

DTC Logic INFOID:0000000005353675

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1236	Throttle control motor (bank 2) circuit short	ECM detects short in both circuits between	Harness or connectors     (Throttle control motor circuit is shorted.)
P2118	Throttle control motor (bank 1) circuit short	ECM and throttle control motor.	Electric throttle control actuator (Throttle control motor)

## DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

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

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

>> GO TO 2.

# 2.perform dtc confirmation procedure

- Turn ignition switch ON and wait at least 2 seconds.
- Start engine and let it idle for 5 seconds. 2.
- 3. Check DTC.

#### Is DTC detected?

YES >> Go to EC-481, "Diagnosis Procedure".

NO >> INSPECTION END EC

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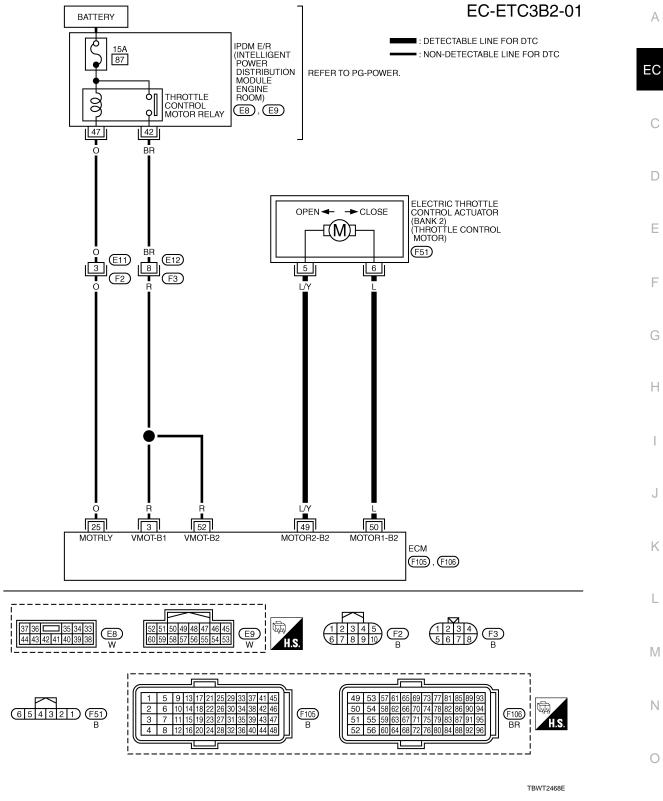
[VQ35HR]

< COMPONENT DIAGNOSIS > Wiring Diagram INFOID:0000000005353676 EC-ETC3B1-01 BATTERY IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) : DETECTABLE LINE FOR DTC 15A 87 : NON-DETECTABLE LINE FOR DTC REFER TO PG-POWER. THROTTLE CONTROL MOTOR RELAY E8, E9 ELECTRIC THROTTLE CONTROL ACTUATOR (BANK 1) (THROTTLE CONTROL MOTOR) **→** CLOSE (M)F31 2 25 3 52 4 MOTOR2-B1 MOTOR1-B1 ECM (F105), (F106) E8 W 654321 F31 (F106)

TBWT2467E

[VQ35HR]

INFOID:0000000005353677



# Diagnosis Procedure

# 1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connections M16, M70. Refer to <u>EC-158, "Ground Inspection"</u>.

#### Is the inspection result normal?

YES >> GO TO 2.

## P1236, P2118 THROTTLE CONTROL MOTOR

## < COMPONENT DIAGNOSIS >

[VQ35HR]

NO >> Repair or replace ground connections.

# 2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR 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.

DTC	Electri	c throttle cont	rol actuator	EC	CM	Continuity						
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity						
			5		49	Existed						
P1236	2	F51	3	F106	50	Not existed						
F 1230					2	131	2 131	6	6	1 100	49	Not existed
										0	O	
			1		2	Existed						
P2118	1 521	1 F31	F24		F105	4	Not existed					
FZ110	, , ,	131	2	1 103	2	Not existed						
			2		4	Existed						

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

## Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

## 3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-482, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 5.

## 4. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace harness or connectors.

# 5.replace electric throttle control actuator

- 1. Replace malfunctioning electric throttle control actuator.
- 2. Go to EC-483, "Special Repair Requirement".

#### >> INSPECTION END

# Component Inspection 1.CHECK THROTTLE CONTROL MOTOR

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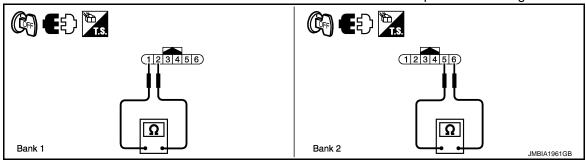
- 1. Turn ignition switch OFF.
- 2. Disconnect electric throttle control actuator harness connector.

## P1236, P2118 THROTTLE CONTROL MOTOR

< COMPONENT DIAGNOSIS >

[VQ35HR]

3. Check resistance between electric throttle control actuator terminals as per the following.



Elect	tric throttle control actuator	Resistance
Bank	Terminals	- Resistance
1	1 and 2	Approx. 1 - 15 Ω [at 25°C (77°F)]
2	5 and 6	Αμριολ. 1 - 13 \$2 [at 23 € (77 1 )]

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

# 2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace malfunctioning electric throttle control actuator.
- 2. Go to EC-483, "Special Repair Requirement".

>> INSPECTION END

## Special Repair Requirement

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

# 2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-27, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END

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## P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< COMPONENT DIAGNOSIS >

[VQ35HR]

## P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

**Description** 

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.

The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and sends the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and opens/closes the throttle valve in response to driving conditions via the throttle control motor.

DTC Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause	
Electric throttle control		A) Electric throttle control actuator does not function properly due to the return spring malfunction.			
P1238	actuator (bank 2)	B)	Throttle valve opening angle in fail-safe mode is not in specified range.		
		C)	ECM detect the throttle valve is stuck open.		
P2119 Electric throttle control actuator (bank 1)		A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	Electric throttle control actuator	
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.		
		C)	ECM detects that the throttle valve is stuck open.		

## DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

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

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

#### >> GO TO 2.

# 2.perform dtc confirmation procedure for malfunction a and b

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Shift selector lever position to D and wait at least 3 seconds.
- 3. Shift selector lever position to P.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON and wait at least 1 second.
- 6. Shift selector lever position to D and wait at least 3 seconds.
- 7. Shift selector lever position to P.
- 8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
- 9. Check DTC.

#### Is DTC detected?

YES >> Go to EC-485, "Diagnosis Procedure".

NO >> GO TO 3.

# 3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

- Turn ignition switch ON and wait at least 1 second.
- 2. Shift selector lever position to D and wait at least 3 seconds.

## P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

[VQ35HR] < COMPONENT DIAGNOSIS > Shift selector lever position to P.

Start engine and let it idle for 3 seconds.

Check DTC.

Is DTC detected?

YES >> Go to EC-485, "Diagnosis Procedure".

>> INSPECTION END NO

## Diagnosis Procedure

# 1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

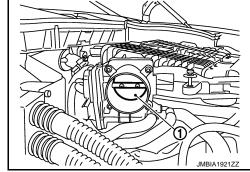
- Turn ignition switch OFF.
- Remove the intake air duct. 2.
- Check if foreign matter is caught between the throttle valve (1) and the housing.

#### Is the inspection result normal?

YES >> GO TO 2.

NO

>> Remove the foreign matter and clean the electric throttle control actuator inside.



# 2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- Replace malfunctioning electric throttle control actuator.
- Go to EC-485, "Special Repair Requirement".

>> INSPECTION END

# Special Repair Requirement

# ${f 1}$ . PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

# 2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-27, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END

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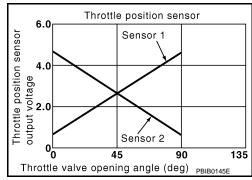
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## P1239, P2135 TP SENSOR

**Description** 

Electric throttle control actuator consists of throttle control motor, throttle position (TP) 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 P1239 or P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-445, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1239	Throttle position (TP) sensor (bank 2) circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1	Harness or connector     (TP sensor 1 and 2 circuit is open or shorted.)
P2135	Throttle position (TP) sensor (bank 1) circuit range/performance	and TP sensor 2.	Electric throttle control actuator (TP sensor 1 and 2)

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

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

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

## **TESTING CONDITION:**

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

>> GO TO 2.

## 2.PERFORM DTC CONFIRMATION PROCEDURE

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

## Is DTC detected?

YES >> Go to EC-488, "Diagnosis Procedure".

NO >> INSPECTION END

Wiring Diagram

INFOID:0000000005353686

## EC-TPS3B1-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

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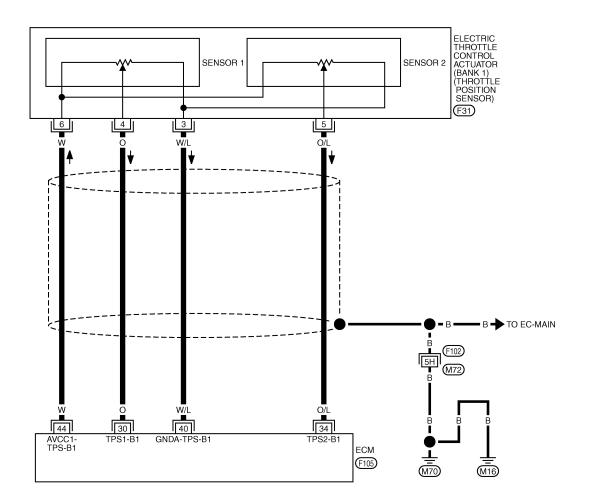
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REFER TO THE FOLLOWING.

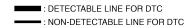
1	5	9	13	17	21	25	29	33	37	41	45
2	6	10	14	18	22	26	30	34	38	42	46
3	7	11	15	19	23	27	31	35	39	43	47
4	8	12	16	20	24	28	32	36	40	44	48

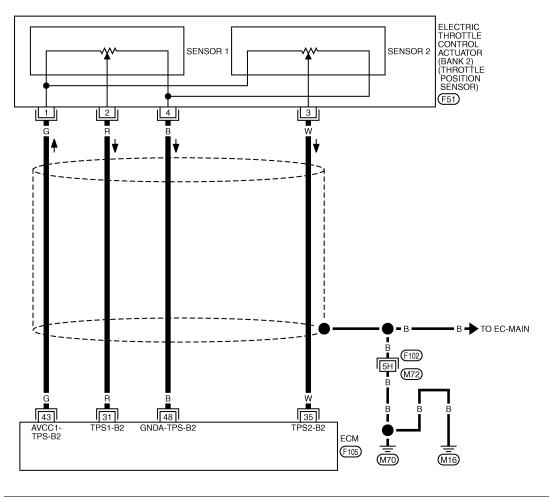
| H.S. | REFER TO THE FOLLOWING.

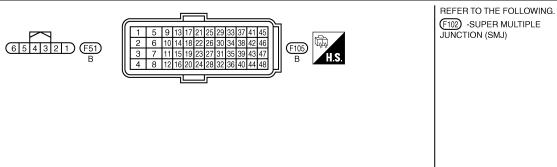
(F102) -SUPER MULTIPLE
JUNCTION (SMJ)

TBWT2471E

## EC-TPS3B2-01







TBWT2472E

## Diagnosis Procedure

#### INFOID:0000000005353687

# 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

## Is the inspection result normal?

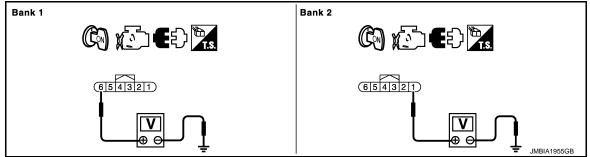
YES >> GO TO 2.

## < COMPONENT DIAGNOSIS >

NO >> Repair or replace ground connections.

# 2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

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



DTC	Electric throttle control actuator			Ground	\\altaga \\\\	
ыс	Bank	Connector	Terminal	Glound	Voltage (V)	
P1239	2	F51	1	Ground	Approx. 5	
P2135	1	F31	6	Ground	Αρρίοχ. 5	

## Is the inspection result normal?

YES >> GO TO 3.

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

# 3.check throttle position sensor ground circuit for open and short

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

DTC	Electric throttle control actuator				ECM		
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P1239	2	F51	4	E105	48	Existed	
P2135	1	F31	3	F105	40	Existed	

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

## Is the inspection result normal?

YES >> GO TO 4.

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

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

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

DTC	Electric throttle control actuator			ECM		Continuity	
DIO	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P1239	2	F51	2		31		
F1239		FOI		3	F105	35	Existed
P2135	1	E21	4	F105	30	Existed	
F2133	135 1 F31	5		34			

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

#### Is the inspection result normal?

YES >> GO TO 5.

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## < COMPONENT DIAGNOSIS >

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

## 5.check throttle position sensor

Refer to EC-490, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

## 6.replace electric throttle control actuator

- 1. Replace malfunctioning electric throttle control actuator.
- 2. EC-491, "Special Repair Requirement"

#### >> INSPECTION END

# 7. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

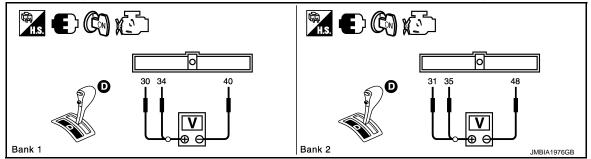
#### >> INSPECTION END

## Component Inspection

INFOID:0000000005353688

# 1. CHECK THROTTLE POSITION (TP) SENSOR

- Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set selector lever position to D.
- 6. Check the voltage between ECM harness connector terminals under the following conditions.



	ECM				
Connector	+	_	Condition	Voltage (V)	
Connector	Terminal	Terminal			
	30	40	Accelerator pedal: Fully released	More than 0.36	
[TP sensor 1 (bank 1)]		40	Accelerator pedal: Fully depressed	Less than 4.75	
	31	48	Accelerator pedal: Fully released	More than 0.36	
F105	[TP sensor 1 (bank 2)]	40	Accelerator pedal: Fully depressed	Less than 4.75	
1 103	34	40	Accelerator pedal: Fully released	Less than 4.75	
_	[TP sensor 2 (bank 1)]	40	Accelerator pedal: Fully depressed	More than 0.36	
	35	48	Accelerator pedal: Fully released	Less than 4.75	
	[TP sensor 2 (bank 2)]	40	Accelerator pedal: Fully depressed	More than 0.36	

## Is the inspection result normal?

YES >> INSPECTION END NO >> GO TO 2.

# 2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

## P1239, P2135 TP SENSOR

Refer to EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

< COMPONENT DIAGNOSIS >

[VQ35HR]

- 1. Replace malfunctioning electric throttle control actuator.
- 2. Go to EC-491, "Special Repair Requirement".

# >> INSPECTION END Special Repair Requirement

Refer to EC-27, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

EC INFOID:0000000005353689

## 1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

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>> GO TO 2.

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# 2. PERFORM IDLE AIR VOLUME LEARNING

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## P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< COMPONENT DIAGNOSIS >

[VQ35HR]

## P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

**Description** 

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

DTC Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1290	Throttle control motor relay circuit open (bank 2)	ECM detects a voltage of power source for	Harness or connectors     (Throttle control motor relay circuit is
P2100	Throttle control motor relay circuit open (bank 1)	throttle control motor is excessively low.	open)  Throttle control motor relay
P2103	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	Harness or connectors     (Throttle control motor relay circuit is shorted)     Throttle control motor relay

## DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 8 V.

## Which DTC is detected?

P1290, P2100>>GO TO 2.

P2103 >> GO TO 3.

## 2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1290 AND P2100

- 1. Turn ignition switch ON and wait at least 2 seconds.
- 2. Start engine and let it idle for 5 seconds.
- Check DTC.

#### Is DTC detected?

YES >> Go to EC-494, "Diagnosis Procedure".

NO >> INSPECTION END

# 3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

- 1. Turn ignition switch ON and wait at least 1 second.
- Check DTC.

#### Is DTC detected?

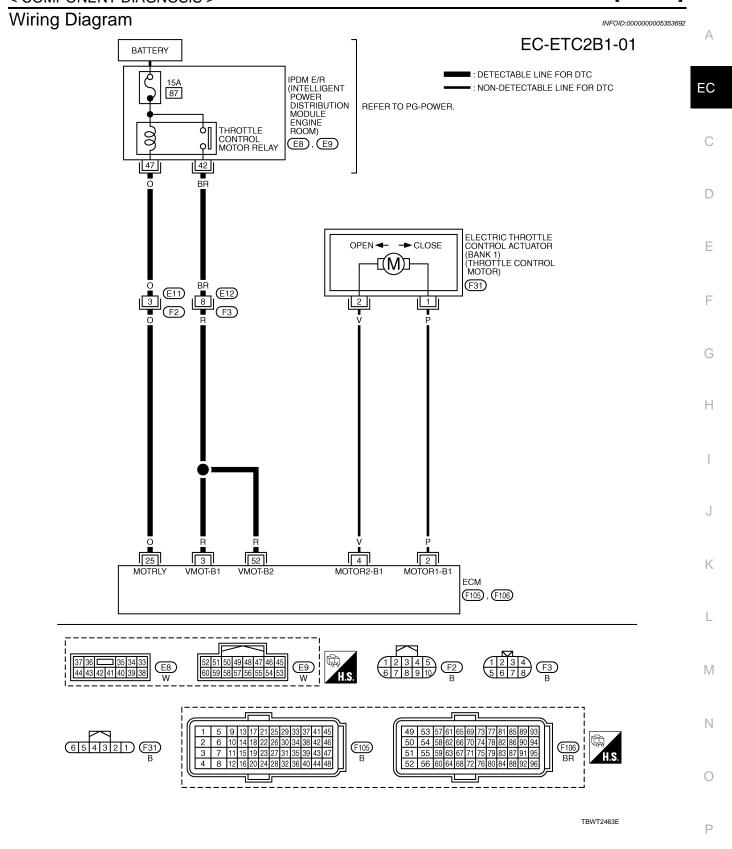
YES >> Go to EC-494, "Diagnosis Procedure".

NO >> INSPECTION END

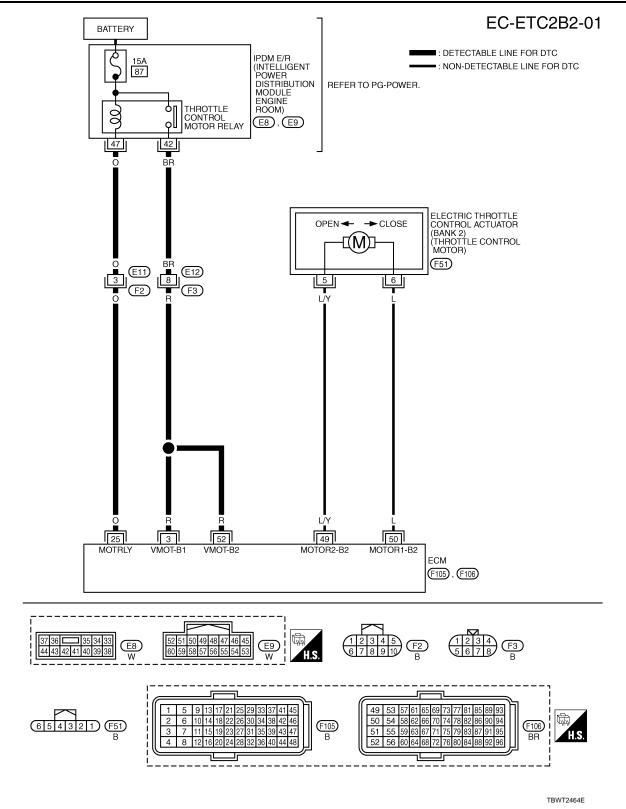
# P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< COMPONENT DIAGNOSIS >

[VQ35HR]



[VQ35HR]



## Diagnosis Procedure

INFOID:0000000005353693

# 1.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Disconnect IPDM E/R harness connector E9.
- 4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

# P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< COMPONENT DIAGNOSIS >

[VQ35HR]

IPDM	E/R	EC	CM	<b>.</b>	_	
Connector	Terminal	Connector	Terminal	Continuity		
E9	47	F105	25	Existed	_	=
. Also ch	neck harne	ess for sho	ort to groui	nd and sho	ort to power.	
-	ection resu		<u> </u>			
	> GO TO 3 > GO TO 2					
_	T MALFUI					
		NC HOMIN	IG PART			
heck the Harness	rollowing. connector	s F11 F2				
			tween ECI	M and IPD	DM E/R	
				_	short to power in harness or connectors.	
CHECK	THROTT	LE CONT	ROL MOT	OR RELA	AY INPUT SIGNAL CIRCUIT	
			ness conne		- London and Cold - Col	_
Check	tne contin	uity betwe	en IPDM	E/R senso	or harness connector and ECM harness connector.	
	IPDM	I F/R	F(	CM		
DTC	Connector	Terminal	Connector	Terminal	Continuity	
P1290			F106	52		
P2100			F105	3	-	
	E9	42	F105	3	_ Existed	
P2103			F106	52		
. Also ch	neck harne	ess for sho	ort to groui	nd and sho	port to power.	
the inspe	ection resu	ılt normal'	<u>}</u>			
_	GO TO 5					
	> GO TO 4		IO DADT			
	T MALFUI	NC HONIN	IG PART			
heck the	following. connector	s F12 F3				
		,	tween ECI	M and IPD	DM E/R	
-		pen circui	t, short to	ground or	short to power in harness or connectors.	
.CHECK	FUSE					
			87) from I	PDM E/R.		
	15 A fuse					
-	ection results GO TO 6		<u> </u>			
	Replace		•			
	INTERMI					
	C-154, "De					
· ·	ection resu					
YES >>	> Replace	IPDM E/F	- \.			
VO >>	Repair or	r replace l	narness or	connector	ors.	

## P1421 COLD START CONTROL

**Description** 

ECM controls ignition timing and engine idle speed when engine is started with pre-warming up condition. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

DTC Logic

#### DTC DETECTION LOGIC

#### NOTE:

• If DTC P1421 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1421	Cold start emission reduction strategy monitoring	ECM does not control ignition timing and engine idle speed properly when engine is started with pre-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 procedure before conducting the next test.

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

#### **TESTING CONDITION:**

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

>> GO TO 2.

## 2.PERFORM DTC CONFIRMATION PROCEDURE

#### (P)With CONSULT-III

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Select "DATA MONITOR" mode with CONSULT-III.
- Check the indication of "COOLAN TEMP/S".

If it is between 7°C (45°F) and 36°C (97°F), go to the following steps.

If it is below 7°C (45°F), warm engine up to more than 7°C (45°F) and retry from step 1.

If it is above 36°C (97°F), cool engine down to less than 36°C (97°F) and retry from step 1.

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

## With GST

Follow the procedure "With CONSULT-III" above.

## Is 1st trip DTC detected?

YES >> Go to EC-496, "Diagnosis Procedure".

NO >> INSPECTION END

## Diagnosis Procedure

INFOID:0000000005353696

## 1.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-27, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

#### Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 2.

NO >> Follow the instruction of Idle Air Volume Learning.

## 2.CHECK INTAKE SYSTEM

## P1421 COLD START CONTROL

P1421 COLD START CONTROL	
< COMPONENT DIAGNOSIS > [VQ35HR]	
Check for the cause of intake air volume lacking. Refer to the following.	Λ
<ul><li>Crushed intake air passage</li><li>Intake air passage clogging</li></ul>	Α
Is the inspection result normal?	
	EC
NO >> Repair or replace malfunctioning part	
3.CHECK FUEL INJECTION SYSTEM FUNCTION	C
Perform DTC Confirmation Procedure for DTC P0171, P0174. Refer to <u>EC-294, "DTC Logic"</u> .	
Is the inspection result normal?  YES >> GO TO 4.	
NO >> Go to EC-297, "Diagnosis Procedure" for DTC P0171, P0174.	D
4.PERFORM DTC CONFIRMATION PROCEDURE	
1. Turn ignition switch ON.	Е
2. Erase DTC.	
<ol> <li>Perform DTC Confirmation Procedure.</li> <li>See <u>EC-496</u>, "<u>DTC Logic</u>".</li> </ol>	_
Is the 1st trip DTC P1421 displayed again?	F
YES >> GO TO 5.	
NO >> INSPECTION END	G
5.REPLACE ECM	
<ol> <li>Replace ECM.</li> <li>Go to EC-25, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Special Repair Require-</li> </ol>	Н
ment".	
>> INSPECTION END	ı
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## P1550 BATTERY CURRENT SENSOR

Description INFOID:000000005353697

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to SC-21, "System Description".

#### **CAUTION:**

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then battery discharge may occur.

DTC Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1550	Battery current sensor circuit range/performance	The output voltage of the battery current sensor remains within the specified range while engine is running.	Harness or connectors     (Battery current sensor circuit is open or shorted.)     [Crankshaft position (CKP) sensor circuit is shorted.]     [Camshaft position (CMP) sensor (bank 2) circuit is shorted.]     [Exhaust valve timing (EVT) control position sensor (bank 2) circuit is shorted.]     [Accelerator pedal position (APP) sensor 2 circuit is shorted.]     (EVAP control system pressure sensor circuit is shorted.)     (Refrigerant pressure sensor circuit is shorted.)     Battery current sensor     CKP sensor     CMP sensor (bank 2)     EVT control position sensor (bank 2)     APP sensor     EVAP control system pressure sensor     Refrigerant pressure sensor

## DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

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

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

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

## 2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and wait at least 10 seconds.
- Check 1st trip DTC.

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#### Is 1st trip DTC detected?

>> Go to EC-499, "Diagnosis Procedure". YES

>> INSPECTION END NO

< COMPONENT DIAGNOSIS >

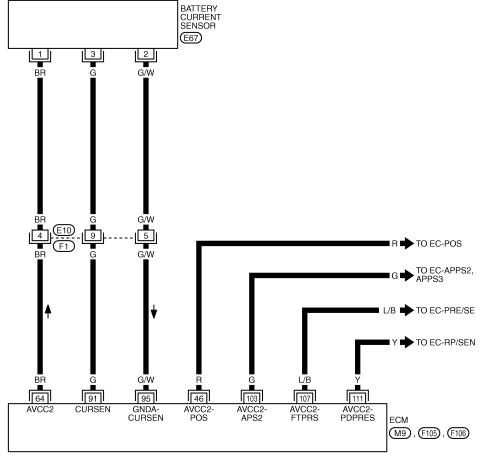
## Wiring Diagram

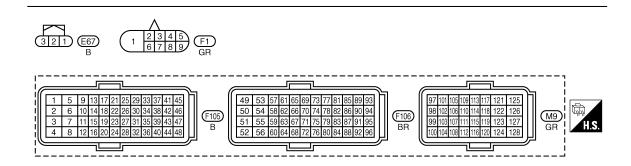
INFOID:0000000005353699 EC

#### EC-CUR/SE-01

■: DETECTABLE LINE FOR DTC : NON-DETECTABLE LINE FOR DTC

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TBWT2457E

Diagnosis Procedure

1. CHECK GROUND CONNECTION

**EC-499** Revision: 2009 June 2010 M35/M45

INFOID:0000000005353700

## P1550 BATTERY CURRENT SENSOR

#### P1000 BATTERT CURRENT SEN

Turn ignition switch OFF.

Check ground connections M16, M70. Refer to <u>EC-158, "Ground Inspection"</u>.

#### Is the inspection result normal?

< COMPONENT DIAGNOSIS >

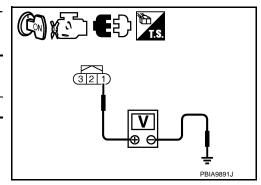
YES >> GO TO 2.

NO >> Repair or replace ground connections.

# 2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

- Disconnect battery current sensor harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between battery current sensor harness connector and ground.

Battery cui	rent sensor	Ground	Voltage (V)	
Connector	Terminal	Giodila		
E67	1	Ground	Approx. 5	



[VQ35HR]

## Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 3.

# ${f 3.}$ CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-II

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

Battery current sensor		EC	Continuity	
Connector	Terminal	Connector	Connector Terminal	
E67	1	F106	64	Existed

## Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

## 4. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E10, F1
- · Harness for open between battery current sensor and ECM

#### >> Repair open circuit.

## 5. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor				
Connector	Terminal	Name	Connector	Terminal		
F105	46	Crankshaft position (CKP) sensor	F52	1		
F106 64	Camshaft position (CMP) sensor (bank 2)	F32	1			
	Exhaust valve timing (EVT) control position sensor (bank 2)	F83	1			
	-	Battery current sensor	E67	1		

## P1550 BATTERY CURRENT SENSOR

## < COMPONENT DIAGNOSIS >

[VQ35HR]

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
M9	103	Accelerator position sensor (APP) sensor	E113	5
	107	EVAP control system pressure sensor	B172	3
	111	Refrigerant pressure sensor	E66	1
Is the insp	ection resu	ult normal?		

Α

YES >> GO TO 6.

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

## **6.**CHECK COMPONENTS

## Check the following.

- CKP sensor (Refer to <u>EC-345, "Component Inspection"</u>.)
- CMP sensor (bank 2) (Refer to <u>EC-352, "Component Inspection"</u>.)
- EVT control position sensor (bank 2) (Refer to EC-459, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-394, "Component Inspection".)
- Refrigerant pressure sensor (Refer to <u>ATC-80, "Magnet Clutch Circuit"</u>.)

#### Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning component.

#### .CHECK APP SENSOR

Refer to EC-561, "Component Inspection".

## Is the inspection result normal?

>> GO TO 14. YES

NO >> GO TO 8.

## 8.REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly.
- Go to EC-562, "Special Repair Requirement".

#### >> INSPECTION END

# 9.check battery current sensor ground circuit for open and short

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

Battery current sensor		ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
E67	2	F106	95	Existed	

Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 10.

## 10.DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E10, F1
- Harness for open or short between battery current sensor and ECM

## >> Repair open circuit, short to ground or short to power in harness or connectors.

# 11. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between battery current sensor harness connector and ECM harness connector.

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#### < COMPONENT DIAGNOSIS >

Battery current sensor		ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
E67	3	F106	91	Existed	

2. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 12.

# 12. DETECT MALFUNCTIONING PART

## Check the following.

- Harness connectors E10, F1
- Harness for open or short between battery current sensor and ECM
  - >> Repair open circuit, short to ground or short to power in harness or connectors.

# 13. CHECK BATTERY CURRENT SENSOR

Refer to EC-502, "Component Inspection".

## Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace battery negative cable assembly.

## 14. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

## Component Inspection

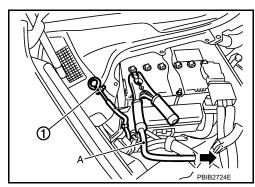
INFOID:0000000005353701

## 1. CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable (1).

#### To body ground

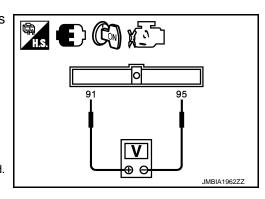
- 4. Install jumper cable (A) between battery negative terminal and body ground.
- 5. Turn ignition switch ON.



6. Check the voltage between ECM harness connector terminals under the following conditions.

Connector	+	_	Voltage (V)
	Terminal	Terminal	
F106 91 (Battery current sensor signature)		95	Approx. 2.5

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to <u>SC-4</u>, "How to Handle Battery".



## **P1550 BATTERY CURRENT SENSOR**

< COMPONENT DIAGNOSIS > [VQ35HR]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

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[VQ35HR]

## P1551, P1552 BATTERY CURRENT SENSOR

**Description** 

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to SC-21, "System Description".

#### **CAUTION:**

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then battery discharge may occur.

DTC Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause		
P1551	Battery current sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors     (Battery current sensor circuit is open		
P1552	Battery current sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	or shorted.) [Crankshaft position (CKP) sensor circuit is shorted.] [Camshaft position (CMP) sensor (bank 2) circuit is shorted.] [Exhaust valve timing (EVT) control position sensor (bank 2) circuit is shorted.] [Accelerator pedal position (APP) sensor 2 circuit is shorted.] (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.)  Battery current sensor  CKP sensor CMP sensor (bank 2) EVT control position sensor (bank 2) APP sensor EVAP control system pressure sensor Refrigerant pressure sensor		

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

## **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 8 V with ignition switch ON

>> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.

Revision: 2009 June **EC-504** 2010 M35/M45

< COMPONENT DIAGNOSIS > [VQ35HR]

2. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-506, "Diagnosis Procedure".

NO >> INSPECTION END

## Wiring Diagram

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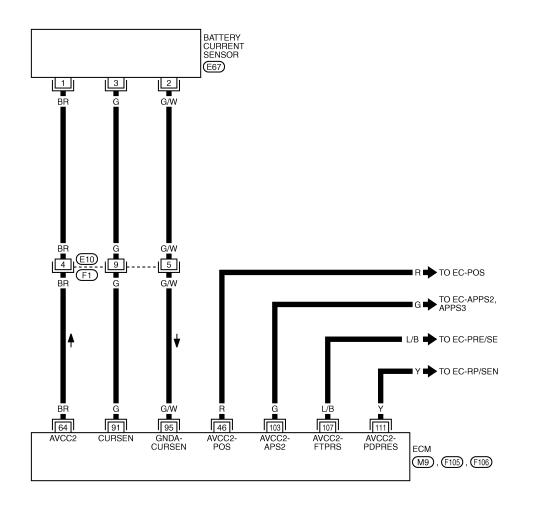
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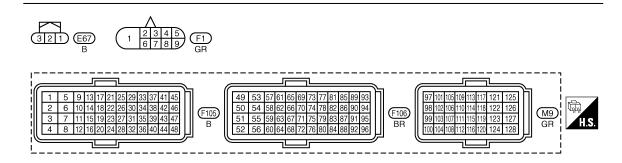
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### EC-CUR/SE-01

: DETECTABLE LINE FOR DTC : NON-DETECTABLE LINE FOR DTC





TBWT2457E

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

## **Diagnosis Procedure**

INFOID:0000000005353705

## 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

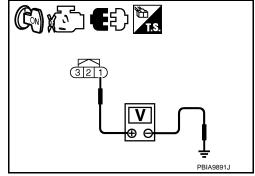
YES >> GO TO 2.

NO >> Repair or replace ground connections.

## 2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

- 1. Disconnect battery current sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between battery current sensor harness connector and ground.

Battery cui	Battery current sensor  Connector Terminal		Voltage (V)
Connector	Terminal	Ground	voltage (v)
E67	1	Ground	Approx. 5



#### Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 3.

## 3. Check battery current sensor power supply circuit-ii

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity	
Connector	Terminal	Connector Terminal		Continuity	
E67	1	F106	64	Existed	

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

## 4. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E10, F1
- Harness for open between battery current sensor and ECM

#### >> Repair open circuit.

## 5. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F105	46	Crankshaft position (CKP) sensor	F52	1

#### < COMPONENT DIAGNOSIS >

**[VQ35HR]** 

< COMPC	NENT DI	AGNOSIS >			[VQSSIR]
E	CM	Sensor			ı
Connector	Terminal	Name	Connector	Terminal	
		Camshaft position (CMP) sensor (bank 2)	F32	1	
F106	64	Exhaust valve timing (EVT) control position sensor (bank 2)	F83	1	
		Battery current sensor	E67	1	•
	103	Accelerator position sensor (APP) sensor	E113	5	
M9	107	EVAP control system pressure sensor	B172	3	
	111	Refrigerant pressure sensor	E66	1	
	•	short to ground or short to power in h	narness or co	nnectors.	
<ul> <li>CMP ser</li> </ul>	isor (Refei nsor (bank	r to <u>EC-345, "Component Inspection</u> 2) (Refer to <u>EC-352, "Component I</u> on sensor (bank 2) (Refer to <u>EC-459</u>	nspection".)	nt Inspection	o" )
EVAP co Refrigera	ontrol syste ant pressu	em pressure sensor (Refer to <u>EC-39</u> re sensor (Refer to <u>ATC-80, "Magneral")</u>	4, "Compone	ent Inspecti	⊥·/ <u>on"</u> .)
NO >	> GO TO > Replace ( APP SEI	malfunctioning component.			
Refer to E	C-561, "Co	omponent Inspection".			
		ult normal?			
	> GO TO 3				
8.repla	CE ACCE	LERATOR PEDAL ASSEMBLY			
		rator pedal assembly. Special Repair Requirement".			
_		TION END		ODEN AN	ID CLIODT
		Y CURRENT SENSOR GROUND C	JIKCUII FUF	COPEN AN	1D 2HOK I
4 T :.					

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery curr	Battery current sensor		ECM	
Connector	Terminal	Connector	Terminal	Continuity
E67	2	F106	95	Existed

4. Also check harness for short to ground and short to power.

### Is the inspection result normal?

YES >> GO TO 11. NO >> GO TO 10.

## 10. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E10, F1
- Harness for open or short between battery current sensor and ECM

**EC-507** Revision: 2009 June 2010 M35/M45

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#### < COMPONENT DIAGNOSIS >

[VQ35HR]

>> Repair open circuit, short to ground or short to power in harness or connectors.

## 11. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery curr	Battery current sensor		ECM	
Connector	Terminal	Connector Terminal		Continuity
E67	3	F106	91	Existed

2. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 12.

# 12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F1
- · Harness for open or short between battery current sensor and ECM

>> Repair open circuit, short to ground or short to power in harness or connectors.

## 13. CHECK BATTERY CURRENT SENSOR

Refer to EC-521, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace battery negative cable assembly.

14. CHECK INTERMITTENT INCIDENT

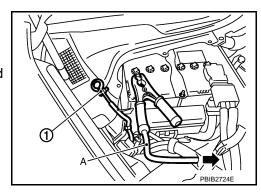
Refer to EC-154, "Description".

>> INSPECTION END

# Component Inspection

INFOID:0000000005353706

- CHECK BATTERY CURRENT SENSOR
   Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- Disconnect battery negative cable (1).
  - To body ground
- 4. Install jumper cable (A) between battery negative terminal and body ground.
- 5. Turn ignition switch ON.



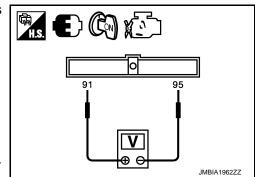
### < COMPONENT DIAGNOSIS >

[VQ35HR]

6. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM		
Connector + Terminal 91	+	_	Voltage (V)
	Terminal		
F106	91 (Battery current sensor signal)	95	Approx. 2.5

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to  $\underline{SC-4}$ , "How to Handle Battery".



#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

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## P1553 BATTERY CURRENT SENSOR

**Description** 

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to SC-21, "System Description".

#### **CAUTION:**

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then battery discharge may occur.

DTC Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1553	Battery current sensor performance	The signal voltage transmitted from the sensor to ECM is higher than the amount of the maximum power generation.	Harness or connectors     (Battery current sensor circuit is open or shorted.)     [Crankshaft position (CKP) sensor circuit is shorted.]     [Camshaft position (CMP) sensor (bank 2) circuit is shorted.]     [Exhaust valve timing (EVT) control position sensor (bank 2) circuit is shorted.]     [Accelerator pedal position (APP) sensor 2 circuit is shorted.]     (EVAP control system pressure sensor circuit is shorted.)     (Refrigerant pressure sensor circuit is shorted.)     Battery current sensor     CKP sensor     CMP sensor (bank 2)     EVT control position sensor (bank 2)     APP sensor     EVAP control system pressure sensor     Refrigerant pressure sensor

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

## 2.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and wait at least 10 seconds.
- 2. Check 1st trip DTC.

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#### Is 1st trip DTC detected?

>> Go to EC-511, "Diagnosis Procedure". YES

>> INSPECTION END NO

< COMPONENT DIAGNOSIS >

## Wiring Diagram

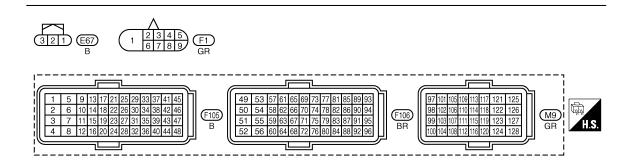
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#### EC-CUR/SE-01

■: DETECTABLE LINE FOR DTC : NON-DETECTABLE LINE FOR DTC

M9, F105, F106

BATTERY CURRENT SENSOR **E**67 3 G/W R 🗪 TO EC-POS TO EC-APPS2, APPS3 L/B TO EC-PRE/SE TO EC-RP/SEN 107 64 91 46 103 111 GNDA-CURSEN



TBWT2457E

Diagnosis Procedure

1. CHECK GROUND CONNECTION

**EC-511** Revision: 2009 June 2010 M35/M45

INFOID:0000000005353710

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### P1553 BATTERY CURRENT SENSOR

Turn ignition switch OFF.

< COMPONENT DIAGNOSIS >

Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

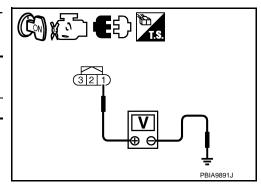
YES >> GO TO 2.

NO >> Repair or replace ground connections.

## 2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

- Disconnect battery current sensor harness connector.
- Turn ignition switch ON.
- 3. Check the voltage between battery current sensor harness connector and ground.

Battery cui	rent sensor	Ground	Voltage (V)
Connector	Terminal	Olouliu	voltage (v)
E67	1	Ground	Approx. 5



[VQ35HR]

#### Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 3.

## 3.check battery current sensor power supply circuit-ii

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery curr	Battery current sensor		ECM		
Connector	Terminal	Connector Terminal		Continuity	
E67	1	F106	64	Existed	

#### Is the inspection result normal?

YES >> GO TO 5.

>> GO TO 4. NO

### 4. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E10, F1
- · Harness for open between battery current sensor and ECM

>> Repair open circuit.

## ${f 5.}$ CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor			
Connector	Terminal	Name	Connector	Terminal	
F105	46	Crankshaft position (CKP) sensor	F52	1	
		Camshaft position (CMP) sensor (bank 2)	F32	1	
F106	64	Exhaust valve timing (EVT) control position sensor (bank 2)	F83	1	
		Battery current sensor	E67	1	

### P1553 BATTERY CURRENT SENSOR

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

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EC	M	Sensor				
Connector	Terminal	Name	Connector	Terminal		Α
	103	Accelerator position sensor (APP) sensor	E113	5		
M9	107	EVAP control system pressure sensor	B172	3		EC
	111	Refrigerant pressure sensor	E66	1		
YES >: NO >:	> GO TO 6 > Repair s	hort to ground or short to power in h	narness or co	nnectors.		С
Check the		NENTS				D
<ul><li>CMP ser</li><li>EVT con</li><li>EVAP co</li><li>Refrigera</li></ul>	isor (bank trol positio ntrol syste int pressu	r to <u>EC-345</u> , "Component Inspection 2) (Refer to <u>EC-352</u> , "Component In sensor (bank 2) (Refer to <u>EC-459</u> ) em pressure sensor (Refer to <u>EC-39</u> ) re sensor (Refer to <u>ATC-80</u> , "Magne oult normal?	nspection".) , "Componer 4, "Compone	ent Inspection".)		E F
	•	malfunctioning component.				G
Is the insperior	ection results  Output  Output	8.				Н
8.REPLA	CE ACCE	LERATOR PEDAL ASSEMBLY				
		ator pedal assembly. Special Repair Requirement".				.I

#### >> INSPECTION END

## $9.\mathsf{check}$ battery current sensor ground circuit for open and short

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery curr	Battery current sensor		ECM	
Connector	Terminal	Connector	Terminal	Continuity
E67	2	F106	95	Existed

Also check harness for short to ground and short to power.

### Is the inspection result normal?

YES >> GO TO 11. NO >> GO TO 10.

## 10. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E10, F1
- Harness for open or short between battery current sensor and ECM

>> Repair open circuit, short to ground or short to power in harness or connectors.

## 11. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between battery current sensor harness connector and ECM harness connector.

**EC-513** Revision: 2009 June 2010 M35/M45

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#### < COMPONENT DIAGNOSIS >

Battery curr	Battery current sensor		ECM	
Connector	Terminal	Connector	Terminal	Continuity
E67	3	F106	91	Existed

2. Also check harness for short to ground and short to power.

### Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 12.

## 12. DETECT MALFUNCTIONING PART

#### Check the following.

- · Harness connectors E10, F1
- Harness for open or short between battery current sensor and ECM
  - >> Repair open circuit, short to ground or short to power in harness or connectors.

## 13. CHECK BATTERY CURRENT SENSOR

Refer to EC-521, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace battery negative cable assembly.

## 14. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

## Component Inspection

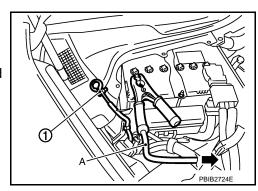
INFOID:0000000005353711

## 1. CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable (1).

#### To body ground

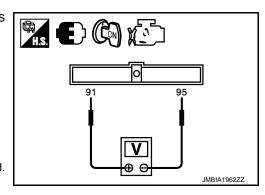
- 4. Install jumper cable (A) between battery negative terminal and body ground.
- 5. Turn ignition switch ON.



6. Check the voltage between ECM harness connector terminals under the following conditions.

Connector	+	_	Voltage (V)
Connector	Terminal	Terminal	
F106	91 (Battery current sensor signal)	95	Approx. 2.5

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to SC-4, "How to Handle Battery".



### **P1553 BATTERY CURRENT SENSOR**

< COMPONENT DIAGNOSIS > [VQ35HR]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

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Revision: 2009 June **EC-515** 2010 M35/M45

## P1554 BATTERY CURRENT SENSOR

Description INFOID:000000005353712

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to SC-21. "System Description".

#### **CAUTION:**

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then battery discharge may occur.

DTC Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1554	Battery current sensor performance	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.	Harness or connectors     (Battery current sensor circuit is open or shorted.)     [Crankshaft position (CKP) sensor circuit is shorted.]     [Camshaft position (CMP) sensor (bank 2) circuit is shorted.]     Exhaust valve timing (EVT) control position sensor (bank 2) circuit is shorted.]     [Accelerator pedal position (APP) sensor 2 circuit is shorted.]     (EVAP control system pressure sensor circuit is shorted.)     (Refrigerant pressure sensor circuit is shorted.)     Battery current sensor     CKP sensor     CMP sensor (bank 2)     EVT control position sensor (bank 2)     APP sensor     EVAP control system pressure sensor     Refrigerant pressure sensor

#### DTC CONFIRMATION PROCEDURE

## 1. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-516, "Component Function Check".

#### NOTE:

Use component function check to check the overall function of the battery current sensor circuit. During this check, a 1st trip DTC might not be confirmed.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-518, "Diagnosis Procedure".

## Component Function Check

INFOID:0000000005353714

## 1.PRECONDITIONING

#### **TESTING CONDITION:**

• Before performing the following procedure, confirm that battery voltage is more than 12.8 V at idle.

Revision: 2009 June **EC-516** 2010 M35/M45

### P1554 BATTERY CURRENT SENSOR

#### < COMPONENT DIAGNOSIS >

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 Before performing the following procedure, confirm that all load switches and A/C switch are turned OFF.

>> GO TO 2.

## 2.PERFORM COMPONENT FUNCTION CHECK

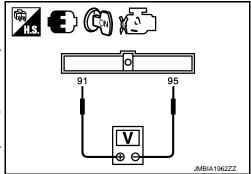
#### (P)With CONSULT-III

- 1. Start engine and let it idle.
- 2. Select "BAT CUR SEN" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "BAT CUR SEN" indication for 10 seconds.
  - "BAT CUR SEN" should be above 2,300 mV at least once.

#### **Without CONSULT-III**

- 1. Start engine and let it idle.
- 2. Check the voltage between ECM harness connector terminals as per the following.

	ECM		
Connector	+	_	Voltage (V)
Connector	Terminal	Terminal	
F106	91 (Battery current sensor signal)	95	Above 2.3 at least once



#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-518, "Diagnosis Procedure".

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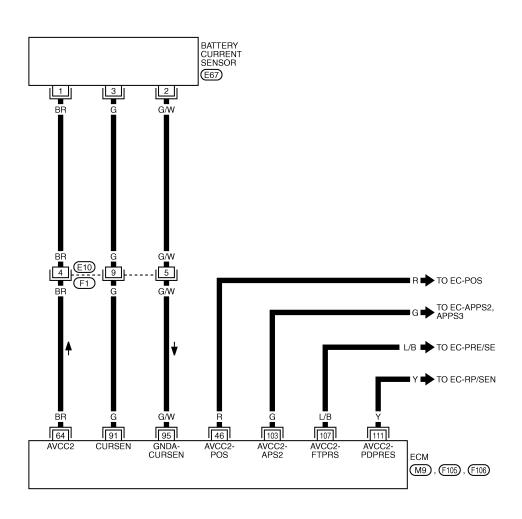
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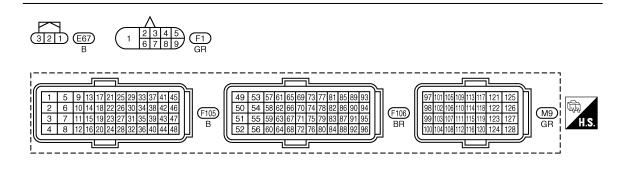
Wiring Diagram

INEO/D:0000000005252715

### EC-CUR/SE-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





TBWT2457E

## Diagnosis Procedure

INFOID:0000000005353716

## 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

Is the inspection result normal?

### P1554 BATTERY CURRENT SENSOR

## < COMPONENT DIAGNOSIS >

[VQ35HR]

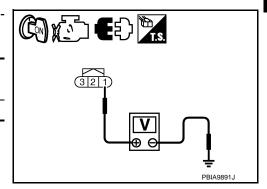
YES >> GO TO 2.

NO >> Repair or replace ground connections.

## $2.\mathsf{CHECK}$ BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

- 1. Disconnect battery current sensor harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between battery current sensor harness connector and ground.

Battery current sensor		Ground	Voltage (V)
Connector	Terminal	Olouliu	voltage (v)
E67	1	Ground	Approx. 5



Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 3.

## 3. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-II

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery curr	ent sensor	ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
E67	1	F106	64	Existed	

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

### 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F1
- Harness for open between battery current sensor and ECM

>> Repair open circuit.

## 5. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor			
Connector	Terminal	Name	Connector	Terminal	
F105	46	Crankshaft position (CKP) sensor	F52	1	
		Camshaft position (CMP) sensor (bank 2)	F32	1	
F106	64	Exhaust valve timing (EVT) control position sensor (bank 2)	F83	1	
		Battery current sensor	E67	1	
	103	Accelerator position sensor (APP) sensor	E113	5	
M9	107	EVAP control system pressure sensor	B172	3	
	111	Refrigerant pressure sensor	E66	1	

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#### < COMPONENT DIAGNOSIS >

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair short to ground or short to power in harness or connectors.

### 6.CHECK COMPONENTS

#### Check the following.

- CKP sensor (Refer to <u>EC-345, "Component Inspection"</u>.)
- CMP sensor (bank 2) (Refer to EC-352, "Component Inspection".)
- EVT control position sensor (bank 2) (Refer to EC-459, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-394, "Component Inspection".)
- Refrigerant pressure sensor (Refer to ATC-80, "Magnet Clutch Circuit".)

#### Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning component.

## 7. CHECK APP SENSOR

#### Refer to EC-561, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 8.

## 8. REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly.
- 2. Go to EC-562, "Special Repair Requirement".

#### >> INSPECTION END

## $9.\mathsf{CHECK}$ BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery curr	current sensor ECM		ECM	
Connector	Terminal	Connector	Terminal	Continuity
E67	2	F106	95	Existed

4. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 10.

## 10. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E10, F1
- · Harness for open or short between battery current sensor and ECM
  - >> Repair open circuit, short to ground or short to power in harness or connectors.

## 11. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery curr	Battery current sensor		CM	Continuity
Connector	Terminal	Connector Terminal		Continuity
E67	3	F106	91	Existed

2. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

### P1554 BATTERY CURRENT SENSOR

### < COMPONENT DIAGNOSIS >

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YES >> GO TO 13. NO >> GO TO 12.

# 12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F1
- Harness for open or short between battery current sensor and ECM

>> Repair open circuit, short to ground or short to power in harness or connectors.

## 13. CHECK BATTERY CURRENT SENSOR

Refer to EC-521, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace battery negative cable assembly.

## 14. CHECK INTERMITTENT INCIDENT

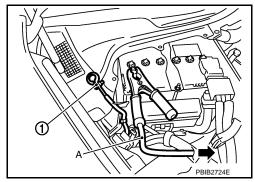
Refer to EC-154, "Description".

#### >> INSPECTION END

## Component Inspection

## 1. CHECK BATTERY CURRENT SENSOR

- Turn ignition switch OFF.
- Reconnect harness connectors disconnected. 2.
- Disconnect battery negative cable (1).
  - To body ground
- Install jumper cable (A) between battery negative terminal and body ground.
- Turn ignition switch ON.



6. Check the voltage between ECM harness connector terminals under the following conditions.

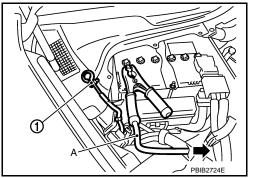
Connector	+	_	Voltage (V)
Connector	Terminal	Terminal	
F106	91 (Battery current sensor signal)	95	Approx. 2.5

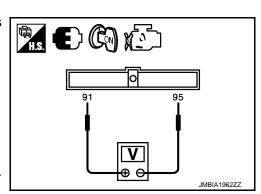
Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to SC-4, "How to Handle Battery".

#### Is the inspection result normal?

YES >> INSPECTION END

>> Replace battery negative cable assembly. NO





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**EC-521** Revision: 2009 June 2010 M35/M45

### P1564 ASCD STEERING SWITCH

Description INFOID:0000000005353718

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-68, "System Description" for the ASCD function.

DTC Logic

#### DTC DETECTION LOGIC

#### NOTE:

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-442, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1564	ASCD steering switch	<ul> <li>An excessively high voltage signal from the ASCD steering switch is sent to ECM.</li> <li>ECM detects that input signal from the ASCD steering switch is out of the specified range.</li> <li>ECM detects that the ASCD steering switch is stuck ON.</li> </ul>	<ul> <li>Harness or connectors (The switch circuit is open or shorted.)</li> <li>ASCD steering switch</li> <li>ECM</li> </ul>

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 10 seconds.
- 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-523, "Diagnosis Procedure".

NO >> INSPECTION END

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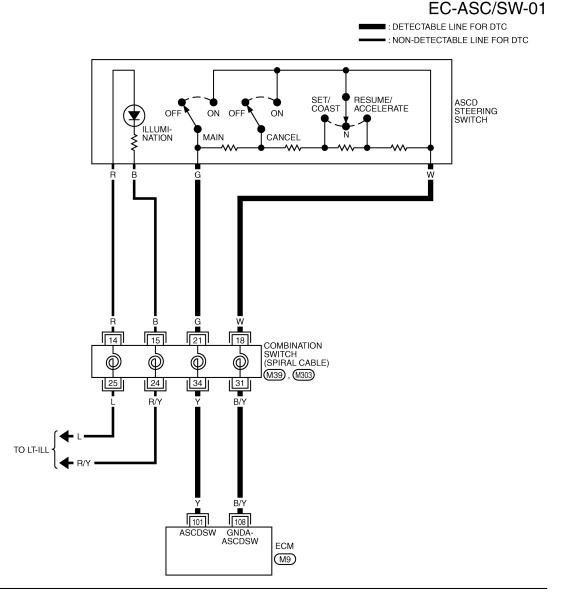
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\*: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT", PG SECTION.

TBWT2459E

INFOID:0000000005353721

## Diagnosis Procedure

## 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connections M16, M70. Refer to <u>EC-158, "Ground Inspection"</u>.

Is the inspection result normal?

Revision: 2009 June **EC-523** 2010 M35/M45

< COMPONENT DIAGNOSIS > [VQ35HR]

YES >> GO TO 2.

NO >> Repair or replace ground connections.

## 2. CHECK ASCD STEERING SWITCH CIRCUIT

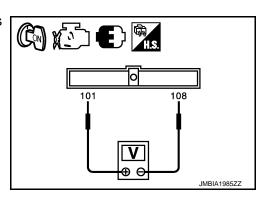
#### (P) With CONSULT-III

- 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	1	Indication
MAIN SW	MAIN switch	Pressed	ON
WAIN SW	WAIN SWILCH	Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
CANCEL SW	CANCEL SWILLI	Released	OFF
RESUME/ACC SW	RESUME/ACCEL-	Pressed	ON
RESONIE/ACC SW	ERATE switch	Released	OFF
SET SW	SET/COAST switch	Pressed	ON
SET SW	SET/COAST SWILCT	Released	OFF

### **⊗** Without CONSULT-III

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals under the following conditions.



	ECM			
Connector	+	_	Condition	Voltage (V)
Connector	Terminal	Terminal		
			MAIN switch: Pressed	Approx. 0
			CANCEL switch: Pressed	Approx. 1
M9	101 (ASCD steering switch signal)	108	SET/COAST switch: Pressed	Approx. 2
	( idea also in g a man alginal)		RESUME/ACCELERATE switch: Pressed	Approx. 3
			All ASCD steering switches: Released	Approx. 4

#### Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

## 3.check ascd steering switch ground circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Disconnect combination switch (spiral cable) harness connector.
- Check the continuity between combination switch (spiral cable) harness connector and ECM harness connector.

## < COMPONENT DIAGNOSIS >

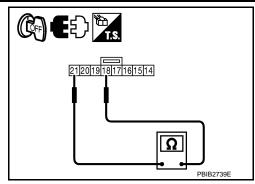
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	witch (spiral cable			Continuity
Connector	Terminal	Connecto		
M303	18	M9	108	Existed
	k harness for s on result norma	•	ina ana si	mort to power.
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	O TO 4.			
DETECT M	ALFUNCTION	ING PART		
heck the follo				
	switch (spiral		CM and o	combination switch (spiral cable)
1 14111655 101 (	ppen and shor	i beiween L	.Civi ariu (	combination switch (spiral cable)
>> Re	pair open circ	uit, short to	ground o	or short to power in harness or connectors.
			•	IGNAL CIRCUIT FOR OPEN AND SHORT
				vitch (spiral cable) harness connector and ECM harness con-
nector.				(
	ı			
Combination swi		ECN		Continuity
Connector	Terminal	Connector	Terminal	
M303	21	M9	101	Existed
	charness for s	•	ind and sh	nort to power.
•	on result norma O TO 7.	<u> </u>		
	O TO 6.			
DETECT M.	ALFUNCTION	ING PART		
heck the follo	wing.			
Combination	switch (spiral		OM 1	and in the could be formal and by
Harness for o	open and snor	t between E	CIM and C	combination switch (spiral cable)
>> Re	epair open circ	uit. short to	around o	or short to power in harness or connectors.
	CD STEERING		ground of	
	25, "Componer		n"	
	on result norma		<u></u> .	
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	place ASCD s	_	tch.	
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efer to EC-15	4, "Description	<u>ı"</u> .		
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	SPECTION EN			
•	Inspection			INFOID:0000000005353722
	CD STEERING			
	on switch OFF.		al cable) I	harness connector.
PISCOLLIEC	t combination	Switch (Shii	ai cabie) i	namess connector.

### < COMPONENT DIAGNOSIS >

[VQ35HR]

Check resistance between combination switch (spiral cable) harness connector terminals under the following conditions.



Combination sw	itch (spiral cable)	Condition	Resistance (Ω)	
Connector	Terminals	Condition	Resistance (22)	
		MAIN switch: Pressed	Approx. 0	
		CANCEL switch: Pressed	Approx. 250	
M303	18 and 21	SET/COAST switch: Pressed	Approx. 660	
		RESUME/ACCELERATE switch: Pressed	Approx. 1,490	
		All ASCD steering switches: Released	Approx. 3,980	

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch

< COMPONENT DIAGNOSIS >

[VQ35HR]

### P1564 ICC STEERING SWITCH

Description INFOID:0000000005353723

ICC steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.

Refer to ACS-9 for the ICC function.

**DTC Logic** INFOID:0000000005353724

#### DTC DETECTION LOGIC

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-442, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1564	ICC steering switch	<ul> <li>An excessively high voltage signal from the ICC steering switch is sent to ECM.</li> <li>ECM detects that input signal from the ICC steering switch is out of the specified range.</li> <li>ECM detects that the ICC steering switch is stuck ON.</li> </ul>	Harness or connectors     (The switch circuit is open or shorted.)     ICC steering switch     ECM

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

## 2.perform dtc confirmation procedure

- Turn ignition switch ON and wait at least 10 seconds.
- Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds. 2.
- Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds. 3.
- Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press DISTANCE switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press LDP switch for at least 10 seconds, then release it at wait at least 10 seconds.
- 8. Check DTC.

#### Is DTC detected?

>> Go to EC-528, "Diagnosis Procedure". YES

>> INSPECTION END NO

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**EC-527** Revision: 2009 June 2010 M35/M45

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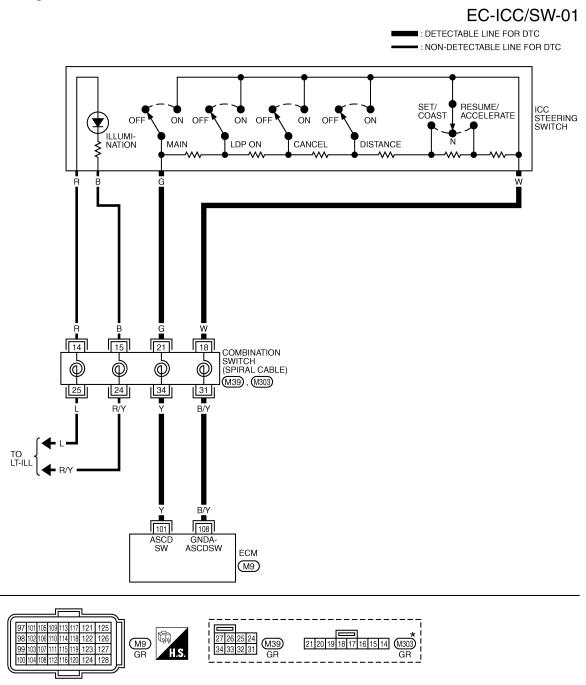
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Wiring Diagram

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\*: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT", PG SECTION.

TBWT2458E

## Diagnosis Procedure

INFOID:0000000005353726

# 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

Is the inspection result normal?

Revision: 2009 June **EC-528** 2010 M35/M45

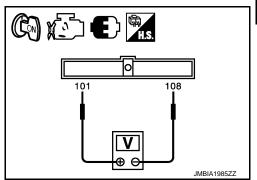
# < COMPONENT DIAGNOSIS >

YES >> GO TO 2.

NO >> Repair or replace ground connections.

## 2.check icc steering switch circuit

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals under the following conditions.



	ECM			
Connector	+	_	Condition	Voltage (V)
Connector	Terminal	Terminal		
M9 (ICC steering switch signal)		MAIN switch: Pressed	Approx. 0	
	signal) 108	LDP switch: Pressed	Approx. 0.8	
		CANCEL switch: Pressed	Approx. 1.6	
		DISTANCE switch: Pressed	Approx. 2.2	
		SET/COAST switch: Pressed	Approx. 2.9	
			RESUME/ACCELERATE switch: Pressed	Approx. 3.4
			All ICC steering switches: Released	Approx. 4.0

#### Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

## 3.check icc steering switch ground circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Disconnect combination switch (spiral cable) harness connector.
- Check the continuity between combination switch (spiral cable) harness connector and ECM harness connector.

Combination sw	EC	CM	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
M303	18	M9	108	Existed

5. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

### 4. DETECT MALFUNCTIONING PART

#### Check the following.

- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch (spiral cable)

>> Repair open circuit, short to ground or short to power in harness or connectors.

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### < COMPONENT DIAGNOSIS >

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## 5. CHECK ICC STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check the continuity between combination (spiral cable) harness connector switch and ECM harness connector.

Combination sw	EC	CM	Continuity	
Connector Terminal		Connector	Terminal	Continuity
M303	21	M9	101	Existed

2. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

## 6. DETECT MALFUNCTIONING PART

Check the following.

- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch (spiral cable)

>> Repair open circuit, short to ground or short to power in harness or connectors.

## 7.CHECK ICC STEERING SWITCH

Refer to EC-530, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace ICC steering switch.

### 8. CHECK INTERMITTENT INCIDENT

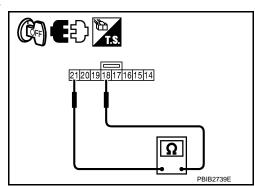
Refer to EC-154, "Description".

>> INSPECTION END

## Component Inspection

INFOID:0000000005353727

- 1. CHECK ICC STEERING SWITCH
- Turn ignition switch OFF.
- 2. Disconnect combination switch (spiral cable) harness connector.
- Check resistance between combination switch (spiral cable) harness connector terminals under the following conditions.



### < COMPONENT DIAGNOSIS >

[VQ35HR]

Combination switch (spiral cable)		Condition	Pagistanes (O)	
Connector	Terminals	Condition	Resistance (Ω)	
		MAIN switch: Pressed	Approx. 0	
		LDP switch: Pressed	Approx. 270	
		CANCEL switch: Pressed	Approx. 620	
M303	18 and 21	DISTANCE switch: Pressed	Approx. 1,100	
		SET/COAST switch: Pressed	Approx. 1,810	
		RESUME/ACCELERATE switch: Pressed	Approx. 2,990	
		All ICC steering switches: Released	Approx. 5,420	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC steering switch

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### P1568 ICC FUNCTION

DTC Logic

#### DTC DETECTION LOGIC

#### NOTE:

- If DTC P1568 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1568 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-442</u>, "<u>DTC Logic"</u>.
- If DTC P1568 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-444</u>, "<u>DTC Logic</u>".

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1568	ICC function	ECM detects a difference between signals from ICC sensor integrated unit is out of specified range.	Harness or connectors     (The CAN communication line is open or shorted.)     ICC sensor integrated unit     ECM

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Step 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

>> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Press MAIN switch on ICC steering switch.
- 3. Drive the vehicle at more than 40 km/h (25 MPH).

#### **CAUTION:**

Always drive vehicle at a safe speed.

- 4. Press SET/COAST switch.
- 5. Check DTC.

#### Is DTC detected?

YES >> Go to EC-532, "Diagnosis Procedure".

NO >> INSPECTION END

## Diagnosis Procedure

INFOID:0000000005353729

## 1. REPLACE ICC SENSOR INTEGRATED UNIT

- 1. Replace ICC sensor integrated unit.
- Perform ACS-14, "ICC System Running Test".
- Check DTC of ICC sensor integrated unit. Refer to ACS-40, "Diagnostic Trouble Code (DTC) Chart".

>> INSPECTION END

### P1572 ASCD BRAKE SWITCH

Description INFOID:0000000005353730

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by those two types of input (ON/OFF signal).

Refer to EC-68, "System Description" for the ASCD function.

DTC Logic INFOID:0000000005353731

#### DTC DETECTION LOGIC

 If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-442, "DTC Logic".

 This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch is turned OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
		A)	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to the ECM at the same time.	Harness or connectors     (The stop lamp switch circuit is shorted.)     Harness or connectors     (The ASCD brake switch circuit is shorted.)
P1572	ASCD brake switch	B)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is being driven.	<ul> <li>Stop lamp switch</li> <li>ASCD brake switch</li> <li>Incorrect stop lamp switch installation</li> <li>Incorrect ASCD brake switch installation</li> <li>ECM</li> </ul>

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### NOTE:

The procedure for malfunction B is not described. It takes an extremely long time to complete the procedure for malfunction B. By performing the procedure for malfunction A, the condition that causes malfunction B can be detected.

>> GO TO 2.

## 2.PERFORM DTC CONFIRMATION PROCEDURE-I

#### (P)With CONSULT-III

- <u>ĭ.</u> Start engine (VDC switch OFF).
- Select "DATA MONITOR" mode with CONSULT-III.
- Press MAIN switch and make sure that CRUISE lamp illuminates.
- 4. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

#### **CAUTION:**

Always drive vehicle at a safe speed.

#### NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position

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### P1572 ASCD BRAKE SWITCH

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

Check 1st trip DTC.

#### **With GST**

Follow the procedure "With CONSULT-III" above.

#### Is 1st trip DTC detected?

YES >> Go to EC-535, "Diagnosis Procedure".

NO >> GO TO 3.

## 3. PERFORM DTC CONFIRMATION PROCEDURE-II

#### (P)With CONSULT-III

1. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

#### **CAUTION:**

Always drive vehicle at a safe speed.

#### NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than 5 seconds so as not to come off from the above-mentioned vehicle speed.

#### 2. Check 1st trip DTC.

#### **With GST**

Follow the procedure "With CONSULT-III" above.

#### Is 1st trip DTC detected?

YES >> Go to EC-535, "Diagnosis Procedure".

NO >> INSPECTION END

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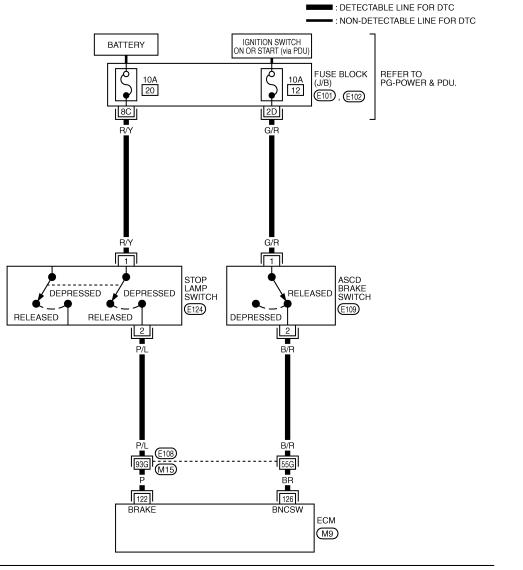
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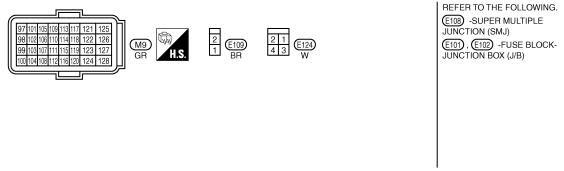
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Diagnosis Procedure

1. CHECK OVERALL FUNCTION-I

## (II) With CONSULT-III

1. Turn ignition switch ON.

2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.

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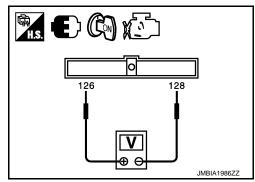
INFOID:0000000005353733

3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition		Indication
BDAKE SW/1	Braka padal	Slightly depressed	OFF
BRAKE SW1 Brake pedal		Fully released	ON

#### **⋈** Without CONSULT-III

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals as per the following.



ECM					
Connector	Connector + -		Condition		Voltage (V)
Connector	Terminal	Terminal			
M9	126	128	Brake pedal	Slightly depressed	Approx. 0
IVIÐ	(ASCD brake switch signal)	120	brake pedar	Fully released	Battery voltage

#### Is the inspection result normal?

YES >> GO TO 2. NO >> GO TO 3.

## 2. CHECK OVERALL FUNCTION-II

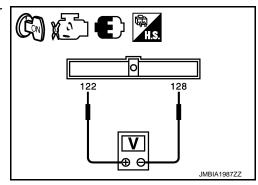
### (P) With CONSULT-III

Select "BRAKE SW2" and check indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW2 Brake pe	Brako podal	Slightly depressed	ON
	brake pedar	Fully released	OFF

### **(X)** Without CONSULT-III

Check the voltage between ECM harness connector terminals under the following conditions.



#### < COMPONENT DIAGNOSIS >

ECM					
Connector	+	_	Condition		Voltage (V)
Connector	Terminal	Terminal			
M9	122	128	Brake pedal Slightly depressed		Battery voltage
IVI9	(Stop lamp switch signal)	120	Drake pedal	Fully released	Approx. 0

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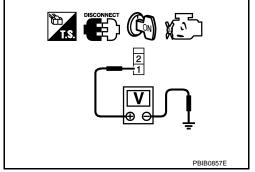
Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 8.

 ${f 3.}$ CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect ASCD brake switch harness connector.
- Turn ignition switch ON.
- Check the voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage	
Connector	Terminal	Giodila	voltage	
E109	1	Ground	Battery voltage	



Is the inspection result normal?

YES >> GO TO 5. NO >> GO TO 4.

## 4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E102
- 10 A fuse (No. 12)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit, short to ground or short to power in harness or connectors.

## ${f 5.}$ CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E109	2	M9	126	Existed

4. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

## **O.**DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and ASCD brake switch

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>> Repair open circuit, short to ground or short to power in harness or connectors.

## 7. CHECK ASCD BRAKE SWITCH

Refer to EC-539, "Component Inspection (ASCD Brake Switch)"

#### Is the inspection result normal?

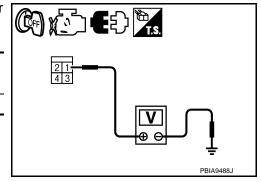
YES >> GO TO 13.

NO >> Replace ASCD brake switch.

## 8.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- 3. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage	
Connector	Terminal	Ground	vollago	
E124	1	Ground	Battery voltage	



#### Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

## 9. DETECT MALFUNCTIONING PART

#### Check the following.

- Fuse block (J/B) connector E101
- 10 A fuse (No. 20)
- Harness for open or short between stop lamp switch and battery
  - >> Repair open circuit, short to ground or short to power in harness or connectors.

## 10.check stop Lamp switch input signal circuit for open and short

- Disconnect ECM harness connector.
- 2. Check the continuity between stop lamp switch harness connector and ECM harness connector.

Stop lamp switch		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
E124	2	M9	122	Existed

3. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E108, M15
- · Harness for open or short between ECM and stop lamp switch

>> Repair open circuit, short to ground or short to power in harness or connectors.

## 12. CHECK STOP LAMP SWITCH

Refer to EC-539, "Component Inspection (Stop Lamp Switch)".

#### P1572 ASCD BRAKE SWITCH

#### [VQ35HR] < COMPONENT DIAGNOSIS > Is the inspection result normal? Α YES >> GO TO 13. NO >> Replace stop lamp switch. 13. CHECK INTERMITTENT INCIDENT EC Refer to EC-154, "Description". >> INSPECTION END Component Inspection (ASCD Brake Switch) INFOID:0000000005353734 1.CHECK ASCD BRAKE SWITCH-I D Turn ignition switch OFF. Disconnect ASCD brake switch harness connector. 2. Check the continuity between ASCD brake switch terminals under the following conditions. Terminals Condition Continuity Fully released Existed 1 and 2 Brake pedal Slightly depressed Not existed Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 2. 2.CHECK ASCD BRAKE SWITCH-II Н Adjust ASCD brake switch installation. Refer to BR-6, "Inspection and Adjustment". Check the continuity between ASCD brake switch terminals under the following conditions. Terminals Condition Continuity Fully released Existed 1 and 2 Brake pedal Slightly depressed Not existed Is the inspection result normal? YES >> INSPECTION END NO >> Replace ASCD brake switch. Component Inspection (Stop Lamp Switch) INFOID:0000000005353735 1.CHECK STOP LAMP SWITCH-I Turn ignition switch OFF. M Disconnect stop lamp switch harness connector. Check the continuity between stop lamp switch terminals under the following conditions. N **Terminals** Condition Continuity Fully released Not existed 1 and 2 Brake pedal Slightly depressed Existed Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 2. 2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-6, "Inspection and Adjustment".

Check the continuity between stop lamp switch terminals under the following conditions.

### P1572 ASCD BRAKE SWITCH

< COMPONENT DIAGNOSIS >

[VQ35HR]

Terminals	Condition		Continuity
1 and 2 Brake pedal	Fully released	Not existed	
i aliu z	втаке редаг	Slightly depressed	Existed

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch.

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## P1572 ICC BRAKE SWITCH

**Description** 

When the brake pedal is depressed, ICC brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by those two types of input (ON/OFF signal). Refer to ACS-9 for the ICC function.

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DTC Logic

### DTC DETECTION LOGIC

#### NOTE:

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-442, "DTC Logic".
- This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed.
   1st trip DTC is erased when ignition switch is turned OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
		A)	ON signals from the stop lamp switch and the ICC brake switch are sent to ECM at the same time.	Harness or connectors     (The stop lamp switch circuit is shorted.)     Harness or connectors
P1572	ICC brake switch	В)	ICC brake switch signal is not sent to ECM for extremely long time while the vehicle is being driven	<ul> <li>(The ICC brake switch circuit is shorted.)</li> <li>Stop lamp switch</li> <li>ICC brake switch</li> <li>ICC brake hold relay</li> <li>Incorrect stop lamp switch installation</li> <li>Incorrect ICC brake switch installation</li> <li>ECM</li> </ul>

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

#### NOTE:

The procedure for malfunction B is not described. It takes an extremely long time to complete the procedure for malfunction B. By performing the procedure for malfunction A, the condition that causes malfunction B can be detected.

>> GO TO 2.

## 2.PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Start engine (VDC switch OFF).
- Press MAIN switch and make sure that CRUISE lamp illuminates.
- 3. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

#### **CAUTION:**

Always drive vehicle at a safe speed.

#### NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position

4. Check 1st trip DTC.

### P1572 ICC BRAKE SWITCH

< COMPONENT DIAGNOSIS >

[VQ35HR]

## Is 1st trip DTC detected?

YES >> Go to EC-543, "Diagnosis Procedure".

NO >> GO TO 3.

# 3.perform dtc confirmation procedure-ii

1. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

#### **CAUTION:**

Always drive vehicle at a safe speed.

NOTÉ:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than 5 seconds so as not to come off from the above-mentioned vehicle speed.

2. Check 1st trip DTC.

### Is 1st trip DTC detected?

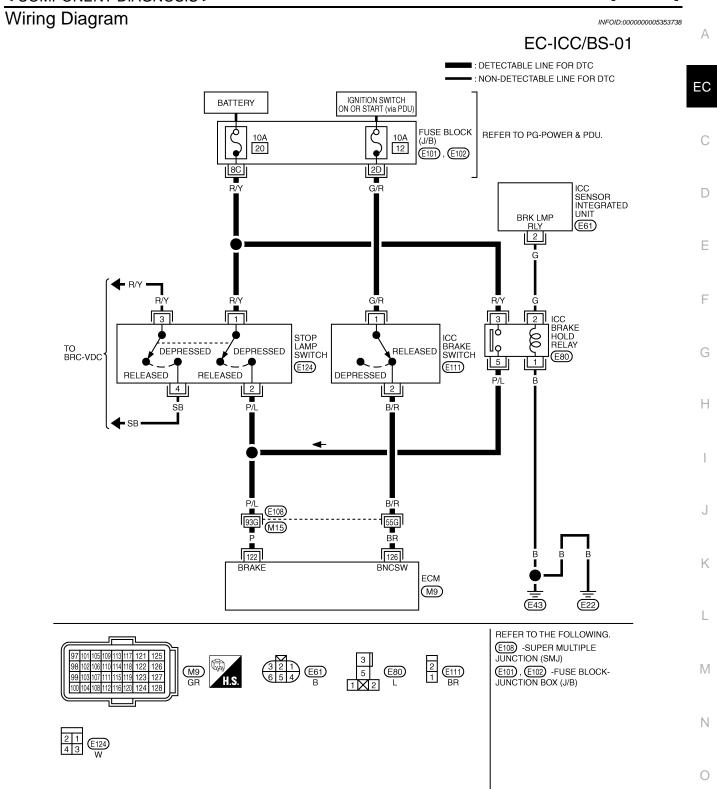
YES >> Go to EC-543, "Diagnosis Procedure".

NO >> INSPECTION END

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## Diagnosis Procedure

## 1. CHECK OVERALL FUNCTION-I

## (II) With CONSULT-III

1. Turn ignition switch ON.

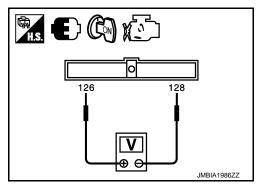
2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.

3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition	Indication	
BRAKE SW1	Brake pedal	Slightly depressed	OFF
BRARE SWI	Blake pedal	Fully released	ON

### **⋈** Without CONSULT-III

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals under the following conditions.



	ECM				
Connector	+	_	Condition		Voltage (V)
Connector	Terminal	Terminal			
M9	126	128	Brake pedal	Slightly depressed	Approx. 0
IVI9	(ICC brake switch signal)		Біаке рецаі	Fully released	Battery voltage

#### Is the inspection result normal?

YES >> GO TO 2. NO >> GO TO 3.

## 2. CHECK OVERALL FUNCTION-II

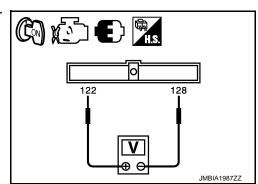
### (P) With CONSULT-III

Select "BRAKE SW2" and check indication under the following conditions.

Monitor item	Monitor item Condition		
BRAKE SW2	Brake pedal	Slightly depressed	ON
DIVARE OWZ	brake pedar	Fully released	OFF

### **⊗** Without CONSULT-III

Check the voltage between ECM harness connector terminals under the following conditions.



	ECM				
Connector	+	_	Condition Vo		Voltage (V)
Connector	Terminal	Terminal			
M9	122	128	Brake pedal	Slightly depressed	Battery voltage
IVIS	(Stop lamp switch signal)	120	brake pedar	Fully released	Approx. 0

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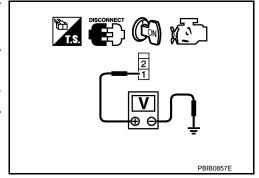
#### Is the inspection result normal?

YES >> GO TO 15. NO >> GO TO 8.

## 3. CHECK ICC BRAKE SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ICC brake switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ICC brake switch harness connector and ground.

ICC brak	e switch	Ground	Voltage	
Connector	Terminal	Giodila		
E111	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 E102
- 10 A fuse (No. 12)
- · Harness for open or short between ICC brake hold relay switch and fuse

>> Repair open circuit, short to ground or short to power in harness or connectors.

## ${f 5.}$ CHECK ICC BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between ICC brake switch harness connector and ECM harness connector.

ICC brak	e switch	EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E111	2	M9	126	Existed

4. Also check harness for short to ground and short to power.

### Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

## **6.** DETECT MALFUNCTIONING PART

#### Check the following.

Harness connectors E108, M15

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- · Harness for open or short between ICC brake switch and ECM
  - >> Repair open circuit, short to ground or short to power in harness or connectors.

## 7. CHECK ICC BRAKE SWITCH

Refer to EC-547, "Component Inspection (ICC Brake Switch)".

### Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace ICC brake switch.

## 8.check dtc with icc sensor integrated unit

Refer to ACS-40, "Diagnostic Trouble Code (DTC) Chart".

#### Is the inspection result normal?

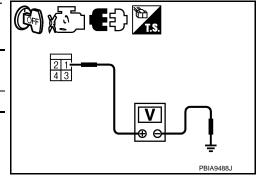
YES >> GO TO 9.

NO >> Repair or replace.

## 9. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

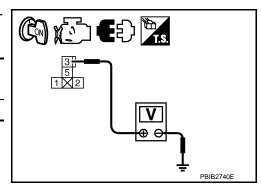
- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- 3. Disconnect ICC brake hold relay.
- 4. Check the voltage between stop lamp switch harness connector and ground.

Stop lam	p switch	Ground	Voltage	
Connector	Terminal	Giodila		
E124	1	Ground	Battery voltage	



Check the voltage between ICC brake hold relay harness connector and ground.

ICC brake	hold relay	Ground	Voltage	
Connector	Terminal			
E80	3	Ground	Battery voltage	



#### Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 10.

## 10. DETECT MALFUNCTIONING PART

#### Check the following.

- Fuse block (J/B) connector E101
- 10 A fuse (No. 20)
- Harness for open or short between battery and stop lamp switch
- Harness for open or short between battery and ICC brake hold relay
  - >> Repair open circuit, short to ground or short to power in harness or connectors.

## 11. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

### P1572 ICC BRAKE SWITCH

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

Disconnect ECM harness connector.

Check the continuity between stop lamp switch harness connector and ECM harness connector.

Stop lam	p switch	EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E124	2	M9	122	Existed

3. Check the continuity between ICC brake hold relay harness connector and ECM harness connector.

ICC brake	hold relay	EC	CM	Continuity
Connector	Terminal	Connector Terminal		Continuity
E80	5	M9	122	Existed

4. Also check harness for short to ground and short to power.

### Is the inspection result normal?

>> GO TO 13. YES NO >> GO TO 12.

## 12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and stop lamp switch
- Harness for open or short between ECM and ICC brake hold relay

>> Repair open circuit, short to ground or short to power in harness or connectors.

## 13. CHECK STOP LAMP SWITCH

Refer to EC-548, "Component Inspection (Stop Lamp Switch)".

#### Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace stop lamp switch.

## 14. CHECK ICC BRAKE HOLD RELAY

Refer to EC-548, "Component Inspection (ICC Brake Hold Relay)".

#### Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace ICC brake hold relay.

## 15. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

>> INSPECTION END

## Component Inspection (ICC Brake Switch)

## 1. CHECK ICC BRAKE SWITCH-I

- Turn ignition switch OFF.
- 2. Disconnect ICC brake switch harness connector.
- Check the continuity between ICC brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

#### Is the inspection result normal?

>> INSPECTION END

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#### < COMPONENT DIAGNOSIS >

NO >> GO TO 2.

## 2. CHECK ICC BRAKE SWITCH-II

- 1. Adjust ICC brake switch installation. Refer to BR-6, "Inspection and Adjustment".
- 2. Check the continuity between ICC brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2 Brake pedal	Fully released	Existed	
	Бтаке рецаг	Slightly depressed	Not existed

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC brake switch.

## Component Inspection (Stop Lamp Switch)

INFOID:0000000005353741

## 1. CHECK STOP LAMP SWITCH-I

- Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- 3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
r and 2 Brake pedar	Slightly depressed	Existed	

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

## 2.CHECK STOP LAMP SWITCH-II

- 1. Adjust stop lamp switch installation. Refer to BR-6, "Inspection and Adjustment".
- 2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
r and 2   Brake pedar	Slightly depressed	Existed	

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch.

## Component Inspection (ICC Brake Hold Relay)

INFOID:0000000005353742

## 1. CHECK ICC BRAKE HOLD RELAY

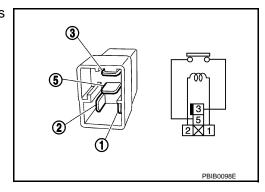
- 1. Turn ignition switch OFF.
- 2. Remove ICC brake hold relay.
- 3. Check the continuity between ICC brake hold relay terminals under the following conditions.

Terminals	Condition	Continuity
3 and 5	12 V direct current supply between terminals 1 and 2	Not existed
J and J	No current supply	Existed

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC brake hold relay



< COMPONENT DIAGNOSIS >

[VQ35HR]

## P1574 ASCD VEHICLE SPEED SENSOR

Description INFOID:0000000005353743

The ECM receives two vehicle speed signals via CAN communication line. One is sent from "unified meter and A/C amp.", and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-68, "System Description" for ASCD functions.

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**DTC Logic** 

INFOID:0000000005353744

#### DTC DETECTION LOGIC

- If DTC P1574 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-429, "DTC Logic".
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-442, "DTC Logic".
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-444, "DTC Logic".

-	DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	(
	P1574	ASCD vehicle speed sensor	The difference between the two vehicle speed signals is out of the specified range.	Harness or connectors     (The CAN communication line is open or shorted.)     Unified meter and A/C amp.     ABS actuator and electric unit (control unit)     Wheel sensor     TCM     ECM	ŀ

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

## 2.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine (VDC switch OFF).
- Drive the vehicle at more than 40 km/h (25 MPH).

**CAUTION:** 

Always drive vehicle at a safe speed.

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Check DTC.

#### Is DTC detected?

YES >> Go to EC-549, "Diagnosis Procedure".

>> INSPECTION END NO

## Diagnosis Procedure

INFOID:0000000005353745

## 1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-47, "Introduction".

Is the inspection result normal?

**EC-549** Revision: 2009 June 2010 M35/M45

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### P1574 ASCD VEHICLE SPEED SENSOR

[VQ35HR]

YES >> GO TO 2.

NO >> Perform troubleshooting relevant to DTC indicated.

 $2. {\sf CHECK} \ {\sf DTC} \ {\sf WITH} \ "{\sf ABS} \ {\sf ACTUATOR} \ {\sf AND} \ {\sf ELECTRIC} \ {\sf UNIT} \ ({\sf CONTROL} \ {\sf UNIT})"$ 

Refer to BRC-12.

### Is the inspection result normal?

< COMPONENT DIAGNOSIS >

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

 ${\bf 3.}$ CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to DI-28, "CONSULT-III Function (METER/M&A)".

>> INSPECTION END

INFOID:0000000005353747

## P1574 ICC VEHICLE SPEED SENSOR

Description INFOID:0000000005353746

The ECM receives two vehicle speed signals via CAN communication line. One is sent from "unified meter and A/C amp.", and the other is from TCM (Transmission control module). The ECM uses these signals for ICC control. Refer to ACS-9 for ICC functions.

EC

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**DTC Logic** 

#### DTC DETECTION LOGIC

If DTC P1574 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-429, "DTC Logic".
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-442, "DTC Logic".
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-444, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1574	ICC vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	Harness or connectors     (The CAN communication line is open or shorted.)     Unified meter and A/C amp.     ABS actuator and electric unit (control unit)     Wheel sensor     TCM     ECM

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

## 2.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine (VDC switch OFF).
- Drive the vehicle at more than 40 km/h (25 MPH).

**CAUTION:** 

Always drive vehicle at a safe speed.

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Check DTC.

#### Is DTC detected?

YES >> Go to EC-551, "Diagnosis Procedure".

>> INSPECTION END NO

## Diagnosis Procedure

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-47, "Introduction".

Is the inspection result normal?

**EC-551** Revision: 2009 June 2010 M35/M45

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INFOID:0000000005353748

### P1574 ICC VEHICLE SPEED SENSOR

[VQ35HR]

# < COMPONENT DIAGNOSIS >

YES >> GO TO 2.

NO >> Perform troubleshooting relevant to DTC indicated.

 $2. {\sf CHECK} \ {\sf DTC} \ {\sf WITH} \ "{\sf ABS} \ {\sf ACTUATOR} \ {\sf AND} \ {\sf ELECTRIC} \ {\sf UNIT} \ ({\sf CONTROL} \ {\sf UNIT})"$ 

Refer to BRC-12.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

 ${\bf 3.}$ CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Check combination meter function.

Refer to DI-28, "CONSULT-III Function (METER/M&A)".

>> INSPECTION END

Revision: 2009 June **EC-552** 2010 M35/M45

### **P1715 INPUT SPEED SENSOR**

< COMPONENT DIAGNOSIS >

[VQ35HR]

## P1715 INPUT SPEED SENSOR

Description INFOID:0000000005353749

ECM receives Input speed sensor signal from TCM through CAN communication line. ECM uses this signal for engine control.

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DTC Logic

INFOID:0000000005353750

#### DTC DETECTION LOGIC

#### NOTE:

- If DTC P1715 is displayed with DTC UXXXX first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-340, "DTC Logic".
- If DTC P1715 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to <u>EC-346</u>, "<u>DTC Logic"</u>.
- If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-442, "DTC Logic".
- If DTC P1715 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-444, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715	Input speed sensor (TCM output)	Input speed sensor signal is different from the theoretical value calculated by ECM from output speed sensor signal and engine rpm signal.	Harness or connectors     (The CAN communication line is open or shorted)     Harness or connectors     (Input speed sensor circuit is open or shorted)     TCM

## Diagnosis Procedure

INFOID:0000000005353751

## 1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-47, "Introduction".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM.

>> INSPECTION END

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## P1805 BRAKE SWITCH

Description INFOID:000000005353752

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is being driven.

DTC Logic

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is being driven.	ISTON Jamn SWITCH CITCUIT IS ONED OF SHORT-

#### DTC CONFIRMATION PROCEDURE

## 1.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Fully depress the brake pedal for at least 5 seconds.
- 3. Erase the DTC.
- 4. Check 1st trip DTC.

### Is 1st trip DTC detected?

YES >> Go to EC-555, "Diagnosis Procedure".

NO >> INSPECTION END

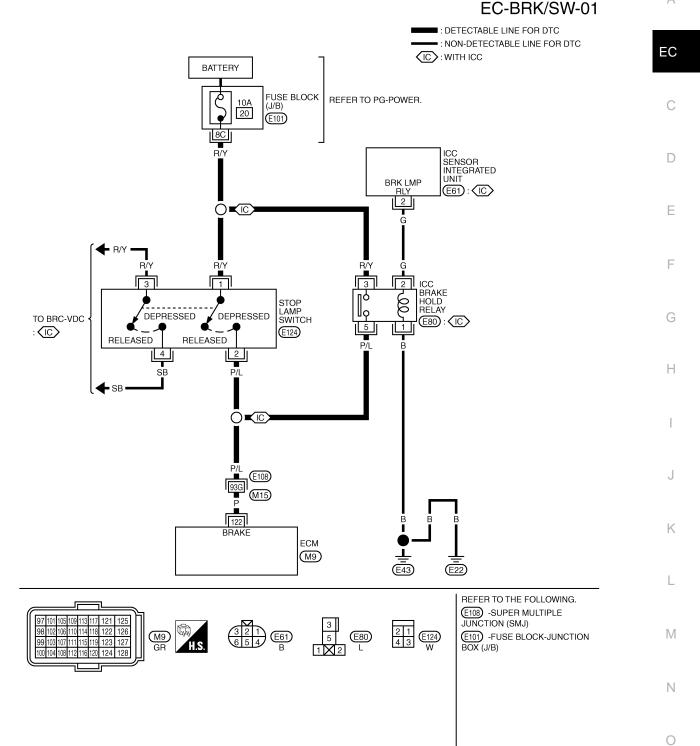
TBWT2462E

INFOID:0000000005353755

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## Diagnosis Procedure

## 1. CHECK STOP LAMP SWITCH CIRCUIT

- Turn ignition switch OFF.
- Check the stop lamp illumination under the following conditions.

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#### < COMPONENT DIAGNOSIS >

Con	Stop lamp	
Brake pedal	Fully released	Not illuminated
	Slightly depressed	Illuminated

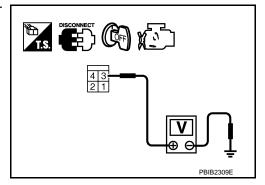
### Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 2.

## 2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- 1. Disconnect stop lamp switch harness connector.
- Check the voltage between stop lamp switch harness connector and ground.

•	Stop lamp switch		Ground	Voltage
	Connector	Terminal	Giodila	voltage
	E124	1	Ground	Battery voltage



#### Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

## 3. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E101
- 10 A fuse (No. 20)
- Harness for open or short between stop lamp switch and battery
  - >> Repair open circuit, short to ground or short to power in harness or connectors.

## 4. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect stop lamp switch harness connector.
- 2. Disconnect ECM harness connector.
- Check the continuity between stop lamp switch harness connector and ECM harness connector.

Stop lam	o switch	EC	ECM	
Connector	Terminal	Connector Terminal		Continuity
E124	2	M9	122	Existed

4. Also check harness for short to ground and short to power.

## Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

## 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and stop lamp switch

>> Repair open circuit, short to ground or short to power in harness or connectors.

## 6. CHECK STOP LAMP SWITCH

Refer to EC-557, "Component Inspection (Stop Lamp Switch)".

			P1805 BRAKE	SWITCH	[VO2EHD]	
	NENT DIA				[VQ35HR]	
•	ection result > GO TO 7.					A
NO >	> Replace s	top lamp switch.				
		TENT INCIDENT				ΕC
Refer to <u>E</u>	<u>C-154, "Des</u>	scription".				
>	> INSPECT	ION END				(
Compor	ent Inspe	ection (Stop La	amp Switch)		INFOID:0000000005353756	
1 CUECK	. CTODIAN	NP SWITCH-I	. ,			[
	gnition switc					
<ol><li>Discoi</li></ol>	nect stop la	amp switch harne				[
3. Check	the continu	lity between stop	amp switch termin	als under the following conditions.		
Terminals	C	Condition	Continuity			
1 and 2	Brake pedal	Fully released	Not existed			
r dild 2	Brano podar	Slightly depressed	Existed			
NO >		MP SWITCH-II				
				spection and Adjustment". als under the following conditions.		
Terminals	C	Condition	Continuity			
1 and 2	Brake pedal	Fully released	Not existed			
c the inco	ection result	Slightly depressed	Existed			
-	> INSPECT					
		top lamp switch.				

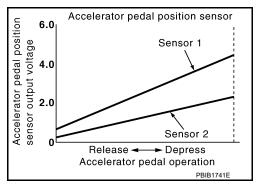
## **P2122, P2123 APP SENSOR**

**Description** 

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and sends voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for engine operations such as fuel cut.



DTC Logic

## DTC DETECTION LOGIC

#### NOTE:

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-445, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122	Accelerator pedal position (APP) sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	Harness or connectors     (APP sensor 1 circuit is open or shorted.)
P2123	Accelerator pedal position (APP) sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	Accelerator pedal position sensor (APP sensor 1)

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- Check DTC.

#### Is DTC detected?

YES >> Go to EC-559, "Diagnosis Procedure".

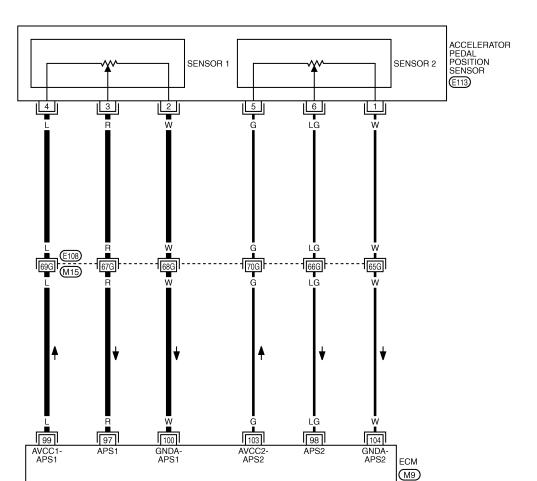
NO >> INSPECTION END

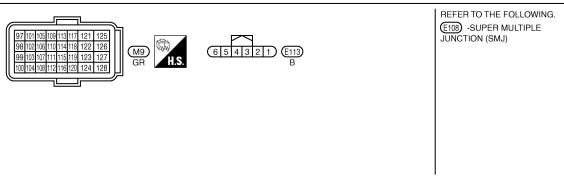
Wiring Diagram

INFOID:0000000005353759









TBWT2469E

## Diagnosis Procedure

## 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to <a href="EC-158">EC-158</a>, "Ground Inspection".

#### Is the inspection result normal?

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#### < COMPONENT DIAGNOSIS >

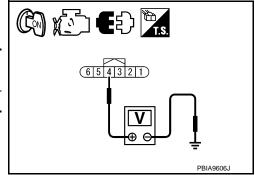
YES >> GO TO 2.

NO >> Repair or replace ground connections.

## 2.CHECK ACCELERATOR PEDAL POSITION (APP) SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect APP sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between APP sensor harness connector and ground.

APP :	sensor	Ground	Voltage (V)	
Connector	Terminal	Ground	voltage (v)	
E113	4	Ground	Approx. 5	



### Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

## 3.DETECT MALFUNCTIONING PART

### Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and APP sensor
  - >> Repair open circuit, short to ground or short to power in harness or connectors.

## 4. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP :	APP sensor ECM		ECM	
Connector	Terminal	Connector	Terminal	Continuity
E113	2	M9	100	Existed

4. Also check harness for short to ground and short to power.

### Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

## DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E108, M15
- · Harness for open or short between ECM and APP sensor
  - >> Repair open circuit, short to ground or short to power in harness or connectors.

## 6. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP	sensor	ECM		Continuity	
Connector	Terminal	Connector	Connector Terminal		
E113	3	M9	97	Existed	

2. Also check harness for short to ground and short to power.

## **P2122, P2123 APP SENSOR**

#### < COMPONENT DIAGNOSIS >

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Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and APP sensor

>> Repair open circuit, short to ground or short to power in harness or connectors.

## 8. CHECK APP SENSOR

Refer to EC-561, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly.
- 2. Go to EC-562, "Special Repair Requirement".

#### >> INSPECTION END

## 10. CHECK INTERMITTENT INCIDENT

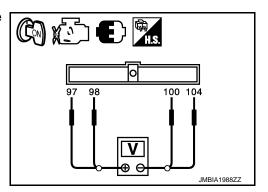
Refer to EC-154, "Description".

>> INSPECTION END

## Component Inspection

INFOID:0000000005353761

- ${\bf 1.} {\sf CHECK\ ACCELERATOR\ PEDAL\ POSITION\ (APP)\ SENSOR}$
- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Turn ignition switch ON.
- Check the voltage ECM harness connector terminals under the following conditions.



	ECM				
Connector + Terminal		_	Condition		Voltage (V)
		Terminal			
	97 (APP sensor 1) 100	100	Accelerator pedal	Fully released	0.45 - 1.0
M9				Fully depressed	4.4 - 4.8
IVI9		104		Fully released	0.22 - 0.50
	98 (APP sensor 2)	104		Fully depressed	2.1 - 2.5

Is the inspection result normal?

Revision: 2009 June **EC-561** 2010 M35/M45

## **P2122, P2123 APP SENSOR**

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

YES >> INSPECTION END

NO >> GO TO 2.

## 2.REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly.
- 2. Go to EC-562, "Special Repair Requirement".

#### >> INSPECTION END

## Special Repair Requirement

INFOID:0000000005353762

## 1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-27, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 2.

## 2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 3.

## 3. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-27, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> END

INFOID:0000000005353764

## P2127, P2128 APP SENSOR

Description INFOID:0000000005353763

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and sends voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for engine operations such as fuel cut.

Accelerator pedal position sensor Sensor 1 Sensor 2 → Depress Release -Accelerator pedal operation

DTC DETECTION LOGIC

DTC Logic

DTC No. Trouble diagnosis name DTC detecting condition Possible cause Accelerator pedal posi-· Harness or connectors Н An excessively low voltage from the APP sen-P2127 tion (APP) sensor 2 cir-(APP sensor 2 circuit is open or shorted.) sor 2 is sent to ECM. cuit low input [Crankshaft position (CKP) sensor circuit is shorted.] [Camshaft position (CMP) sensor (bank 2) circuit is shorted.] [Exhaust valve timing (EVT) control position sensor (bank 2) circuit is shorted.] (Battery current sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) Accelerator pedal posi-An excessively high voltage from the APP sen-(Refrigerant pressure sensor circuit is P2128 tion (APP) sensor 2 cir-K sor 2 is sent to ECM. shorted.) cuit high input • APP sensor (APP sensor 2) · CKP sensor CMP sensor (bank 2) EVT control position sensor (bank 2) Battery current sensor EVAP control system pressure sensor · Refrigerant pressure sensor M

### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

## 2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- 2. Check DTC.

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**EC-563** Revision: 2009 June 2010 M35/M45

#### Is DTC detected?

YES >> Go to EC-564, "Diagnosis Procedure".

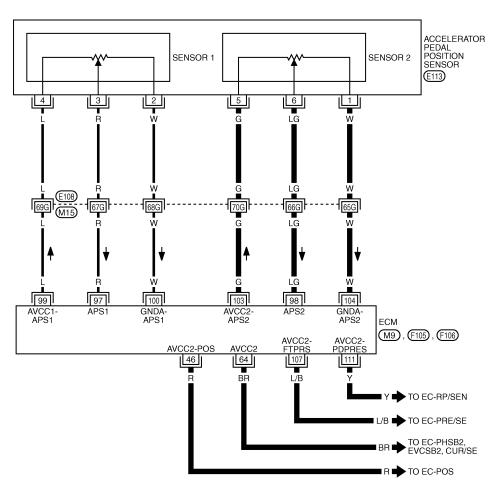
NO >> INSPECTION END

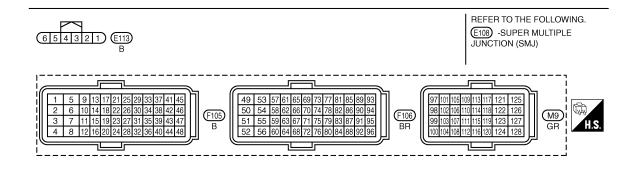
## Wiring Diagram

INFOID:0000000005353765

### EC-APPS2-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





TBWT2470E

## Diagnosis Procedure

INFOID:0000000005353766

1. CHECK GROUND CONNECTION

## < COMPONENT DIAGNOSIS >

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

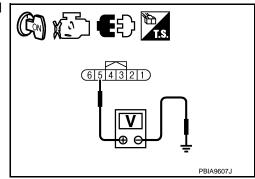
YES >> GO TO 2.

NO >> Repair or replace ground connections.

## 2.check accelerator pedal position (app) sensor 2 power supply circuit-i

- 1. Disconnect APP sensor harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between APP sensor harness connector and ground.

APP :	sensor	Ground	Voltage (V)	
Connector	Terminal	Giodila	voltage (v)	
E113	5	Ground	Approx. 5	



#### Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 3.

## 3.check app sensor 2 power supply circuit-ii

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E113	5	M9	103	Existed

### Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open between ECM and APP sensor

#### >> Repair open circuit.

## 5.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

EC	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
F105	46	Crankshaft position (CKP) sensor	F52	1
		Camshaft position (CMP) sensor (bank 2)	F32	1
F106	64	Exhaust valve timing (EVT) control position sensor (bank 2)	F83	1
		Battery current sensor	E67	1

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Revision: 2009 June **EC-565** 2010 M35/M45

#### < COMPONENT DIAGNOSIS >

E	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
	103	APP sensor	E113	5
M9	107	EVAP control system pressure sensor	B172	3
	111	Refrigerant pressure sensor	E66	1

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair short to ground or short to power in harness or connectors.

## 6. CHECK COMPONENTS

#### Check the following.

- CKP (Refer to <u>EC-345</u>, "Component Inspection".)
- CMP sensor (bank 2) (Refer to EC-352, "Component Inspection".)
- EVT control position sensor (bank 2) (Refer to EC-459, "Component Inspection".)
- Battery current sensor (Refer to EC-502, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-394, "Component Inspection".)
- Refrigerant pressure sensor (Refer to ATC-80, "Magnet Clutch Circuit".)

#### Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace malfunctioning component.

## 7.CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP	sensor	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E113	1	M9	104	Existed

4. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 8.

## 8. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and APP sensor

>> Repair open circuit, short to ground or short to power in harness or connectors.

## 9. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP :	APP sensor		ECM	
Connector	Terminal	Connector Terminal		Continuity
E113	6	M9	98	Existed

2. Also check harness for short to ground and short to power.

## Is the inspection result normal?

YES >> GO TO 11. NO >> GO TO 10.

## 10. DETECT MALFUNCTIONING PART

Check the following.

### **P2127, P2128 APP SENSOR**

### < COMPONENT DIAGNOSIS >

[VQ35HR]

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- Harness connectors E108, M15
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit, short to ground or short to power in harness or connectors.

## 11. CHECK APP SENSOR

Refer to EC-567, "Component Inspection".

### Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 12.

## 12. REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly.
- 2. Go to EC-568, "Special Repair Requirement".

#### >> INSPECTION END

## 13. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

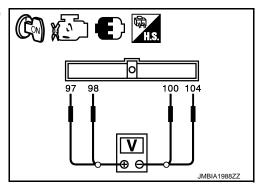
>> INSPECTION END

## Component Inspection

INFOID:0000000005353767

## 1.CHECK ACCELERATOR PEDAL POSITION (APP) SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- Turn ignition switch ON.
- 4. Check the voltage ECM harness connector terminals under the following conditions.



ECM					
Connector + Terminal		_	Condition		Voltage (V)
		Terminal			
	97 (APP sensor 1)	97 (APP sensor 1) 100 98 (APP sensor 2) 104		Fully released	0.45 - 1.0
MO			A     -	Fully depressed	4.4 - 4.8
M9 -	00 (ABB		Accelerator pedal	Fully released	0.22 - 0.50
	98 (APP sensor 2)			Fully depressed	2.1 - 2.5

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

## 2. REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly.
- 2. Go to EC-574, "Special Repair Requirement".

Revision: 2009 June **EC-567** 2010 M35/M45

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>> INSPECTION END

## Special Repair Requirement

INFOID:0000000005353768

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-27, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 2.

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 3.

3. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-27, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> END

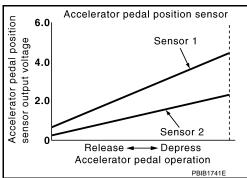
## P2138 APP SENSOR

Description INFOID:0000000005353769

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and sends voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for engine operations such as fuel cut.



**DTC Logic** INFOID:0000000005353770

#### DTC DETECTION LOGIC

NOTE:

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-445, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal position (APP) sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	Harness or connectors     (APP sensor 2 circuit is open or shorted.)     [Crankshaft position (CKP) sensor circuit is shorted.]     [Camshaft position (CMP) sensor (bank 2) circuit is shorted.]     [Exhaust valve timing (EVT) control position sensor (bank 2) circuit is shorted.]     (Battery current sensor circuit is shorted.)     (EVAP control system pressure sensor circuit is shorted.)     (Refrigerant pressure sensor circuit is shorted.)     APP sensor (APP sensor 2)     CKP sensor     CMP sensor (bank 2)     EVT control position sensor (bank 2)     Battery current sensor     EVAP control system pressure sensor     Refrigerant pressure sensor

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON. 2.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

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## 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- Check DTC.

#### Is DTC detected?

YES >> Go to EC-571, "Diagnosis Procedure".

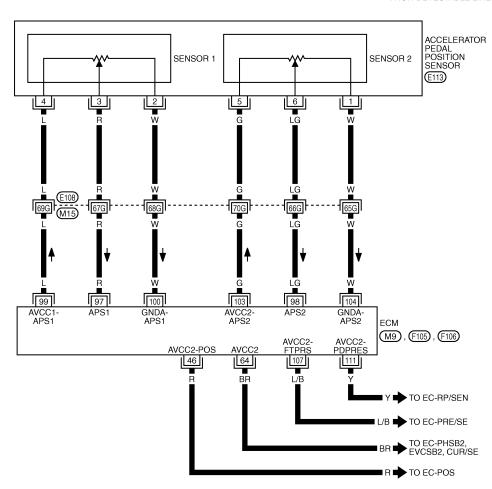
NO >> INSPECTION END

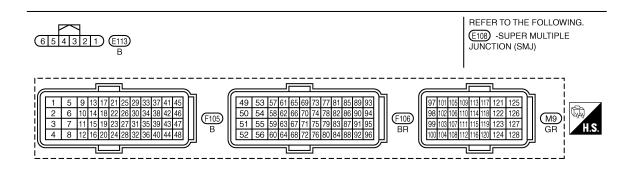
## Wiring Diagram

INFOID:0000000005353771

#### EC-APPS3-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





TBWT2473E

### < COMPONENT DIAGNOSIS >

Diagnosis Procedure

INFOID:0000000005353772

[VQ35HR]

## 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

### Is the inspection result normal?

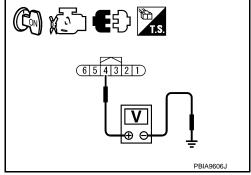
YES >> GO TO 2.

NO >> Repair or replace ground connections.

## 2.CHECK ACCELERATOR PEDAL POSITION (APP) SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect APP sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between APP sensor harness connector and ground.

APP :	sensor	Ground	Voltage (V)	
Connector	Terminal	Giodila	voltage (v)	
E113	4	Ground	Approx. 5	



### Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

## 3. DETECT MALFUNCTIONING PART

Check the following.

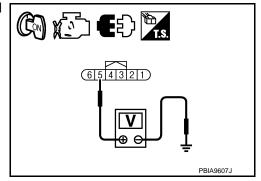
- Harness connectors E108, M15
- · Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit, short to ground or short to power in harness or connectors.

## 4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch ON.
- Check the voltage between APP sensor harness connector and ground.

APP :	sensor	Ground	Voltage (V)	
Connector	Terminal	Giodila	voitage (v)	
E113	5	Ground	Approx. 5	



### Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 5.

## 5. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between APP sensor harness connector and ECM harness connector.

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APP :	APP sensor		ECM	
Connector	Terminal	Connector Terminal		Continuity
E113	5	M9	103	Existed

#### Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

## 6. DETECT MALFUNCTIONING PART

### Check the following.

- Harness connectors E108, M15
- Harness for open between ECM and APP sensor

### >> Repair open circuit.

## 7.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor				
Connector	Terminal	Name	Connector	Terminal		
F105	46	Crankshaft position (CKP) sensor	F52	1		
		Camshaft position (CMP) sensor (bank 2)	F32	1		
F106 64	Exhaust valve timing (EVT) control position sensor (bank 2)		F83	1		
		Battery current sensor	E67	1		
103		APP sensor	E113	5		
M9 107	107	EVAP control system pressure sensor	B172	3		
•	111	Refrigerant pressure sensor	E66	1		

#### Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair short to ground or short to power in harness or connectors.

## 8. CHECK COMPONENTS

#### Check the following.

- CKP sensor (Refer to <u>EC-345</u>, "Component Inspection".)
- CMP sensor (bank 2) (Refer to EC-352, "Component Inspection".)
- EVT control position sensor (bank 2) (Refer to <u>EC-459</u>, "Component Inspection".)
- Battery current sensor (Refer to <u>EC-502</u>, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-394, "Component Inspection".)
- Refrigerant pressure sensor (Refer to <u>ATC-80, "Magnet Clutch Circuit".)</u>

### Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace malfunctioning component.

## 9. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E113	2	M9	100	Existed
	1	IVIS	104	Existed

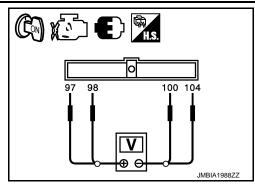
### P2138 APP SENSOR

[VQ35HR] < COMPONENT DIAGNOSIS > Also check harness for short to ground and short to power. Α Is the inspection result normal? YES >> GO TO 11. NO >> GO TO 10. EC 10.DETECT MALFUNCTIONING PART Check the following. Harness connectors E108, M15 Harness for open or short between ECM and APP sensor >> Repair open circuit, short to ground or short to power in harness or connectors. D 11. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT Check the continuity between APP sensor harness connector and ECM harness connector. Е APP sensor **ECM** Continuity **Terminal** Connector **Terminal** Connector F 3 97 M9 E112 Existed 6 98 Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 13. NO >> GO TO 12. 12.DETECT MALFUNCTIONING PART Check the following. Harness connectors E108, M15 Harness for open or short between ECM and APP sensor >> Repair open circuit, short to ground or short to power in harness or connectors. 13. CHECK APP SENSOR Refer to EC-573, "Component Inspection". Is the inspection result normal? YES >> GO TO 15. NO >> GO TO 14. 14.replace accelerator pedal assembly Replace accelerator pedal assembly. Go to EC-574, "Special Repair Requirement". >> INSPECTION END N 15. CHECK INTERMITTENT INCIDENT Refer to EC-154, "Description". >> INSPECTION END Component Inspection INFOID:0000000005353773 1.CHECK ACCELERATOR PEDAL POSITION (APP) SENSOR Turn ignition switch OFF. Reconnect all harness connectors disconnected.

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Turn ignition switch ON.

4. Check the voltage ECM harness connector terminals under the following conditions.



ECM						
Connector + Terminal		_	Condition		Voltage (V)	
		Terminal				
	97 (APP sensor 1)	100	Accelerator podel	Fully released	0.45 - 1.0	
M9				Fully depressed	4.4 - 4.8	
ivis	00 (ADD	Accelerator pedal	Fully released	0.22 - 0.50		
	90 (AFF SellSUI 2)	98 (APP sensor 2) 104		Fully depressed	2.1 - 2.5	

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

## 2. REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly.
- 2. Go to EC-574, "Special Repair Requirement".

>> INSPECTION END

## Special Repair Requirement

INFOID:0000000005353774

## 1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-27, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 2.

## 2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 3.

## 3.perform idle air volume learning

Refer to EC-27, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> END

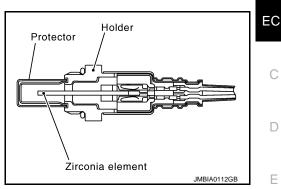
## P2A00, P2A03 A/F SENSOR 1

Description INFOID:0000000005353775

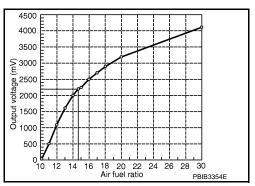
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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 approximately 800°C (1,472°F).



**DTC** Logic INFOID:0000000005353776

#### DTC DETECTION LOGIC

To judge the malfunction, the air fuel ratio (A/F) signal computed by ECM from the A/F sensor 1 signal is monitored so it will not shift to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2A00	A/F sensor 1 (bank 1) circuit range/performance	A/F sensor 1 signal shifts to the lean side for a	A/F sensor 1     A/F sensor 1 heater
P2A03	A/F sensor 1 (bank 2) circuit range/performance	<ul> <li>specified period.</li> <li>The A/F signal computed by ECM from the A/F sensor 1 signal shifts to the rich side for a specified period.</li> </ul>	<ul><li>Fuel pressure</li><li>Fuel injector</li><li>Intake air leaks</li></ul>

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

## 2.PERFORM DTC CONFIRMATION PROCEDURE

- Clear the mixture ratio self-learning value. Refer to EC-30, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- Turn ignition switch OFF and wait at least 10 seconds.

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## **P2A00, P2A03 A/F SENSOR 1**

## < COMPONENT DIAGNOSIS >

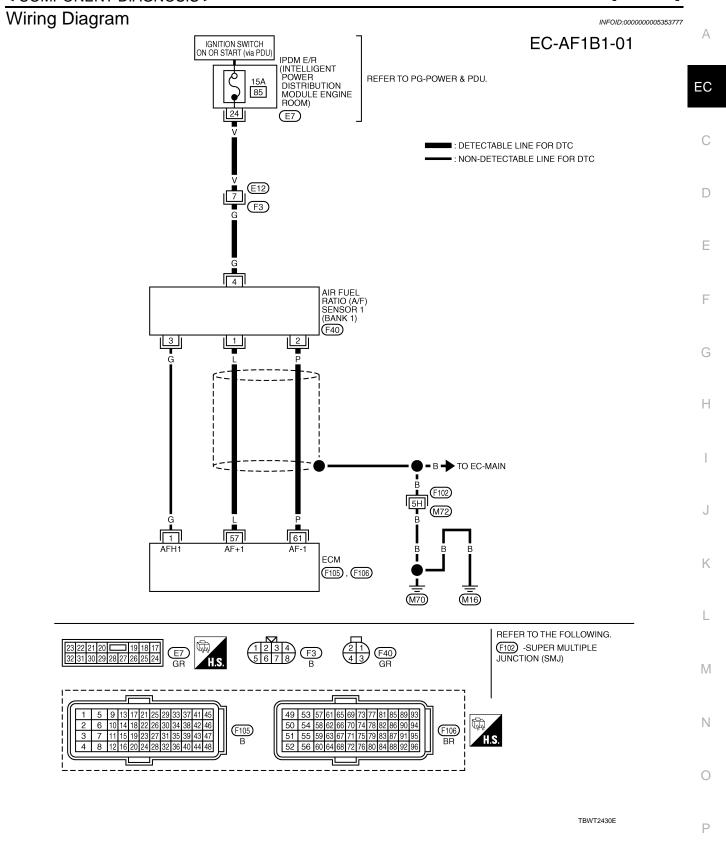
[VQ35HR]

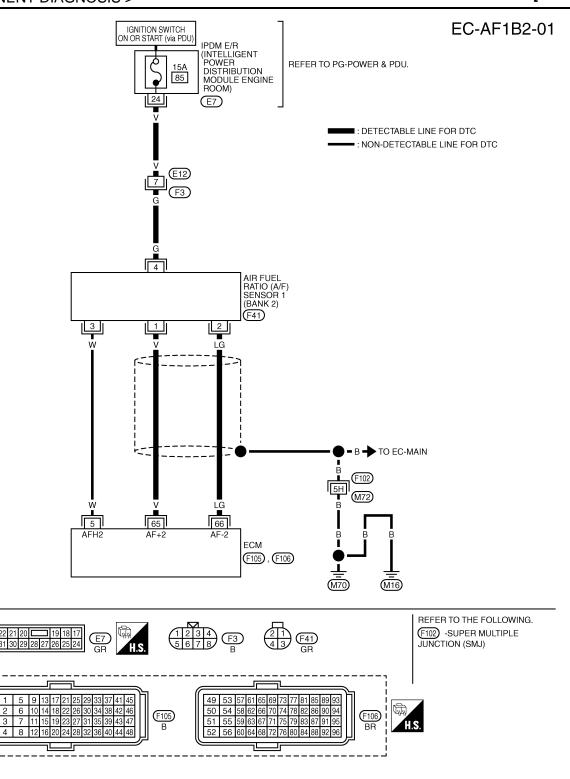
- Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
- 6. Let engine idle for 1 minute.
- 7. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
- 8. Check 1st trip DTC.

### Is 1st trip DTC detected?

YES >> Go to EC-578, "Diagnosis Procedure".

NO >> INSPECTION END





# Diagnosis Procedure

INFOID:0000000005353778

TBWT2431E

# 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connections M16, M70. Refer to EC-158, "Ground Inspection".

#### Is the inspection result normal?

YES >> GO TO 2.

# P2A00, P2A03 A/F SENSOR 1

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

NO >> Repair or replace ground connections.

# 2.retighten air fuel ratio (A/F) sensor 1 $\,$

Loosen and retighten the A/F sensor 1. Refer to EM-24, "Removal and Installation".

>> GO TO 3.

# 3. CHECK FOR INTAKE AIR LEAK

- Start engine and run it at idle.
- Listen for an intake air leak after the mass air flow sensor.

#### Is intake air leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 4.

# 4.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to EC-30, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- 2. Run engine for at least 10 minutes at idle speed.

## Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?

>> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-297, "Diagnosis Procedure" or EC-304, "Diagnosis Procedure".

NO >> GO TO 5.

# 5. CHECK HARNESS CONNECTOR

- Turn ignition switch OFF.
- Disconnect A/F sensor 1 harness connector. 2.
- Check that water is not inside connectors.

#### Is the inspection result normal?

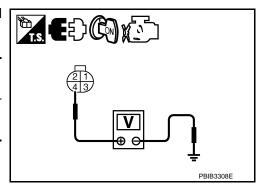
YES >> GO TO 6.

NO >> Repair or replace harness connector.

# O.CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

- Turn ignition switch ON.
- Check the voltage between A/F sensor 1 harness connector and ground.

DTC		A/F sensor 1		Ground	Voltage
ыс	Bank	Connector	Terminal	Ground	voltage
P2A00	1	F40	4	Ground	Battery voltage
P2A03	2	F41	4	Giodila	Battery voltage



#### Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

# 7.DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E12, F3
- IPDM E/R harness connector E7
- 15 A fuse (No. 85)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

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# $8.\mathsf{CHECK}$ A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

	DTC	A/F sensor 1			EC	Continuity	
	DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
	P2A00	1	F40	1		57	
1	1 2A00	'	1 40	2	F106	61	Existed
	D3V03	2	F41	1	1 100	65	LXISIEU
	P2A03 2 F41	141	2		66		

4. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

DTC	A/F sensor 1		Ground	Continuity		
DIC	Bank	Connector	Terminal	Giodila	Continuity	
P2A00	1	F40	1			
F2A00	'	2	2	Ground	Not existed	
P2A03	2	F41	1	Ground	Not existed	
P2A03	2	Γ <del>4</del> Ι	2			

DTC	EC	CM	Ground	Continuity
ыс	Connector	Terminal		
P2A00		57		
F2A00	F100	61	Ground	Not existed
P2A03	F106	65	Ground	Not existed
		66		

Also check harness for short to power.

#### Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

# 9.CHECK A/F SENSOR 1 HEATER

Refer to EC-178, "Component Inspection".

## Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 11.

# 10. CHECK INTERMITTENT INCIDENT

Perform EC-154, "Description".

#### Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair or replace malfunctioning part.

11.REPLACE A/F SENSOR 1

#### Replace A/F sensor 1.

#### **CAUTION:**

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).

P2A00, P2A03 A/F SENSOR 1	
< COMPONENT DIAGNOSIS > [VQ35HR]	
Will CONSULT-III be used? YES >> GO TO 12.	А
YES >> GO TO 12. NO >> GO TO 13.	$\wedge$
12.confirm a/f adjustment data	F.C.
With CONSULT-III	EC
<ol> <li>Turn ignition switch ON.</li> <li>Select "A/F ADJ-B1" and "A/F ADJ-B2" in "DATA MONITOR" mode with CONSULT-III.</li> <li>Make sure that "0.000" is displayed on CONSULT-III screen.</li> </ol>	С
Is "0.000" displayed?	
YES >> INSPECTION END NO >> GO TO 13.	D
13. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE	
Clear the mixture ratio self-learning value. Refer to <u>EC-30</u> , "MIXTURE RATIO SELF-LEARNING VALUE <u>CLEAR</u> : Special Repair Requirement".	Е
Will CONSULT-III be used? YES >> GO TO 14.	F
NO >> INSPECTION END	
14.CONFIRM A/F ADJUSTMENT DATA	G
<ul><li>With CONSULT-III</li><li>1. Turn ignition switch ON.</li></ul>	
<ol> <li>Select "A/F ADJ-B1" and "A/F ADJ-B2" in "DATA MONITOR" mode with CONSULT-III.</li> <li>Make sure that "0.000" is displayed on CONSULT-III screen.</li> </ol>	Н
>> INSPECTION END	
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# **ASCD BRAKE SWITCH**

Description INFOID:0000000005353779

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by those two types of input (ON/OFF signal). Refer to <a href="EC-68">EC-68</a>, "System Description"</a> for the ASCD function.

# Component Function Check

INFOID:0000000005353780

# 1. CHECK ASCD BRAKE SWITCH FUNCTION

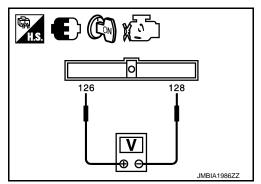
# (1) With CONSULT-III

- 1. Turn ignition switch ON.
- 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	Slightly depressed	OFF
DIVARL SWI	Brake pedal	Fully released	ON

## **⋈** Without CONSULT-III

- Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals as per the following.



ECM						
Connector +		_	Condition		Voltage (V)	
Terminal		Terminal				
M9	126	128	Brake pedal	Slightly depressed	Approx. 0	
IVIÐ	(ASCD brake switch signal)	120	Diake peual	Fully released	Battery voltage	

## Is the inspection result normal?

YES >> INSPECTION END

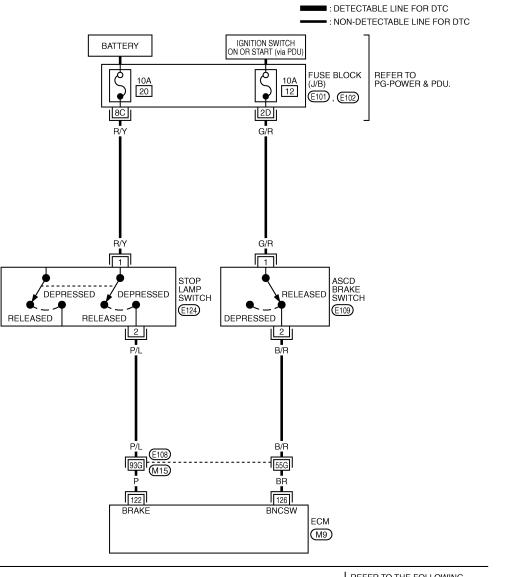
NO >> Go to EC-583, "Diagnosis Procedure".

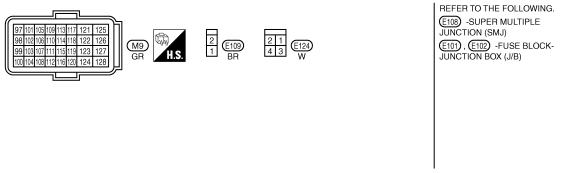
Wiring Diagram

[VQ35HR]

INFOID:0000000005353781







TBWT2474E

# Diagnosis Procedure

# 1. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch harness connector.
- Turn ignition switch ON.

**EC-583** Revision: 2009 June 2010 M35/M45

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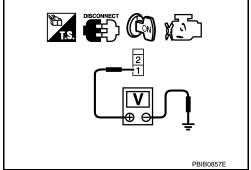
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INFOID:0000000005353782

#### < COMPONENT DIAGNOSIS >

Check the voltage between ASCD brake switch harness connector and ground.

ASCD bra	ke switch	Ground	Voltage	
Connector	Terminal		voltage	
E109	1	Ground	Battery voltage	



#### Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 2.

# 2. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E102
- 10 A fuse (No. 12)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit, short to ground or short to power in harness or connectors.

# $3. \mathsf{CHECK}$ 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		EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E109	2	M9	126	Existed

4. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 5. NO >> GO TO 4.

# 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and ASCD brake switch

>> Repair open circuit, short to ground or short to power in harness or connectors.

# 5. CHECK ASCD BRAKE SWITCH

Refer to EC-585, "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 EC-154, "Description".

## >> INSPECTION END

# **ASCD BRAKE SWITCH**

## < COMPONENT DIAGNOSIS >

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# Component Inspection (ASCD Brake Switch)

INFOID:0000000005353783

# 1. CHECK ASCD BRAKE SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch harness connector.
- 3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed		
	втаке редаг	Slightly depressed	Not existed		

# Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

# 2.CHECK ASCD BRAKE SWITCH-II

- 1. Adjust ASCD brake switch installation. Refer to BR-6, "Inspection and Adjustment".
- 2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Condition Con		Continuity
1 and 2 Br	Brake pedal	Fully released	Existed		
	brake pedar	Slightly depressed	Not existed		

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD brake switch.

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# **ASCD INDICATOR**

**Description** 

ASCD operation status is indicated by two indicators (CRUISE and SET) in combination meter.

CRUISE indicator is displayed to indicated that ASCD system is ready for operation when MAIN switch on ASCD steering switch is turned ON.

SET indicator is displayed when the following conditions are met.

- CRUISE indicator is displayed.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of the ASCD setting.

SET indicator is displayed during ASCD control.

Refer to EC-68, "System Description" for the ASCD function.

# Component Function Check

INFOID:0000000005353785

# 1. CHECK ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

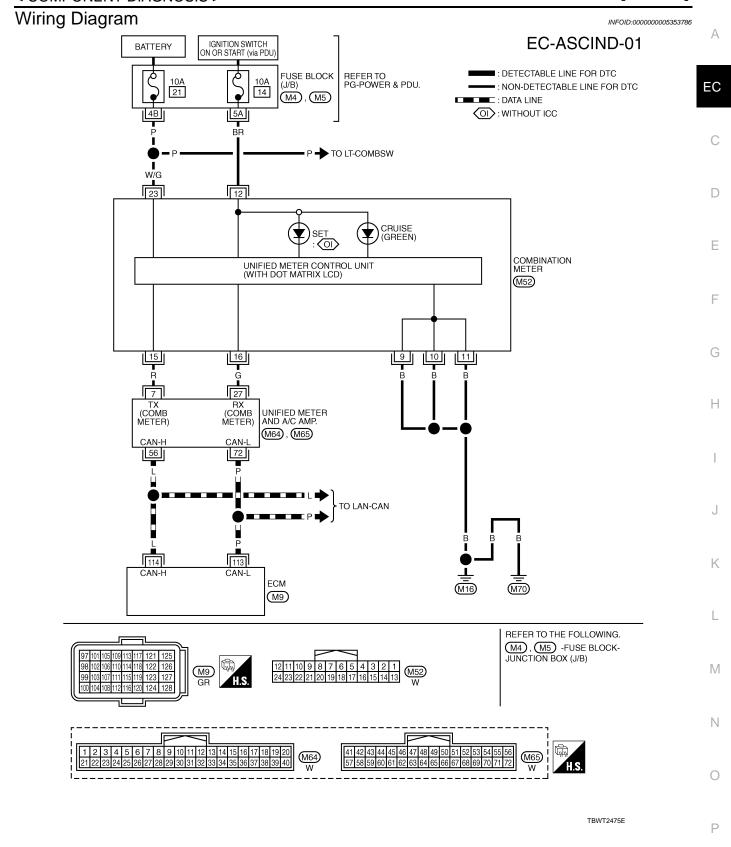
ASCD INDICATOR	CONDITIO	SPECIFICATION	
CRUISE	Ignition switch: ON     MAIN switch: Pressed at the 1st time →at the 2nd time		$ON \to OFF$
057	MAIN switch: ON	ASCD: Operating	ON
SET	When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Not operating	OFF

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-587, "Diagnosis Procedure".

INFOID:0000000005353787



# Diagnosis Procedure

# 1. CHECK DTC

Check that DTC UXXXX is not displayed.

Is the inspection result normal?

## **ASCD INDICATOR**

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

YES >> GO TO 2.

NO >> Perform trouble diagnosis for DTC UXXXX.

 $2.\mathsf{CHECK}$  DTC WITH "UNIFIED METER AND A/C AMP."

Refer to DI-28, "CONSULT-III Function (METER/M&A)".

# Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

3.CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

## Is the inspection result normal?

YES >> Replace combination meter.

NO >> Repair or replace malfunctioning part.

## **COOLING FAN**

< COMPONENT DIAGNOSIS > [VQ35HR]

# **COOLING FAN**

Description

## COOLING FAN CONTROL MODULE

Cooling fan control module receives ON/OFF pulse duty signal from IPDM E/R. Corresponding to this ON/OFF pulse duty signal, cooling fan control module sends cooling fan motor operating voltage to cooling fan motor. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage.

#### **COOLING FAN MOTOR**

Cooling fan motor receives cooling fan motor operating voltage from cooling fan control module. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage.

# Component Function Check

1. CHECK COOLING FAN FUNCTION

# (I) With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Check that cooling fan speed varies according to the percentage.

# **W** Without CONSULT-III

- 1. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PG-22, "Auto Active Test".
- 2. Check that cooling fan operates.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-591, "Diagnosis Procedure".

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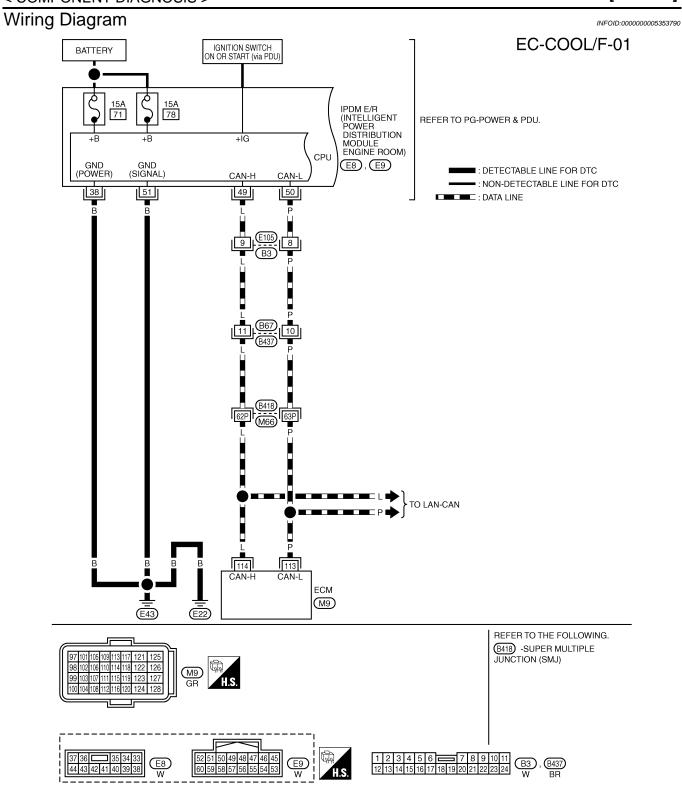
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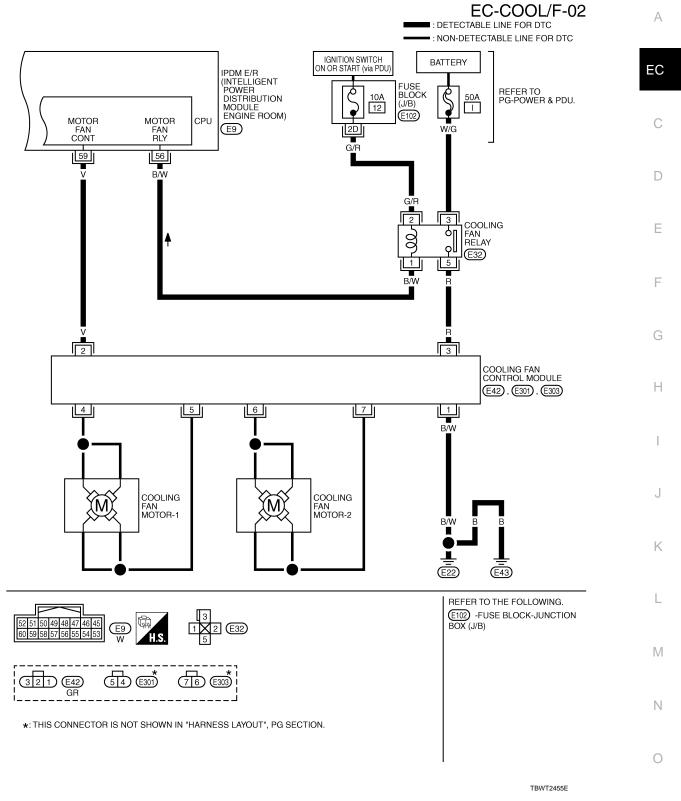
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# Diagnosis Procedure

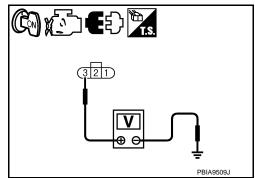
# 1. CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-I

- Turn ignition switch OFF.
- 2. Disconnect cooling fan control module harness connector.
- 3. Turn ignition switch ON.

## < COMPONENT DIAGNOSIS >

 Check the voltage between cooling fan control module harness connector and ground.

Cooling fan control module		Ground	Voltage	
Connector	Terminal	Giodila	voltage	
E42	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 control module		Ground	Continuity
Connector	Terminal	Ground	Continuity
E42	1	Ground	Existed

3. Also check harness for short to power.

#### Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to power in harness or connectors.

# 3.CHECK IPDM E/R GROUND CIRCUIT

- 1. Disconnect IPDM E/R harness connectors.
- 2. Check the continuity between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Continuity	
Connector	Terminal	Glound	Continuity	
E8	E8 38		Existed	
E9	51	Ground	LXISTEG	

3. Also check harness for short to power.

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to power in harness or connectors.

# 4. CHECK COOLING FAN CONTROL SIGNAL CIRCUIT

- 1. Disconnect IPDM E/R harness connector.
- Check the continuity between IPDM E/R harness connector and cooling fan control module harness connector.

IPDM	E/R	Cooling fan control module		Continuity
Connector	Terminal	Connector Terminal		Continuity
E9	59	E42	2	Existed

3. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

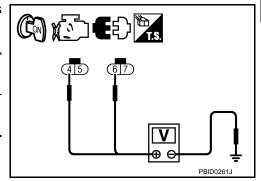
YES >> GO TO 5.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

# ${f 5.}$ CHECK COOLING FAN CONTROL MODULE OUTPUT SIGNAL CIRCUIT

- 1. Reconnect all harness connectors disconnected.
- Disconnect cooling fan control module harness connectors.
- Turn ignition switch ON.
- 4. Check the voltage between cooling fan control module terminals and ground.

Cooling fan control module		Ground	Voltage	
Connector Terminal		Giodila		
E301	4	Ground	Battery voltage	
E303	6	Giodila	Battery voltage	



## Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace cooling fan control module 1.

## O.CHECK COOLING FAN MOTORS -1 AND -2

Refer to EC-594, "Component Inspection (Cooling Fan Motor)".

## Is the inspection result normal?

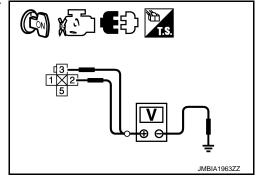
>> GO TO 11. YES

NO >> Replace malfunctioning cooling fan motor.

# .CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect cooling fan relay.
- 3. Turn ignition switch ON.
- 4. Check the voltage between cooling fan relay harness connector and ground.

Cooling fan relay		Ground	Voltage	
Connector	Terminal	Giodila	vollage	
E32	2	Ground	Battery voltage	
	3	Ciodila	Dattery Voltage	



#### Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

# 8.DETECT MALFUNCTIONING PART

## Check the following.

- 10 A fuse (No. 12)
- Fuse block (J/B) connector E102
- 50 A fusible link (letter I)
- · Harness for open or short between cooling fan relay and fuse
- Harness for open or short between cooling fan relay and battery

>> Repair open circuit, short to ground or short to power in harness or connectors.

# 9.CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-III

Turn ignition switch OFF.

**EC-593** Revision: 2009 June 2010 M35/M45

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#### < COMPONENT DIAGNOSIS >

- 2. Disconnect IPDM E/R harness connector.
- Check the continuity between cooling fan relay harness connector and IPDM E/R harness connector.

Cooling f	Cooling fan relay		IPDM E/R	
Connector	Terminal	Connector Terminal		Continuity
E32	1	E9	56	Existed

 Check the continuity between cooling fan relay harness connector and cooling fan control module harness connector.

Cooling fan relay		Cooling fan control module		Continuity
Connector	Terminal	Connector Terminal		Continuity
E32	5	E42	3	Existed

5. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

# 10. CHECK COOLING FAN RELAY

Refer to EC-594, "Component Inspection (Cooling Fan Relay)".

#### Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace cooling fan relay.

# 11. CHECK INTERMITTENT INCIDENT

Perform EC-154, "Description".

#### Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace harness connectors.

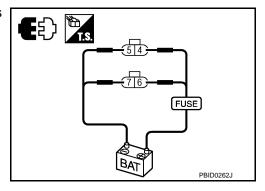
# Component Inspection (Cooling Fan Motor)

INFOID:0000000005353792

# 1. CHECK COOLING FAN MOTOR

- Turn ignition switch OFF.
- Disconnect cooling fan control module harness connectors.
- 3. Supply cooling fan control module harness connector terminals with battery voltage and check operation.

Cooling fan control module					
Motor	Motor Connector Terminal		Operation		
IVIOLOI	Connector	(+)	(-)		
1	E301	4	5	Cooling fan operates.	
2	E303	6	7	Cooming fair operates.	
1 41 1	4				



#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace cooling fan motor.

# Component Inspection (Cooling Fan Relay)

#### INFOID:0000000005353793

# 1. CHECK COOLING FAN RELAY

- Turn ignition switch OFF.
- Remove cooling fan relay.

Revision: 2009 June **EC-594** 2010 M35/M45

# **COOLING FAN**

# < COMPONENT DIAGNOSIS >

[VQ35HR]

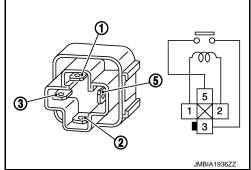
3. Check the continuity between cooling fan relay terminals under the following conditions.

Terminals	Conditions	Continuity
3 and 5	12 V direct current supply between terminals 1 and 2	Existed
o ana o	No current supply	Not existed

# Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace cooling fan relay.



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# **ELECTRICAL LOAD SIGNAL**

**Description** 

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred through the CAN communication line.

# Component Function Check

INFOID:0000000005353795

# 1. CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

- 1. Turn ignition switch ON.
- 2. Connect CONSULT-III and select "DATA MONITOR" mode.
- 3. Select "LOAD SIGNAL" and check indication under the following conditions.

Monitor item	Condition	Indication	
LOAD SIGNAL	Rear window defogger switch	ON	ON
	rteal willdow delogger switch	OFF	OFF

## Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-596, "Diagnosis Procedure".

# 2. CHECK LIGHTING SWITCH FUNCTION

Check "LOAD SIGNAL" indication under the following conditions.

Monitor item	Co	Indication	
LOAD SIGNAL	Lighting switch	ON at 2nd position	ON
LOAD SIGNAL	NAL Lighting switch	OFF	OFF

#### Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to EC-596, "Diagnosis Procedure".

# 3.CHECK HEATER FAN CONTROL SWITCH FUNCTION

Select "HEATER FAN SW" and check indication under the following conditions.

Monitor item	Condition	Indication	
HEATER FAN SW	Heater fan control switch	ON	ON
	rieater fair control switch	OFF	OFF

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-596, "Diagnosis Procedure".

# Diagnosis Procedure

INFOID:0000000005353796

# 1. INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to <u>EC-596, "Component Function Check"</u>.

#### Which circuit is related to the incident?

Rear window defogger>>GO TO 2.

Headlamp>>GO TO 3.

Heater fan>>GO TO 4.

# 2.CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to GW-64, "Component Parts and Harness Connector Location".

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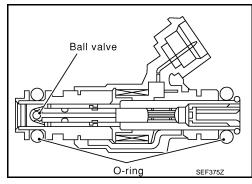
Revision: 2009 June **EC-597** 2010 M35/M45

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# **FUEL INJECTOR**

**Description** 

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



# Component Function Check

1. INSPECTION START

Turn ignition switch to START.

Are any cylinders ignited?

YES >> GO TO 2.

NO >> Go to EC-599, "Diagnosis Procedure".

2. CHECK FUEL INJECTOR FUNCTION

## (P)With CONSULT-III

- 1. Start engine.
- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Check that each circuit produces a momentary engine speed drop.

#### Without CONSULT-III

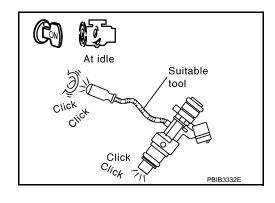
- 1. Start engine.
- 2. Listen to each fuel injector operating sound.

## Clicking sound should be heard.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-599, "Diagnosis Procedure".



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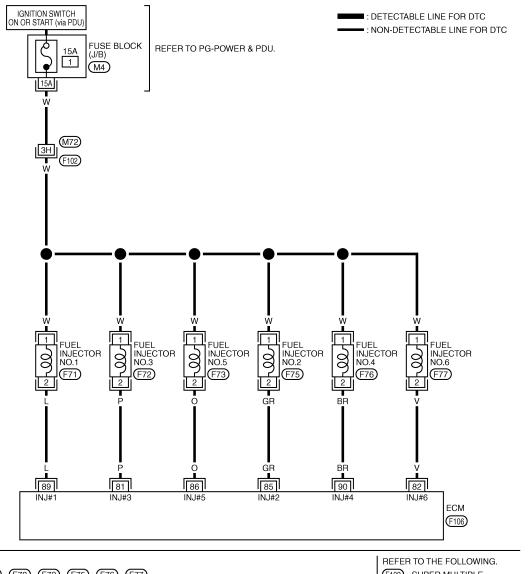
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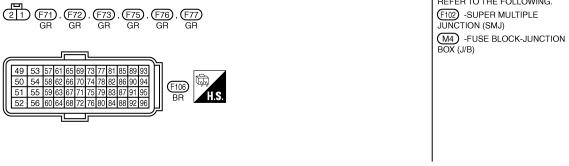
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Wiring Diagram

## **EC-INJECT-01**





Diagnosis Procedure

# 1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect fuel injector harness connector.
- Turn ignition switch ON.

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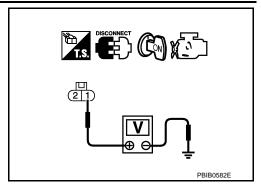
INFOID:0000000005353800

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## < COMPONENT DIAGNOSIS >

 Check the voltage between fuel injector harness connector and ground.

Fuel injector		Ground	Voltage		
Cylinder	Connector	Terminal	Ground	vollage	
1	F71	1			
2	F75	1	Ground		
3	F72	1		Battery voltage	
4	F76	1		Battery voltage	
5	F73	1			
6	F77	1			



#### Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

# 2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F102, M72
- Fuse block (J/B) connector M4
- 15 A fuse (No. 1)
- Harness for open or short between fuel injector and fuse

>> Repair open circuit, short to ground or short to power in harness or connectors.

# 3.check fuel injector output signal circuit for open and short

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between fuel injector harness connector and ECM harness connector.

	Fuel injector		EC	Continuity	
Cylinder	Connector	Terminal	Connector	Terminal	Continuity
1	F71	2	F106	89	
2	F75	2		85	
3	F72	2		81	Existed
4	F76	2		90	EXISIEU
5	F73	2		86	
6	F77	2		82	

4. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

# 4. CHECK FUEL INJECTOR

Refer to EC-601, "Component Inspection".

## Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning fuel injector.

# 5. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

## Is the inspection result normal?

YES >> Replace IPDM E/R.

# **FUEL INJECTOR**

## < COMPONENT DIAGNOSIS >

[VQ35HR]

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

# Component Inspection

INFOID:0000000005353801

# 1. CHECK FUEL INJECTOR

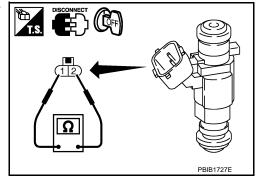
- 1. Turn ignition switch OFF.
- 2. Disconnect fuel injector harness connector.
- 3. Check resistance between fuel injector terminals as per the following.

Terminals	Resistance
1 and 2	11.1 - 14.3 Ω [at 10 - 60°C (50 - 140°F)]

## Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector.



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# **FUEL PUMP**

**Description** 

Sensor	Input signal to ECM	ECM Function	Actuator
Crankshaft position sensor Camshaft position sensor	Engine speed*	Fuel pump control	Fuel pump relay ↓
Battery	Battery voltage*		Fuel pump

<sup>\*:</sup> 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, it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation	
Ignition switch is turned to ON.	Operates for 1 second.	
Engine running and cranking	Operates.	
When engine is stopped	Stops in 1.5 seconds.	
Except as shown above	Stops.	

# Component Function Check

INFOID:0000000005353803

# 1. CHECK FUEL PUMP FUNCTION

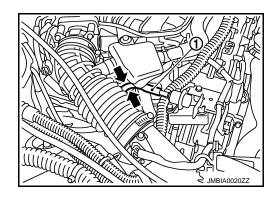
- 1. Turn ignition switch ON.
- 2. Pinch fuel feed hose (1) with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

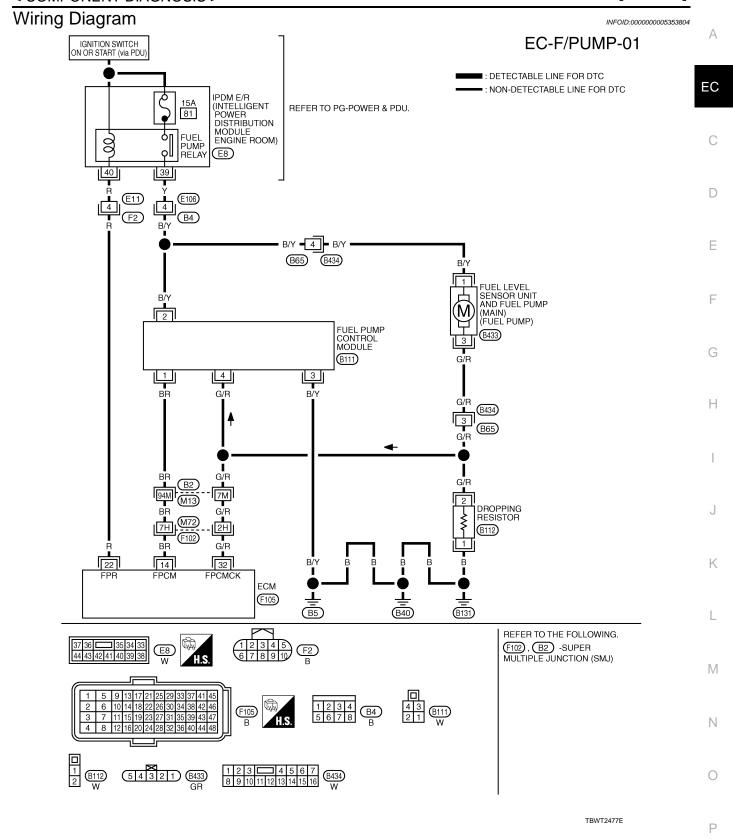
Is the inspection result normal?

YES >> INSPECTION END

NO >> EC-603, "Diagnosis Procedure".



INFOID:0000000005353805



# Diagnosis Procedure

1. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

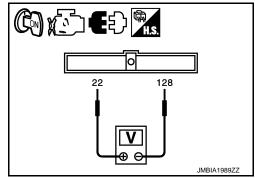
- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Turn ignition switch ON.

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## < COMPONENT DIAGNOSIS >

Check the voltage between ECM harness connector and ground.

+			_	Voltage
Connector	Terminal	Connector	Terminal	
F105	22	M9	128	Battery voltage



#### Is the inspection result normal?

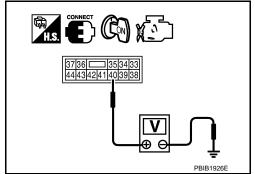
YES >> GO TO 4.

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	Olouliu	Vollage	
E8	40	Ground	Battery voltage	



#### Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 13.

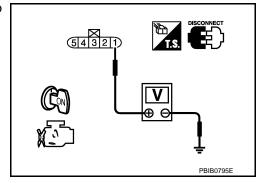
# 3. DETECT MALFUNCTIONING PART

## Check the following.

- Harness connectors E11, F2
- Harness for open or short between IPDM E/R and ECM
  - >> Repair open circuit, short to ground or short to power in harness or connectors.

# 4. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect "fuel level sensor unit and fuel pump (main)" harness connector.
- 4. Turn ignition switch ON.
- 5. Check the voltage between "fuel level sensor unit and fuel pump (main)" harness connector and ground.



Fuel level sensor unit and fuel pump (main)		Ground	Voltage	
Connector	Terminal	Giodila	voltage	
B433	1	Ground	Battery voltage should exist for 1 second after ignition switch is turned ON.	

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## Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 5.

# 5. CHECK 15 A FUSE

- 1. Turn ignition switch OFF.
- 2. Disconnect 15 A fuse (No. 81) from IPDM E/R.
- Check 15 A fuse.

## Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace 15 A fuse.

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# 6.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Disconnect IPDM E/R harness connector E8.

2. Check the continuity between IPDM E/R harness connector and "fuel level sensor unit and fuel pump (main)" harness connector.

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IPDM	E/R	Fuel level sensor unit and fuel pump (main)		Continuity
Connector	Terminal	Connector Terminal		Continuity
E8	39	B433	1	Existed

3. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

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# 7.DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors B4, E106
- Harness connectors B65, B434
- IPDM E/R harness connector E8
- Harness for open or short between IPDM E/R and "fuel level sensor unit and fuel pump (main)"

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## >> Repair open circuit or short to power in harness or connectors.

# 8. CHECK FUEL PUMP GROUND CIRCUIT-I

1. Turn ignition switch OFF.

2. Disconnect dropping resistor harness connector.

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 Check the continuity between "fuel level sensor unit and fuel pump (main)" harness connector and dropping resistor.

Fuel level sensor unit and fuel pump (main)		Droppin	Continuity		
Connector	Terminal	Connector	Terminal		
B433	3	B112	2	Existed	

4. Also check harness for short to power.

Is the inspection result normal?
YES >> GO TO 10.

NO >> GO TO 9.

# 9. DETECT MALFUNCTIONING PART

Revision: 2009 June **EC-605** 2010 M35/M45

#### < COMPONENT DIAGNOSIS >

Check the following.

- Harness connectors B65, B434
- Harness for open or short between "fuel level sensor unit and fuel pump (main)" and dropping resistor

>> Repair open circuit or short to power in harness or connectors.

# 10. CHECK FUEL PUMP GROUND CIRCUIT-II

Check the continuity between dropping resistor and ground.

Droppin	g resistor	Ground	Continuity	
Connector	Connector Terminal		Continuity	
B112	1	Ground	Existed	

2. Also check harness for short to power.

# Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair open circuit or short to power in harness or connectors.

# 11. CHECK DROPPING RESISTOR

Refer to EC-606, "Component Inspection (Dropping Resistor)".

#### Is the inspecting result normal?

YES >> GO TO 12.

NO >> Replace dropping resistor.

# 12.CHECK FUEL PUMP

Refer to EC-606, "Component Inspection (Fuel Pump)".

#### Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace fuel pump.

# 13. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace harness or connectors.

# Component Inspection (Fuel Pump)

INFOID:0000000005353806

# 1. CHECK FUEL PUMP

- Turn ignition switch OFF.
- Disconnect "fuel level sensor unit and fuel pump (main)" harness connector.
- 3. Check resistance between "fuel level sensor unit and fuel pump (main)" terminals as follows.

Terminals	Resistance
1 and 3	0.2 - 5.0 Ω [at 25°C (77°F)]

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump (main)"

# DISCONNECT 1 2 3 4 5 SEC918C

# Component Inspection (Dropping Resistor)

INFOID:0000000005353807

# 1. CHECK DROPPING RESISTOR

1. Turn ignition switch OFF.

Revision: 2009 June **EC-606** 2010 M35/M45

# **FUEL PUMP**

# < COMPONENT DIAGNOSIS >

[VQ35HR]

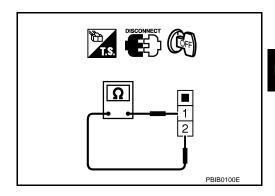
- 2. Disconnect dropping resistor harness connector.
- 3. Check resistance between dropping resistor as follows.

Terminals	Resistance
1 and 2	0.9 Ω [at 20°C (68°F)]

# Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace dropping resistor.



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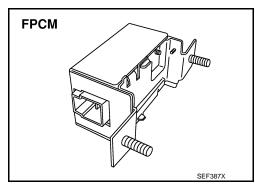
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# FUEL PUMP CONTROL MODULE

**Description** 

The Fuel pump control module (FPCM) adjusts the voltage supplied to the fuel pump to control the amount of fuel flow. When the FPCM increases the voltage supplied to the fuel pump, the fuel flow is increased. When the FPCM decreases the voltage, the fuel flow is decreased.



# Component Function Check

INFOID:0000000005353809

# 1.CHECK FUEL PUMP CONTROL MODULE (FPCM) FUNCTION

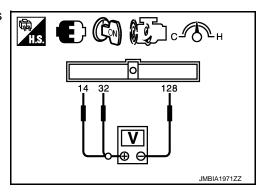
## (P)With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "FPCM" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "FPCM" indication under the following conditions.

Monitor item	Condition	Indication
	Engine: Cranking	HI
FPCM	Engine: Idle     Engine coolant temperature: More than 10 °C (50 °F)	LOW

## N Without CONSULT-III

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminal as per the following.

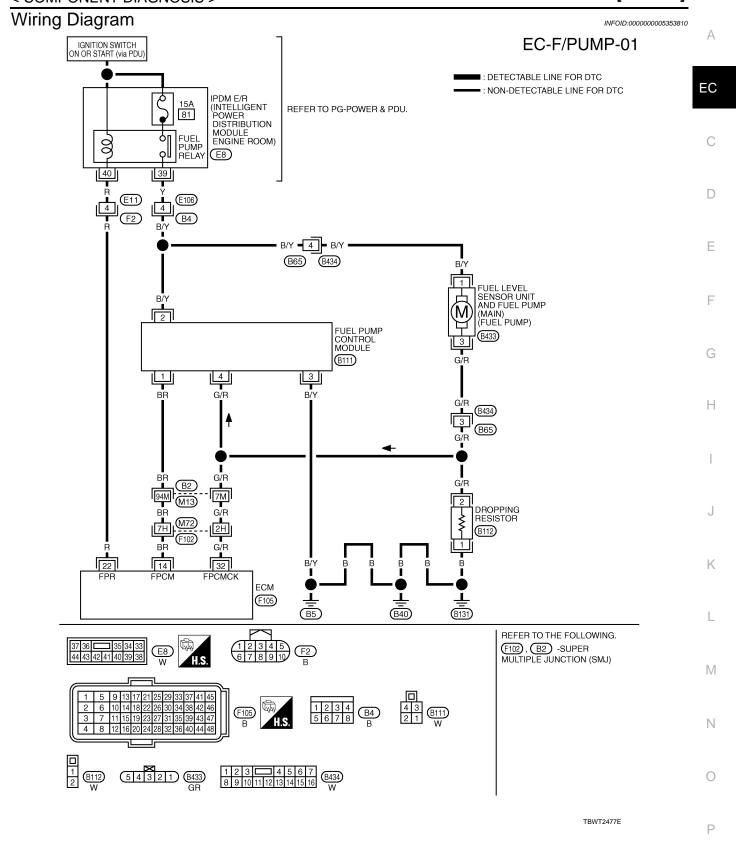


	ECM					
	+	-	_	Condition	Voltage (V)	
Connector	Terminal	Connector	Terminal			
	14			a Engine: Cranking	0 - 0.5	
F105	32	M9	120	Engine: Cranking		
F105	14	IVIS	128	120	Engine: Idle	Annray 0
•	32			Engine coolant temperature: More than 10 °C (50 °F)	Approx. 0	

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-609, "Diagnosis Procedure".



# Diagnosis Procedure

INFOID:0000000005353811

# 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connections M16, M70. Refer to <u>EC-158, "Ground Inspection"</u>.

#### Is the inspection result normal?

#### < COMPONENT DIAGNOSIS >

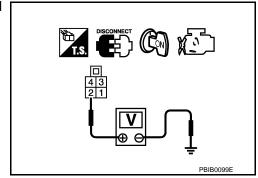
YES >> GO TO 2.

NO >> Repair or replace ground connections.

# 2. CHECK FPCM POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect fuel pump control module (FPCM) harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between FPCM harness connector and ground.

FP	СМ	Ground	Voltage	
Connector	Connector Terminal		voltage	
B111	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 B4, E106
- IPDM E/R harness connector E8
- 15 A fuse (No. 81)
- Harness for open or short between FPCM and IPDM E/R

>> Repair open circuit, short to ground or short to power in harness or connectors.

# 4. CHECK FPCM GROUND CIRCUIT FOR OPEN AND SHORT-I

- Turn ignition switch OFF.
- 2. Check the continuity between FPCM harness connector and ground.

FP	CM	Ground	Continuity	
Connector	Terminal	Ground		
B111	3	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 power in harness or connectors.

# CHECK FPCM GROUND CIRCUIT FOR OPEN AND SHORT-II

- 1. Disconnect "fuel level sensor unit and fuel pump" (main) harness connector.
- 2. Disconnect dropping resistor harness connector.
- 3. Check the continuity between "fuel level sensor unit and fuel pump" (main) harness connector or FPCM harness connector and dropping resistor harness connector.

Fuel level sensor unit and fuel pump (main)		Droppin	Continuity	
Connector	Terminal	Connector	Terminal	
B433	3	B112	2	Existed

## **FUEL PUMP CONTROL MODULE**

## < COMPONENT DIAGNOSIS >

[VQ35HR]

FPCM		Droppin	Continuity	
Connector	Terminal	Connector Terminal		Continuity
B111	4	B112	2	Existed

Also check harness for short to ground and short to power.

# Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

# 6. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors B65, B434
- Harness for open or short between "fuel level sensor unit and fuel pump" (main) and dropping resistor
- Harness for open or short between FPCM and dropping resistor

>> Repair open circuit, short to ground or short to power in harness or connectors.

# 7.CHECK FPCM INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Disconnect ECM harness connector.
- Check the continuity between FPCM harness connector and ECM harness connector.

FPCM		E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
B111	4	F105	32	Existed

3. Also check harness for short to ground and short to power.

## Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 8.

# 8.DETECT MALFUNCTIONING PART

## Check the following.

- Harness connectors B2, M13
- Harness connectors F102, M72
- Harness for open or short between FPCM and ECM

>> Repair open circuit, short to ground or short to power in harness or connectors.

# 9.check fpcm output signal circuit for open and short

Check the continuity between ECM and FPCM

E	ECM		FPCM	
Connector	Terminal	Connector Terminal		Continuity
F105	14	B111	1	Existed

Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 11. NO >> GO TO 10.

# 10.detect malfunctioning part

#### Check the following.

- Harness connectors B2, M13
- Harness connectors F102, M72
- Harness for open or short between ECM and FPCM

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# **FUEL PUMP CONTROL MODULE**

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

>> Repair open circuit, short to ground or short to power in harness or connectors.

# 11.CHECK FPCM

Refer to EC-612, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace FPCM.

12. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

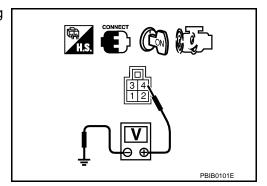
>> INSPECTION END

# Component Inspection

INFOID:0000000005353812

# 1. CHECK FUEL PUMP CONTROL MODULE (FPCM)

- 1. Start engine and warm it up normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Check the voltage between FPCM terminals under the following conditions.



FPCM		Ground	Condition	Voltage (V)
Connector	Terminal	Giodila	Condition	voltage (v)
B111 4	Ground	When engine cranking	Approx. 0	
	Biii 4 Giouna	After starting engine	Approx. 5	

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace FPCM.

INFOID:0000000005353814

### ICC BRAKE SWITCH

**Description** 

When the brake pedal is depressed, ICC brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by those two types of input (ON/OFF signal). Refer to ACS-9 for the ICC function.

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# Component Function Check

# 1. CHECK ICC BRAKE SWITCH FUNCTION

# With CONSULT-III

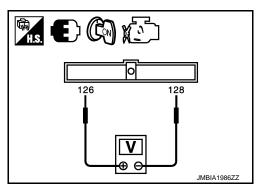
- 1. Turn ignition switch ON.
- 2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Cor	Indication	
BRAKE SW1 Brake pedal		Slightly depressed	OFF
(ICC brake switch)	Brake pedai	Fully released	ON

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#### **⋈** Without CONSULT-III

- Turn ignition switch ON.
- Check the voltage between ECM harness connector terminals as follows.



ECM					
Connector	+	_	Condition		Voltage (V)
Connector	Terminal	Terminal			
M9	126	128	Brake pedal Slightly depressed		Approx. 0
IVIS	(ICC brake switch signal)	120	brake pedar	Fully released	Battery voltage

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-614, "Diagnosis Procedure".

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Revision: 2009 June **EC-613** 2010 M35/M45

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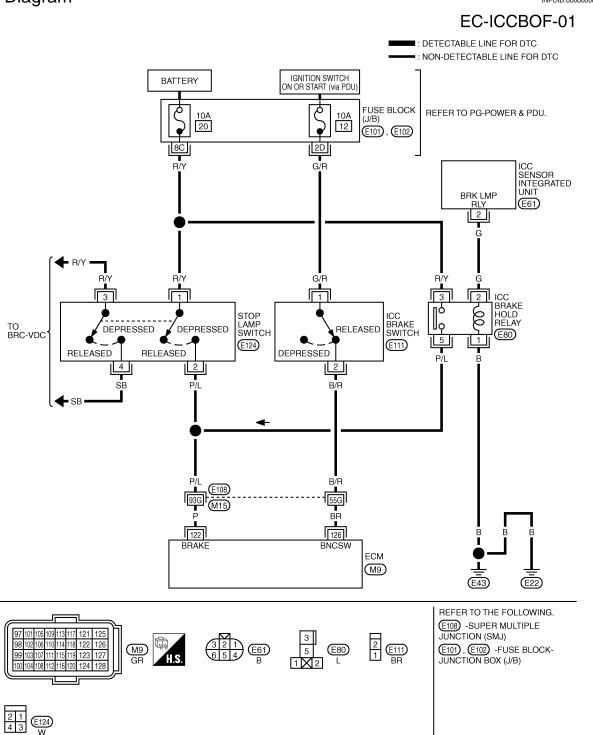
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Wiring Diagram



TBWT2478E

# Diagnosis Procedure

INFOID:0000000005353816

# 1.CHECK ICC BRAKE SWITCH POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ICC brake switch harness connector.
- Turn ignition switch ON.

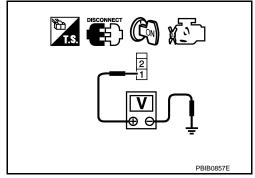
Revision: 2009 June **EC-614** 2010 M35/M45

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

4. Check the voltage between ICC brake switch harness connector and ground.

ICC brake switch		Ground	Voltage	
Connector	Terminal	Oround	voltage	
E111	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 E102
- 10 A fuse (No. 12)
- Harness for open or short between ICC brake switch and fuse

>> Repair open circuit short to ground or short to power in harness or connectors.

# ${f 3.}$ CHECK ICC BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between ICC brake switch harness connector and ECM harness connector.

ICC brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E111	2	M9	126	Existed

4. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 5. NO >> GO TO 4.

### 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- · Harness for open or short between ICC brake switch and ECM

>> Repair open circuit, short to ground or short to power in harness or connectors.

**EC-615** 

### 5. CHECK ICC BRAKE SWITCH

Refer to EC-616, "Component Inspection (ICC Brake Switch)".

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace ICC brake switch.

#### 6. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

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2010 M35/M45

#### **ICC BRAKE SWITCH**

#### < COMPONENT DIAGNOSIS >

INFOID:0000000005353817

[VQ35HR]

# Component Inspection (ICC Brake Switch)

# 1. CHECK ICC BRAKE SWITCH-I

- Turn ignition switch OFF.
- 2. Disconnect ICC brake switch harness connector.
- 3. Check the continuity between ICC brake switch terminals under the following conditions.

Terminals		Continuity	
1 and 2	Brako podal	Fully released	Existed
r and 2	Brake pedal	Slightly depressed	Not existed

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

# 2. CHECK ICC BRAKE SWITCH-II

- 1. Adjust ICC brake switch installation. Refer to BR-6, "Inspection and Adjustment".
- 2. Check the continuity between ICC brake switch terminals under the following conditions.

Terminals		Continuity	
1 and 2	Brake pedal	Fully released	Existed
1 and 2	Brake pedar	Slightly depressed	Not existed

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC brake switch.

INFOID:0000000005353819

### **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.

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### Component Function Check

# 1.INSPECTION START

Turn ignition switch OFF, and restart engine.

#### Does the engine start?

YES-1 >> With CONSULT-III: GO TO 2.

YES-2 >> Without CONSULT-III: GO TO 3.

NO >> Go to EC-620, "Diagnosis Procedure".

# 2.CHECK IGNITION SIGNAL FUNCTION

#### (P) With CONSULT-III

- 1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 2. Check that each circuit produces a momentary engine speed drop.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-620, "Diagnosis Procedure".

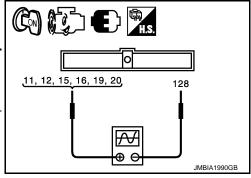
# 3.CHECK IGNITION SIGNAL FUNCTION

#### **⋈** Without CONSULT-III

1. Let engine idle.

Read the voltage signal between ECM harness connector terminals under the following conditions with an oscilloscope.

ECM			ECM		
	+		_	Voltage signal	
Connector	Terminal	Connector	Terminal		
	11				
	12			50mSec/div	
E40E	15	MO	400		
F105	16	M9	128	÷	
	19				
	20			2V/div JMBIA0035GB	



NOTE:

The pulse cycle changes depending on rpm at idle.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-620, "Diagnosis Procedure".

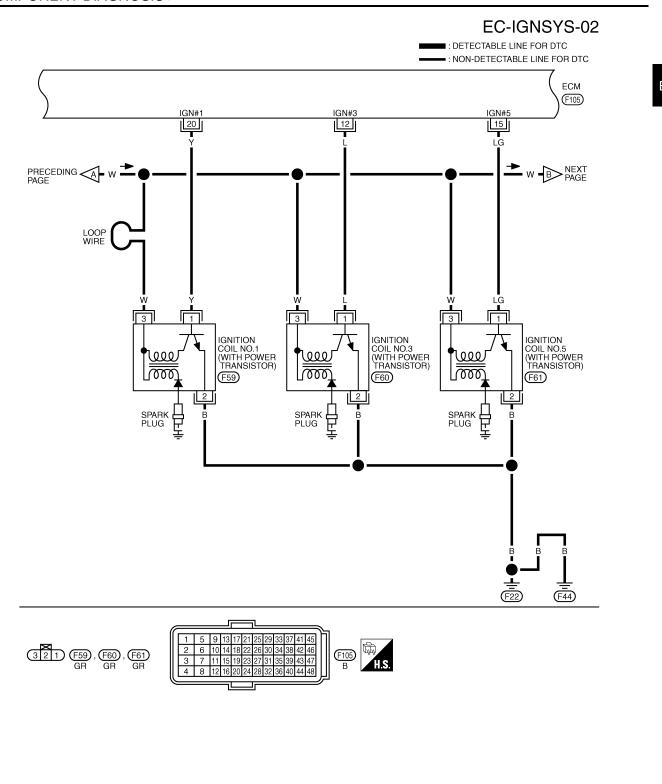
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Revision: 2009 June **EC-617** 2010 M35/M45

Wiring Diagram INFOID:0000000005353820 EC-IGNSYS-01 BATTERY : DETECTABLE LINE FOR DTC : NON-DETECTABLE LINE FOR DTC 20A 77 IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) REFER TO PG-POWER. ECM RELAY 8 E7, E9 18 46 E12 5 F3 W ANEXT PAGE CONDENSER (F38) F44 125 24 ECM M9, F105 REFER TO THE FOLLOWING. E108) -SUPER MULTIPLE JUNCTION (SMJ) E7 GR 1234 5678 F3 B 1 2 8 W 118 122 126 M9 GR (F105)

TBWT2479E



TBWT2480E

**EC-619** Revision: 2009 June 2010 M35/M45

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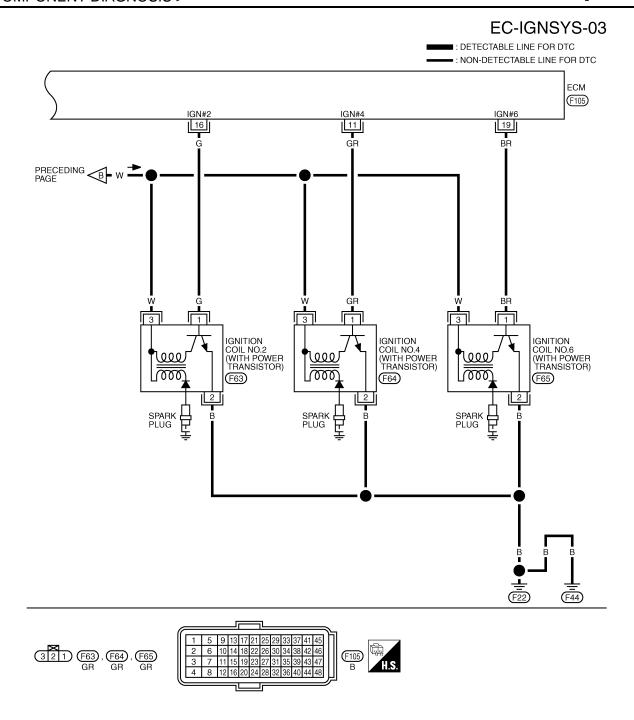
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TBWT2481E

# Diagnosis Procedure

INFOID:0000000005353821

# 1. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

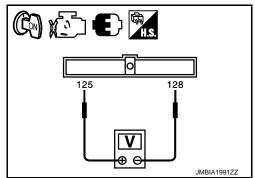
1. Turn ignition switch OFF, wait at least 10 seconds and then turn it ON.

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

Check the voltage between ECM harness connector terminals under the following conditions.

ECM			
Connector	+	_	Voltage
Connector	Terminal	Terminal	
M9	125	128	Battery voltage



Is the inspection result normal?

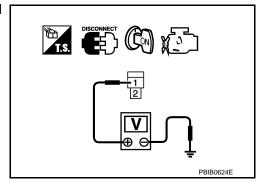
YES >> GO TO 2.

NO >> Go to EC-155, "Diagnosis Procedure".

2.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

- Turn ignition switch OFF.
- 2. Disconnect condenser harness connector.
- Turn ignition switch ON.
- 4. Check the voltage between condenser harness connector and ground.

Cond	Condenser		Voltage
Connector	Terminal	Ground	vollage
F38	1	Ground	Battery voltage



Is the inspection result normal?

YES >> GO TO 5. NO >> GO TO 3.

# 3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

- Turn ignition switch OFF.
- Disconnect IPDM E/R harness connector. 2.
- 3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

IPDM E/R		Condenser		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E7	17	F38	1	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Go to EC-155, "Diagnosis Procedure".

NO >> GO TO 4.

# 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F3, E12
- Harness for open or short between IPDM E/R and condenser

>> Repair open circuit, short to ground or short to power in harness or connectors.

5.check condenser ground circuit for open and short

**EC-621** Revision: 2009 June 2010 M35/M45 Α

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#### < COMPONENT DIAGNOSIS >

- Turn ignition switch OFF.
- 2. Check the continuity between condenser harness connector and ground.

	Condenser		Ground	Continuity
Conne	ctor	Terminal	Ground	Continuity
F38	3	2	Ground	Existed

3. Also check harness for short to power.

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair open circuit or short to power in harness or connectors.

### 6.CHECK CONDENSER

Refer to EC-624, "Component Inspection (Condenser)"

#### Is the inspection result normal?

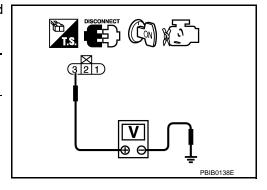
YES >> GO TO 7.

NO >> Replace condenser.

# 7.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

- 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.

lanition soil					
Ignition coil			Voltage		
Connector	Terminal	Glound	voltage		
F59	3	- Ground Ba			
F63	3				
F60	3		Ground Batton, vo	Pattory voltage	
F64	3		Battery voltage		
F61	3				
F65	3				
	F59 F63 F60 F64 F61	Connector         Terminal           F59         3           F63         3           F60         3           F64         3           F61         3	Connector         Terminal           F59         3           F63         3           F60         3           F64         3           F61         3		



#### Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace harness connectors.

# 8. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity
Cylinder	Connector	Terminal	Ground	Continuity
1	F59	2		
2	F63	2	Ground	Existed
3	F60	2		
4	F64	2		
5	F61	2		
6	F65	2		

3. Also check harness for short to power.

#### Is the inspection result normal?

YES >> GO TO 9.

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NO >> Repair open circuit or short to power in harness or connectors.

# 9. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect ECM harness connector.
- Check the continuity between ignition coil harness connector and ECM harness connector.

Ignition coil			E	Continuity	
Cylinder	Connector	Terminal	Connector	Terminal	Continuity
1	F59	1		20	
2	F63	1	F105	16	
3	F60	1		12	Existed
4	F64	1	F105	11	Existed
5	F61	1		15	
6	F65	1		19	

3. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

### 10.CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-623, "Component Inspection (Ignition Coil with Power Transistor)".

#### Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace malfunctioning ignition coil with power transistor.

### 11. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

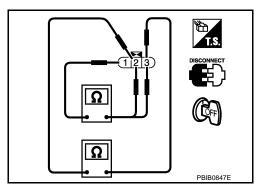
# Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000005353822

# 1. CHECK IGNITION COIL WITH POWER TRANSISTOR-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ignition coil harness connector.
- Check resistance between ignition coil terminals as per the following.

Terminals	Resistance [at 25°C (77°F)]	
1 and 2	Except 0 or ∞Ω	
1 and 3	Except 0 Ω	
2 and 3		



#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning ignition coil with power transistor.

# 2. CHECK IGNITION COIL WITH POWER TRANSISTOR-II

#### **CAUTION**

Perform the following procedure in a place with no combustible objects and good ventilation.

Turn ignition switch OFF.

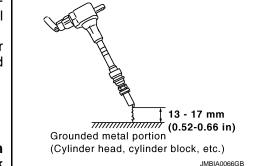
#### < COMPONENT DIAGNOSIS >

- Reconnect all harness connectors disconnected.
- Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

#### NOTE:

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- Start engine.
- After engine stalls, crank it 2 or 3 times to release all fuel pressure.
- 6. Turn ignition switch OFF.
- 7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- Remove ignition coil and spark plug of the cylinder to be checked.
- 9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 10. Connect spark plug and harness connector to ignition coil.
- 11. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 12. Crank engine for approximately 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



#### Spark should be generated.

#### **CAUTION:**

- Never place to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made. NOTE:

When the gap is less than 13 mm (0.52 in), a spark might be generated even if the coil is malfunctioning.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning ignition coil with power transistor.

# Component Inspection (Condenser)

INFOID:0000000005353823

# 1. CHECK CONDENSER

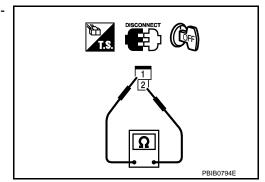
- Turn ignition switch OFF.
- 2. Disconnect condenser harness connector.
- Check resistance between condenser terminals as per the following.

Terminals	Resistance
1 and 2	Above 1 MΩ [at 25°C (77°F)]

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace condenser.



### **INFORMATION DISPLAY (ASCD)**

[VQ35HR] < COMPONENT DIAGNOSIS >

# **INFORMATION DISPLAY (ASCD)**

Description INFOID:0000000005353824

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INFOID:0000000005353825

INFOID:0000000005353826

ASCD operation status is indicated by two indicators (CRUISE and SET) in combination meter.

CRUISE indicator is displayed to indicated that ASCD system is ready for operation when MAIN switch on ASCD steering switch is turned ON.

SET indicator is displayed when the following conditions are met.

- · CRUISE indicator is displayed.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of the ASCD setting. The set speed is also displayed on the information display.

SET indicator is displayed during ASCD control.

When the canceling conditions come into effect, the CRUISE and SET indications on the information display disappear.

# Component Function Check

# 1. CHECK INFORMATION DISPLAY

- Start engine.
- 2. Press MAIN switch on ASCD steering switch.
- 3. Drive the vehicle at more than 40 km/h (25 MPH) **CAUTION:**

#### Always drive vehicle at a safe speed.

- Press SET/COAST switch.
- 5. Check that the readings of the speedometer show the same values as the set speed indicated in the information display while driving the vehicle on a flat road.

#### Is the inspection result normal?

YES >> INSPECTION END

>> Go to EC-625, "Diagnosis Procedure". NO

### Diagnosis Procedure

### 1.CHECK DTC

Check that DTC UXXXX, P0500 or P1574 is not displayed.

#### Is the inspection result normal?

YES >> GO TO 2.

NO-1 >> UXXXX: Perform trouble diagnosis for DTC UXXXX.

NO-2 >> P0500: Perform trouble diagnosis for DTC P0500. Refer to EC-430, "Diagnosis Procedure".

NO-3 >> P1574: Perform trouble diagnosis for DTC P1574. Refer to EC-549, "Diagnosis Procedure".

### 2.CHECK DTC WITH "UNITIED MATER & A/C AMP."

#### Refer to DI-28, "CONSULT-III Function (METER/M&A)".

#### Is the inspection result normal?

YES

NO

YES

NO

>> GO TO 3. N >> Perform trouble diagnosis relevant to DTC indicated. 3.check intermittent incident Refer to EC-154, "Description". Is the inspection result normal? >> Replace combination meter. Р >> Repair or replace.

**EC-625** Revision: 2009 June 2010 M35/M45

### MALFUNCTION INDICATOR LAMP

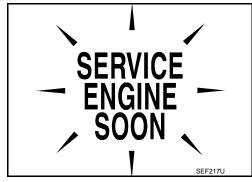
**Description** 

The Malfunction Indicator Lamp (MIL) is located on the combination meter.

The MIL will illuminate when the ignition switch is turned ON without the engine running. This is a bulb check.

When the engine is started, the MIL should turn off. If the MIL remains illuminated, the on board diagnostic system has detected an engine system malfunction.

For details, refer to EC-121, "Diagnosis Description".



# Component Function Check

INFOID:0000000005353828

1.CHECK MALFUNCTION INDICATOR LAMP (MIL) FUNCTION

- 1. Turn ignition switch ON.
- 2. Check that MIL illuminates.

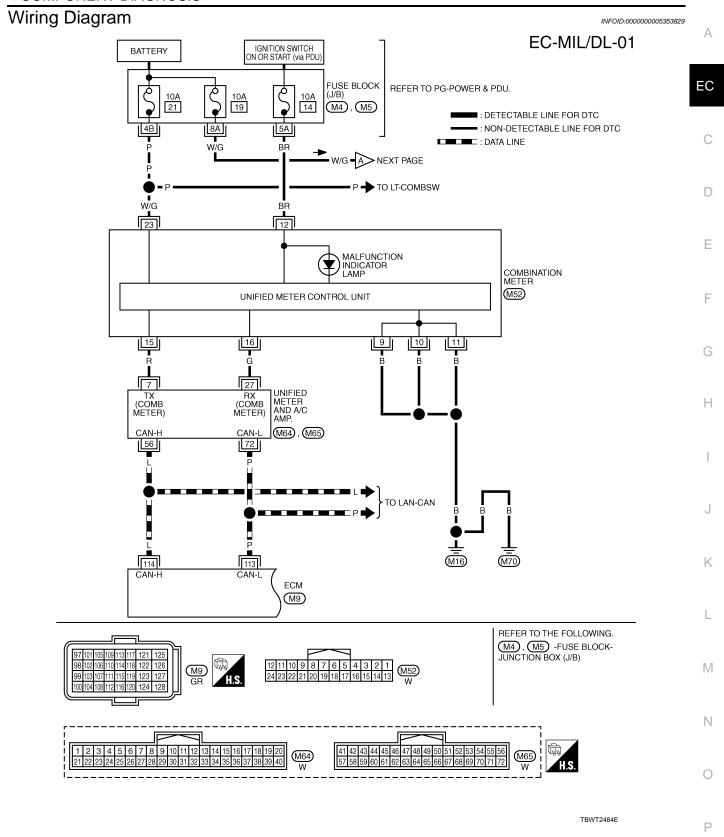
Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-628, "Diagnosis Procedure".

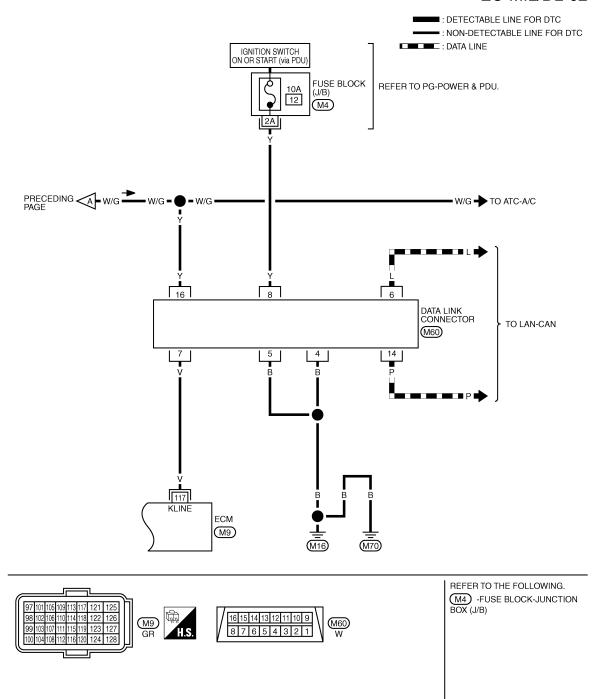
#### MALFUNCTION INDICATOR LAMP

[VQ35HR]



Revision: 2009 June **EC-627** 2010 M35/M45

#### EC-MIL/DL-02



TBWT2485E

# Diagnosis Procedure

#### INFOID:0000000005353830

# 1. CHECK DTC

Check that DTC UXXXX is not displayed.

#### Is the inspection result normal?

YES >> GO TO 2.

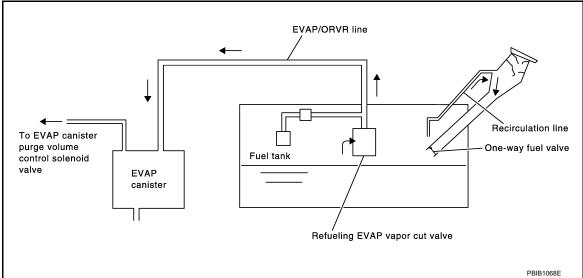
NO >> Perform trouble diagnosis for DTC UXXXX.

MALFUNCTION INDICATOR LAMP		
< COMPONENT DIAGNOSIS >	[VQ35HR]	
2.CHECK DTC WITH "UNIFIED METER AND A/C AMP."	£	Д
Refer to DI-28, "CONSULT-III Function (METER/M&A)".		
Is the inspection result normal? YES >> GO TO 3.	EO	
NO >> Repair or replace malfunctioning part.		J
3.CHECK INTERMITTENT INCIDENT		
Refer to EC-154, "Description".		)
Is the inspection result normal?		
YES >> Replace combination meter. NO >> Repair or replace malfunctioning part.		)
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EC-629 Revision: 2009 June 2010 M35/M45

# ON BOARD REFUELING VAPOR RECOVERY (ORVR)

Description INFOID:000000005353831



From the beginning of refueling, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve and EVAP/ORVR line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

#### **WARNING:**

When conducting inspections below, be sure to observe the following:

- Put a "CAUTION: FLAMMABLE" sign in workshop.
- Never smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Always furnish the workshop with a 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 <u>EC-692, "Inspection"</u>.
- Disconnect battery ground cable.
- Always replace O-ring when the fuel gauge retainer is removed.
- Never kink or twist hose and tube when they are installed.
- Never tighten hose and clamps excessively to avoid damaging hoses.
- · After installation, run engine and check for fuel leaks at connections.
- Never attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically.
   Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

# Component Function Check

INFOID:0000000005353832

# 1. CHECK ORVR FUNCTION

Check whether the following symptoms are present.

- Fuel odor from EVAP canister is strong.
- · Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

#### Are any symptoms present?

YES >> Go to EC-630, "Diagnosis Procedure".

NO >> INSPECTION END

# Diagnosis Procedure

INFOID:0000000005353833

# 1.INSPECTION START

Check whether the following symptoms are present.

A: Fuel odor from EVAP canister is strong.

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

B: Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Which symptom is present?

- A >> GO TO 2.
- B >> GO TO 7.

# 2.CHECK EVAP CANISTER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.0 kg (4.0 lb).

Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 4.

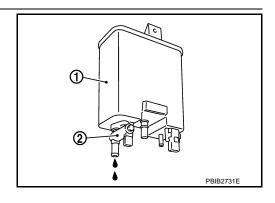
3.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister (1).

2 : EVAP canister vent control valve

Does water drain from the EVAP canister?

YES >> GO TO 4. NO >> GO TO 6.



### 4. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 5.

### 5. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

### 6.CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-633, "Component Inspection".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

### 7. CHECK EVAP CANISTER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- 2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.0 kg (4.0 lb).

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 9.

8. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

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#### < COMPONENT DIAGNOSIS >

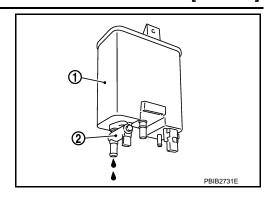
[VQ35HR]

Check if water will drain from EVAP canister (1).

2 : EVAP canister vent control valve

#### Does water drain from the EVAP canister?

YES >> GO TO 9. NO >> GO TO 11.



# 9. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 10.

# 10. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

# 11. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kinks, looseness and improper connection.

#### Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace hoses and tubes.

# 12. CHECK FILLER NECK TUBE

Check recirculation line for clogging, dents and cracks.

#### Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace filler neck tube.

# 13. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-633, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

# 14. CHECK FUEL FILLER TUBE

Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.

#### Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace fuel filler tube.

# 15. CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

#### Is the inspection result normal?

YES >> GO TO 16.

NO >> Repair or replace one-way fuel valve with fuel tank.

### 16. CHECK ONE-WAY FUEL VALVE-II

- 1. Check that fuel is drained from the tank.
- 2. Remove fuel filler tube and hose.

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

INFOID:0000000005353834

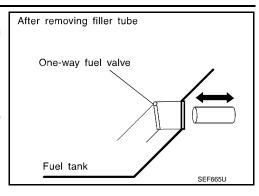
Check one-way fuel valve for operation as per the following. When a stick is inserted, the valve should open, when removing stick it should close.

Do not drop any material into the tank.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.



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## Component Inspection

# 1. INSPECTION START

Will CONSULT-III be used?

#### Will CONSULT-III be used?

YES >> GO TO 2.

NO >> GO TO 3.

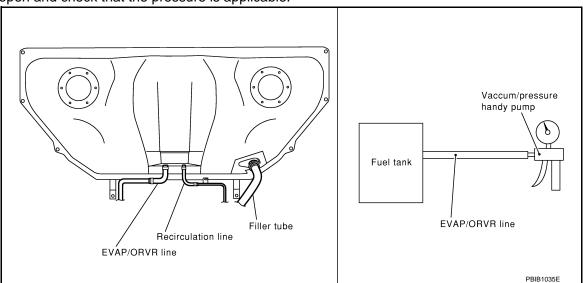
2.CHECK REFUELING EVAP VAPOR CUT VALVE

### **With CONSULT-III**

- Turn ignition switch OFF.
- Remove fuel tank. Refer to <u>FL-10</u>, "<u>Removal and Installation</u>".
- 3. Drain fuel from the tank as per the following:
- Remove fuel feed hose located on the fuel gauge retainer.
- Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
- Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-III.
- 4. Check refueling EVAP vapor cut valve for being stuck to close as per the following. Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
- 5. Check refueling EVAP vapor cut valve for being stuck to open as per the following.
- Connect vacuum pump to hose end.
- Remove fuel gauge retainer with fuel gauge unit.

#### Always replace O-ring with new one.

- Turn fuel tank upside down.
- Apply vacuum pressure to hose end [–13.3 kPa (–0.136 kg/cm<sup>3</sup>, –1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



Is the inspection result normal?

YES >> INSPECTION END

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

3.check refueling evap vapor cut valve

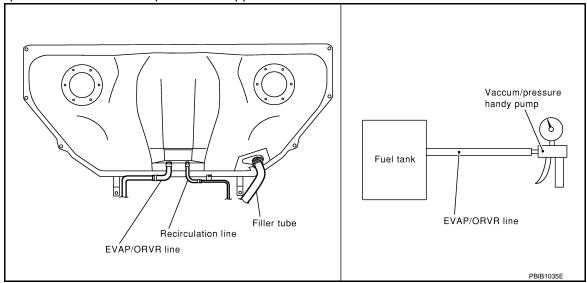
#### **⋈**Without CONSULT-III

- 1. Turn ignition switch OFF.
- Remove fuel tank. Refer to <u>FL-10</u>, "Removal and Installation".
- 3. Drain fuel from the tank as per the following:
- Remove fuel gauge retainer.
- Drain fuel from the tank using a handy pump into a fuel container.
- 4. Check refueling EVAP vapor cut valve for being stuck to close as per the following.

  Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
- 5. Check refueling EVAP vapor cut valve for being stuck to open as per the following.
- Connect vacuum pump to hose end.
- Remove fuel gauge retainer with fuel gauge unit.

#### Always replace O-ring with new one.

- Turn fuel tank upside down.
- Apply vacuum pressure to hose end [-13.3 kPa (-0.136 kg/cm<sup>3</sup>, -1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



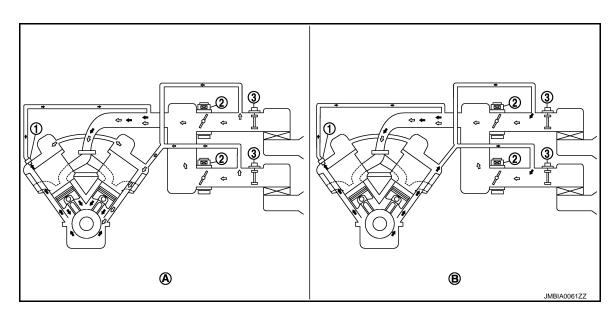
#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

### POSITIVE CRANKCASE VENTILATION

Description



- 1. PCV valve
- A. Normal condition
- ⟨□: Fresh air
- Elow-by air

- 2. Electric throttle control actuator
- B. Hi-load condition

Mass air flow sensor

This system returns blow-by gas to the intake manifold.

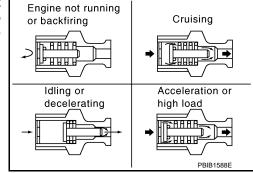
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



# Component Inspection

1. CHECK POSITIVE CRANKCASE VENTILATION (PCV) VALVE

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INFOID:0000000005353836

### **POSITIVE CRANKCASE VENTILATION**

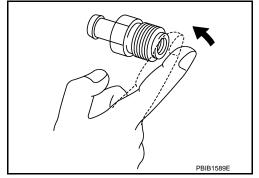
#### < COMPONENT DIAGNOSIS >

[VQ35HR]

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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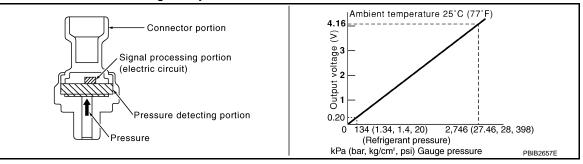
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### REFRIGERANT PRESSURE SENSOR

Description INFOID:000000005353837

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.



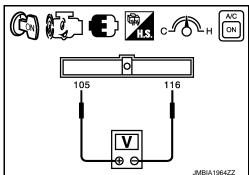
# Component Function Check

INFOID:0000000005353838

# 1. CHECK REFRIGERANT PRESSURE SENSOR FUNCTION

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn A/C switch and blower fan switch ON.
- 3. Check the voltage between ECM harness connector terminals under the following conditions.

Connector	+	_	Voltage (V)	
Connector	Terminal	Terminal		
M9	105 (Refrigerant pressure sensor signal)	116	1.0 - 4.0	



#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-638, "Diagnosis Procedure".

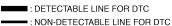
Revision: 2009 June **EC-637** 2010 M35/M45

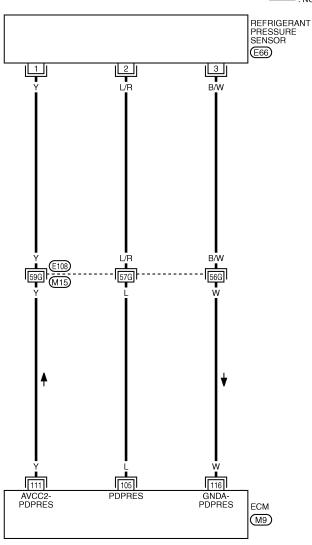
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Wiring Diagram









REFER TO THE FOLLOWING.

(E108) -SUPER MULTIPLE
JUNCTION (SMJ)

TBWT2482E

# Diagnosis Procedure

INFOID:0000000005353840

# 1. CHECK GROUND CONNECTION

- 1. Turn A/C switch and blower fan switch OFF.
- 2. Turn ignition switch OFF.
- Check ground connections M16, M70. Refer to <u>EC-158, "Ground Inspection"</u>.

#### REFRIGERANT PRESSURE SENSOR

# < COMPONENT DIAGNOSIS >

[VQ35HR]

#### Is the inspection result normal?

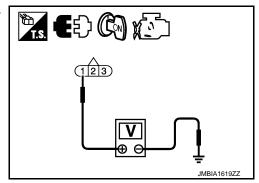
YES >> GO TO 2.

NO >> Repair or replace ground connections.

# 2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect refrigerant pressure sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pr	essure sensor	Ground	Voltage (V)
Connector	Terminal	Oround	voltage (v)
E66	1	Ground	Approx. 5



#### Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

# 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit, short to ground or short to power in harness or connectors.

# 4. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E66	3	M9	116	Existed

4. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

#### DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit, short to ground or short to power in harness or connectors.

# 6. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

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#### REFRIGERANT PRESSURE SENSOR

[VQ35HR]

Refrigerant pressure sensor		EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E66	2	M9	105	Existed

2. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 7.

# 7.DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and refrigerant pressure sensor
  - >> Repair open circuit, short to ground or short to power in harness or connectors.

# 8. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.

NO >> Repair or replace malfunctioning part.

#### SNOW MODE SWITCH

< COMPONENT DIAGNOSIS >

[VQ35HR]

INFOID:0000000005353842

# **SNOW MODE SWITCH**

Description INFOID:000000005353841

The snow mode switch signal is sent to the "unified meter and A/C amp." from the snow mode switch. The "unified meter and A/C amp." then sends the signal to the ECM by CAN communication line.

The snow mode is used for driving or starting the vehicle on snowy roads or slippery areas. If the snow mode is activated, the vehicle speed will not accelerator as quickly as normal to avoid vehicle slip. In other words, ECM controls rapid engine torque change by controlling the electric throttle control actuator operating speed.

# Component Function Check

# 1. CHECK SNOW MODE SWITCH FUNCTION

- 1. Turn ignition switch ON.
- 2. Select "SNOW MODE SW" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "SNOW MODE SW" indication under the following conditions.

Monitor item	Condition		Indication
SNOW MODE SW	Snow mode switch	ON	ON
	Snow mode switch	OFF	OFF

#### <u>Is the inspection result normal?</u>

YES >> GO TO 2.

NO >> Go to EC-642, "Diagnosis Procedure".

# 2.CHECK SNOW MODE INDICATOR FUNCTION

- 1. Turn ignition switch ON.
- 2. Check the snow mode indicator in the snow mode switch under the following condition.

Condition		Snow mode indicator
Snow mode switch	ON	ON
Show mode switch	OFF	OFF

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-642, "Diagnosis Procedure".

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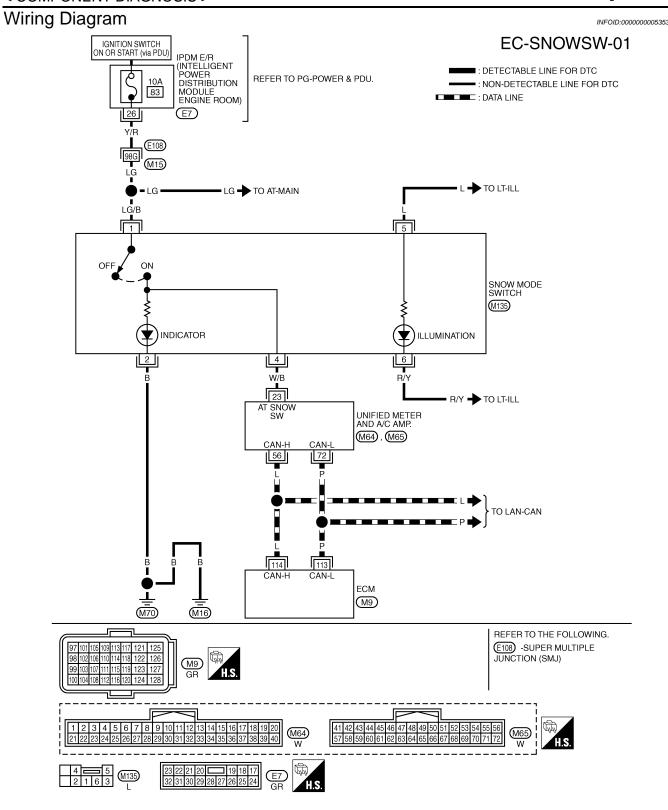
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TBWT2483E

# Diagnosis Procedure

INFOID:0000000005353844

# 1. CHECK SNOW MODE SWITCH OVERALL FUNCTION

Confirm the malfunctioning circuit (snow mode switch or snow mode indicator). Refer to <u>EC-641</u>. "Component Function Check".

Which circuit is related to the incident?

#### SNOW MODE SWITCH

#### < COMPONENT DIAGNOSIS >

Snow mode switch>>GO TO 2. Snow mode indicator>>GO TO 6.

2.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to DI-28, "CONSULT-III Function (METER/M&A)".

#### Is the inspection result normal?

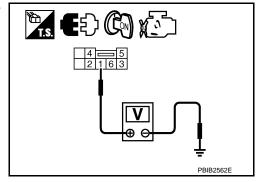
YES >> GO TO 3.

NO >> Go to DI-26, "System Description".

# 3.check snow mode switch power supply circuit

- Turn ignition switch OFF.
- Disconnect snow mode switch harness connector.
- Turn ignition switch ON. 3.
- 4. Check the voltage between snow mode switch harness connector and ground.

Snow mode switch		Ground	Voltage	
Connector	tor Terminal			
M135	1	Ground	Battery voltage	



#### Is the inspection result normal?

YES >> GO TO 5. NO >> GO TO 4.

# 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- IPDM E/R harness connector E7
- 10 A fuse (No. 83)
- Harness for open or short between snow mode switch and fuse.

>> Repair open circuit, short to ground or short to power in harness or connectors.

# ${f 5.}$ check snow mode switch input signal circuit for open and short

- 1. Turn ignition switch OFF.
- Disconnect "unified meter and A/C amp." harness connector.
- 3. Check the continuity between snow mode switch harness connector and "unified meter and A/C amp." harness connector.

Snow mode switch		Unified meter and A/C amp.		Continuity
Connector	Terminal	Connector	Terminal	Continuity
M135	4	M64	23	Existed

Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YFS >> GO TO 8.

NO >> Repair open circuit, short to ground or short to power in harness or connector.

### 6.CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connections M16, M70. Refer to <a>EC-158</a>, "Ground Inspection"</a>.

#### Is the inspection result normal?

YES >> GO TO 7.

**EC-643** Revision: 2009 June 2010 M35/M45

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#### **SNOW MODE SWITCH**

#### < COMPONENT DIAGNOSIS >

[VQ35HR]

NO >> Repair or replace ground connections.

# 7.check snow mode indicator lamp ground circuit for open and short

1. Check the continuity between snow mode switch harness connector and ground.

Snow mode switch		Ground	Continuity
Connector	Terminal	Ground	Continuity
M135	2	Ground	Existed

2. Also check harness for short to power.

#### Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to power in harness or connectors.

#### 8.CHECK SNOW MODE SWITCH

Refer to EC-644, "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace snow mode switch.

### 9. CHECK INTERMITTENT INCIDENT

Refer to EC-154, "Description".

#### >> INSPECTION END

# Component Inspection

INFOID:0000000005353845

# 1. CHECK SNOW MODE SWITCH-I

- Turn ignition switch OFF.
- Disconnect snow mode switch harness connector.
- 3. Check the continuity between snow mode switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 4	Snow mode switch	ON	Existed
	Show mode switch	OFF	Not Existed

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace snow mode switch.

# 2.CHECK SNOW MODE SWITCH-II

Check the continuity between snow mode switch terminals under the following conditions.

Terminals (Polarity)	Continuity
2 (+) - 4 (-)	Existed
4 (+) - 2 (-)	Not Existed

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace snow mode switch.

[VQ35HR] < ECU DIAGNOSIS >

# **ECU DIAGNOSIS**

### **ECM**

Reference Value INFOID:0000000005353846 EC

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### VALUES ON THE DIAGNOSIS TOOL

#### NOTE:

- · Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
- \* Specification data may not be directly related to their components signals/values/operations. i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIM-ING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

CONSULT-III MONITOR ITEM

Monitor Item	Condition		Values/Status
ENG SPEED	Run engine and compare CONSULT-III value with the tachometer indication.		Almost the same speed as the tachometer indication
MAS A/F SE-B1	See EC-146, "Description".		
MAS A/F SE-B2	See EC-146, "Description".		
B/FUEL SCHDL	See EC-146, "Description".		
A/F ALPHA-B1	See EC-146, "Description".		
A/F ALPHA-B2	See EC-146, "Description".		
COOLAN TEMP/S	Ignition switch: ON		Indicates engine coolant temperature
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
A/F SEN1 (B2)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
HO2S2 (B1)	<ul> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met.</li> <li>Engine: After warming up</li> <li>After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>		0 - 0.3 V ←→ Approx. 0.6 - 1.0 V
HO2S2 (B2)	<ul> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met.</li> <li>Engine: After warming up</li> <li>After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>		0 - 0.3 V ←→ Approx. 0.6 - 1.0 V
HO2S2 MNTR (B1)	<ul> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met.</li> <li>Engine: After warming up</li> <li>After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>		$LEAN \longleftrightarrow RICH$
HO2S2 MNTR (B2)	<ul> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met.</li> <li>Engine: After warming up</li> <li>After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>		$LEAN \longleftrightarrow RICH$
VHCL SPEED SE	Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	Ignition switch: ON (Engine stopped)		11 - 14 V
ACCEL CENTA	Ignition switch: ON	Accelerator pedal: Fully released	0.45 - 1.0 V
ACCEL SEN 1	(Engine stopped)	Accelerator pedal: Fully depressed	4.4 - 4.8 V
	Ignition switch: ON	Accelerator pedal: Fully released	0.45 - 1.0 V
ACCEL SEN 2*1		Accelerator pedal: Fully depressed	4.4 - 4.8 V

Monitor Item	Co	ondition	Values/Status
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 1-B1	<ul><li>(Engine stopped)</li><li>Selector lever: D</li></ul>	Accelerator pedal: Fully depressed	Less than 4.75 V
1	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 2-B1*1	<ul><li>(Engine stopped)</li><li>Selector lever: D</li></ul>	Accelerator pedal: Fully depressed	Less than 4.75 V
FUEL T/TMP SE	Ignition switch: ON		Indicates fuel tank tempera- ture
INT/A TEMP SE	Ignition switch: ON		Indicates intake air temperature
EVAP SYS PRES	Ignition switch: ON		Approx. 1.8 - 4.8 V
FUEL LEVEL SE	Ignition switch: ON		Depending on fuel level of fuel tank
START SIGNAL	• Ignition switch: $ON \rightarrow START \rightarrow Ol$	N	$OFF \to ON \to OFF$
CLSD THL POS	Ignition switch: ON	Accelerator pedal: Fully released	ON
CLSD THE POS	(Engine stopped)	Accelerator pedal: Slightly depressed	OFF
	• Engine: After werming and idle the	Air conditioner switch: OFF	OFF
AIR COND SIG	Engine: After warming up, idle the engine	Air conditioner switch: ON (Compressor operates.)	ON
D/N DOSLSW/	• Ignition quitch: ON	Selector lever: P or N	ON
P/N POSI SW	Ignition switch: ON	Selector lever: Except above	OFF
PW/ST SIGNAL	Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
FW/ST SIGNAL		Steering wheel: Being turned	ON
	NAL • Ignition switch: ON	Rear window defogger switch: ON and/or	ON
LOAD SIGNAL		Lighting switch: 2nd position	
		Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	• Ignition switch: $ON \rightarrow OFF \rightarrow ON$		$ON \to OFF \to ON$
HEATER FAN SW	Engine: After warming up, idle the	Heater fan switch: ON	ON
TILATER FAN 5W	engine	Heater fan switch: OFF	OFF
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	OFF
BIVARL SW	- ignition switch. ON	Brake pedal: Slightly depressed	ON
	Engine: After warming up     Selector lever: P or N	Idle	2.0 - 3.0 msec
INJ PULSE-B1	Air conditioner switch: OFF     No load	2,000 rpm	1.9 - 2.9 msec
	Engine: After warming up	Idle	2.0 - 3.0 msec
INJ PULSE-B2	<ul><li>Selector lever: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,000 rpm	1.9 - 2.9 msec
	Engine: After warming up	Idle	10° - 20° BTDC
IGN TIMING	Selector lever: P or N     Air conditioner switch: OFF     No load	2,000 rpm	25° - 45° BTDC
	Engine: After warming up	Idle	5% - 35%
CAL/LD VALUE	<ul><li>Selector lever: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,500 rpm	5% - 35%
	Engine: After warming up	Idle	2.0 - 6.0 g·m/s
MASS AIRFLOW	<ul><li>Selector lever: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,500 rpm	7.0 - 20.0 g·m/s

### **ECM**

< ECU DIAGNOSIS > [VQ35HR]

Monitor Item	C	ondition	Values/Status	
PURG VOL C/V	Engine: After warming up     Selector lever: P or N     Air conditioner switch: OFF	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%	
	No load	2,000 rpm	_	
INT/V TIM (B1)	<ul> <li>Engine: After warming up</li> <li>Selector lever: P or N</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	2,000 rpm	–5° - 5°CA Approx. 0° - 30°CA	
INT/V TIM (B2)	Engine: After warming up     Selector lever: P or N     Air conditioner switch: OFF     No load	2,000 rpm	_5° - 5°CA Approx. 0° - 30°CA	<u> </u>
	Engine: After warming up	Idle	–5° - 5°CA	
EXH/V TIM B1	<ul> <li>Selector lever: P or N</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	Around 2,500 rpm while the engine speed is rising	Approx. 0° - 30°CA	
	Engine: After warming up	Idle	–5° - 5°CA	
EXH/V TIM B2	<ul><li>Selector lever: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	Around 2,500 rpm while the engine speed is rising	Approx. 0° - 30°CA	_
	Engine: After warming up	Idle	0% - 2%	
INT/V SOL (B1)	<ul><li>Selector lever: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,000 rpm	Approx. 0% - 50%	<del></del>
	Engine: After warming up	Idle	0% - 2%	
<ul> <li>INT/V SOL (B2)</li> <li>Selector lever: P or N</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	Air conditioner switch: OFF	2,000 rpm	Approx. 0% - 50%	
	Engine: After warming up	Idle	0% - 2%	
VTC DTY EX B1	<ul><li>Selector lever: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	Around 2,500 rpm while the engine speed is rising	Approx. 0% - 70%	<del></del>
	Engine: After warming up	Idle	0% - 2%	
VTC DTY EX B2	<ul><li>Selector lever: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	Around 2,500 rpm while the engine speed is rising	Approx. 0% - 70%	
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V	
TP SEN 1-B2	<ul><li>(Engine stopped)</li><li>Selector lever: D</li></ul>	Accelerator pedal: Fully depressed	Less than 4.75 V	_
	Ignition switch: ON     (Engine stopped)     Selector lever: D	Accelerator pedal: Fully released	More than 0.36 V	
TP SEN 2-B2* <sup>1</sup>		Accelerator pedal: Fully depressed	Less than 4.75 V	
		Air conditioner switch: OFF	OFF	_
AIR COND RLY	Engine: After warming up, idle the engine	Air conditioner switch: ON (Compressor operates)	ON	
FUEL PUMP RLY	For 1 second after turning ignition s     Engine running or cranking	switch: ON	ON	
	Except above		OFF	
EDCM	Engine: Cranking		HI	
FPCM	Engine: Idle     Engine coolant temperature: More	than 10°C (50°F)	LOW	
VENT CONT/V	Ignition switch: ON		OFF	
THRTL RELAY	Ignition switch: ON		ON	

Monitor Item		Condition	Values/Status
HO2S2 HTR (B1)	<ul> <li>Engine speed: Below 3,600 rpm after the following conditions are met.</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>		ON
	Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B2)	- Engine: After warming up	ofter the following conditions are met.  en 3,500 and 4,000 rpm for 1 minute and at	ON
	Engine speed: Above 3,600 rpm		OFF
I/P PULLY SPD	Vehicle speed: More than 20 km/h	n (12 MPH)	Almost the same speed as the tachometer indication
VEHICLE SPEED	Turn drive wheels and compare C cation.	ONSULT-III value with the speedometer indi-	Almost the same speed as the speedometer indication
IDL A/V LEARN	Engine: Punning	Idle air volume learning has not been performed yet.	YET
IDE AV LEANN	Engine: Running	Idle air volume learning has already been performed successfully.	CMPLT
SNOW MODE SW	Ignition switch: ON	Snow mode switch: ON	ON
		Snow mode switch: OFF	OFF
ENG OIL TEMP	Engine: After warming up		More than 70°C (158°F)
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has illuminated.	0 - 65,535 km (0 - 40,723 miles)
A/F S1 HTR (B1)	Engine: After warming up, idle the engine (More than 140 seconds after starting engine)		4 - 100%
A/F S1 HTR (B2)	Engine: After warming up, idle the engine     (More than 140 seconds after starting engine)		4 - 100%
AC PRESS SEN	<ul> <li>Engine: Idle</li> <li>Both A/C switch and blower fan switch: ON (Compressor operates)</li> </ul>		1.0 - 4.0 V
VHCL SPEED SE	Turn drive wheels and compare C cation.	<ul> <li>Turn drive wheels and compare CONSULT-III value with the speedometer indi- cation.</li> </ul>	
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
MAIN SW	Ignition switch: ON	MAIN switch: Pressed	ON
Will till to the	igrition switch. Of	MAIN switch: Released	OFF
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	Ignition switch: ON	SET/COAST switch: Pressed	ON
	-g	SET/COAST switch: Released	OFF
BRAKE SW1 (ICC/ASCD brake	Ignition switch: ON	Brake pedal: Fully released	ON
switch)		Brake pedal: Slightly depressed	OFF
BRAKE SW2	a longition quitable ON	Brake pedal: Fully released	OFF
(Stop lamp switch)	Ignition switch: ON	Brake pedal: Slightly depressed	ON
DIST SW	Ignition switch: ON	DISTANCE switch: Pressed	ON
		DISTANCE switch: Released	OFF
VHCL SPD CUT	Ignition switch: ON		NON

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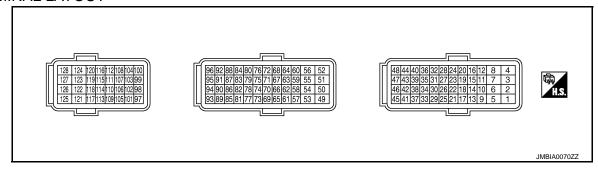
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Monitor Item	C	Values/Status			
LO SPEED CUT	Ignition switch: ON		NON		
AT OD MONITOR	Ignition switch: ON		OFF		
AT OD CANCEL	Ignition switch: ON		OFF		
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time $\rightarrow$ at the 2nd time	$ON \to OFF$		
	MAIN switch: ON	ASCD: Operating	ON		
SET LAMP	<ul> <li>When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)</li> </ul>	ASCD: Not operating	OFF		
EXH V/T LEARN	- Facine Dunning	Exhaust Valve Timing Control Learning has not been performed yet.	YET		
EXH V/I LEARN	Engine: Running	Exhaust Valve Timing Control Learning has not been performed yet.	CMPLT		
BAT CUR SEN	<ul> <li>Engine speed: Idle</li> <li>Battery: Fully charged*<sup>2</sup></li> <li>Selector lever: P or N</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	<ul> <li>Battery: Fully charged*<sup>2</sup></li> <li>Selector lever: P or N</li> <li>Air conditioner switch: OFF</li> </ul>			
AC EVA TEMP	Engine: Idle     Both A/C switch and blower fan sw	itch: ON (Compressor operates)	Changes according to instructed value from Unified mater and A/C amp.		
AC EVA TARGET	Engine: Idle     Both A/C switch and blower fan sw	Engine: Idle     Both A/C switch and blower fan switch: ON (Compressor operates)			
ALT DUTY	Engine: Idle		0 - 80%		
A/F ADJ-B1	Engine: Running	-0.330 - 0.330			
A/F ADJ-B2	Engine: Running	-0.330 - 0.330			
FAN DUTY	Engine: Running	Engine: Running			
ALT DUTY SIG	Power generation voltage variable	control: Operating	ON		
ALI DUTT SIG	Power generation voltage variable	OFF			

<sup>\*1:</sup> Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

#### TERMINAL LAYOUT



## PHYSICAL VALUES

#### NOTE:

- ECM is located behind the instrument assist lower panel. For this inspection, remove passenger side instrument lower panel.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

<sup>\*2:</sup> Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to SC-4, "How to Handle Battery".

	nal No.	Description			Value
+		Signal name	Input/ Output	Condition	(Approx.)
1 (G)	128 (B)	A/F sensor 1 heater (bank 1)	Output	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed (More than 140 seconds after starting engine)</li></ul>	2.9 - 8.8 V★  50mSec/div  5V/div  JMBIA0030GB
2	128	Throttle control motor	Output	[Ignition switch: ON]  • Engine stopped  • Selector lever: D  • Accelerator pedal: Fully depressed	0 - 14 V★  500μSec/div  5V/div  JMBIA0031GB
(1)	(P) (B) (Open) (bank 1)	'	[Ignition switch: ON]  • Engine stopped  • Selector lever: D  • Accelerator pedal: Fully released	0 - 14 V★  500μSec/div  5V/div  JMBIA0032GB	
3 (R)	128 (B)	Throttle control motor relay power supply (bank 1)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
4 (V)	128 (B)	Throttle control motor (Close) (bank 1)	Output	<ul> <li>[Ignition switch: ON]</li> <li>Engine stopped</li> <li>Selector lever: D</li> <li>Accelerator pedal: In the middle of releasing operation</li> </ul>	0 - 14 V★  500μSec/div  5V/div  JMBIA0033GB
5 (W)	128 (B)	A/F sensor 1 heater (bank 2)	Output	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed (More than 140 seconds after starting engine)</li></ul>	2.9 - 8.8 V★  50mSec/div  5V/div  JMBIA0030GB
				<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	BATTERY VOLTAGE (11 - 14 V)
6 (SB)	128 (B)	Exhaust valve timing control magnet retarder (bank 1)	Output	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Around 2,500 rpm while the engine speed is rising</li></ul>	7 - 12 V★  5V/div JMBIA0034GB

Terminal No. (Wire color) Description		Description		O an alitican	Value	А		
+		Signal name	Input/ Output	Condition	(Approx.)			
				[Engine is running]  • Warm-up condition  • Idle speed	BATTERY VOLTAGE (11 - 14 V)	EC		
7 (Y)	128 (B)	Exhaust valve timing control magnet retarder (bank 2)	Output	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Around 2,500 rpm while the engine speed is rising</li></ul>	7 - 12 V★  5V/div JMBIA0034GB	C D		
8 (B)	_	ECM ground	_	_	_			
11 (GR) 12		Ignition signal No. 4		[Engine is running] • Warm-up condition	0 - 0.2 V★  50mSec/div	F		
(L) 15 (LG)	128	Ignition signal No. 3 Ignition signal No. 5		Output	Output	Idle speed     NOTE:     The pulse cycle changes depending on rpm at idle	2V/div JMBIA0035GB	G H
16 (G) 19 (BR)	(B)	Ignition signal No. 2 Ignition signal No. 6 Ignition signal No. 1	Guipui	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.1 - 0.4 V★  50mSec/div	J		
(Y)		igniion oignai ito.			2V/div JMBIA0036GB	I.		
14 (BR)	128 (B)	Fuel pump control module (FPCM)	Output	<ul><li>[When cranking engine]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	0 - 0.5 V 8 - 12 V	K		
17 (P)	128 (B)	Heated oxygen sensor 2 heater (bank 1)	Output	<ul> <li>[Engine is running]</li> <li>Engine speed: Below 3,600 rpm after the following conditions are met</li> <li>Engine: after warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	10 V★  50mSec/div  5V/div  JMBIA0037GB	M N		
				[Ignition switch: ON]  • Engine stopped [Engine is running]  • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)	0		

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	inal No. e color)	Description		O an althium	Value
+		Signal name	Input/ Output	Condition	(Approx.)
				<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	BATTERY VOLTAGE (11 - 14 V)
18 (W)	128 (B)	Intake valve timing control solenoid valve (bank 1)	Output	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>	7 - 12 V★  5V/div  JMBIA1638GB
21	128	EVAP canister purge vol-		<ul><li>[Engine is running]</li><li>Idle speed</li><li>Accelerator pedal: Not depressed even slightly, after engine starting</li></ul>	BATTERY VOLTAGE  (11 - 14 V)★  50mSec/div  10V/div  JMBIA0039GB
(V)		Output	<ul><li>[Engine is running]</li><li>Engine speed: Approx. 2,000 rpm (More than 100 seconds after starting engine)</li></ul>	BATTERY VOLTAGE  (11 - 14 V)★  50mSec/div  10V/div  JMBIA0040GB	
22 (R)	128 (B)	Fuel pump relay	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.5 V
(1.1)	(2)			[Ignition switch: ON]     More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)
24 (SB)	128 (B)	ECM relay (Self shut-off)	Output	<ul><li>[Engine is running]</li><li>[Ignition switch: OFF]</li><li>A few seconds after turning ignition switch OFF</li></ul>	0 - 1.5 V
(30)	(D)	(Odii Silut-Oii)		[Ignition switch: OFF]     More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
25 (O)	128 (B)	Throttle control motor relay	Output	[Ignition switch: ON → OFF]	0 - 1.0 V ↓ BATTERY VOLTAGE (11 - 14 V) ↓ 0 V
				[Ignition switch: ON]	0 - 1.0 V

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	nal No. color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
				<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	BATTERY VOLTAGE (11 - 14 V)
29 (GR)	128 (B)	Intake valve timing control solenoid valve (bank 2)	Output	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>	7 - 12 V★  5V/div  JMBIA1638GB
30	40	Throttle position sensor 1	Input	[Ignition switch: ON]  • Engine stopped  • Selector lever: D  • Accelerator pedal: Fully released	More than 0.36 V
(O)	(W/L)	(bank 1)		<ul><li>[Ignition switch: ON]</li><li>Engine stopped</li><li>Selector lever: D</li><li>Accelerator pedal: Fully depressed</li></ul>	Less than 4.75 V
31	48	Throttle position sensor 1	Input	<ul><li>[Ignition switch: ON]</li><li>Engine stopped</li><li>Selector lever: D</li><li>Accelerator pedal: Fully released</li></ul>	More than 0.36 V
(R)	(B)	(bank 2)		<ul><li>[Ignition switch: ON]</li><li>Engine stopped</li><li>Selector lever: D</li><li>Accelerator pedal: Fully depressed</li></ul>	Less than 4.75 V
				[When cranking engine]	0 V
32 (G/R)	128 (B)	Fuel pump control module (FPCM) check	Input	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	4 - 6 V
33 (LG)	128 (B)	Heated oxygen sensor 2 heater (bank 2)	Output	<ul> <li>[Engine is running]</li> <li>Engine speed: Below 3,600 rpm after the following conditions are met</li> <li>Engine: after warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	50mSec/div 50mSec/div 5V/div JMBIA0037GB
				[Ignition switch: ON]  • Engine stopped [Engine is running]  • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
34	40	Throttle position sensor 2	Input	<ul><li>[Ignition switch: ON]</li><li>Engine stopped</li><li>Selector lever: D</li><li>Accelerator pedal: Fully released</li></ul>	Less than 4.75 V
(O/L)	(W/L)	(bank 1)	Input	<ul><li>[Ignition switch: ON]</li><li>Engine stopped</li><li>Selector lever: D</li><li>Accelerator pedal: Fully depressed</li></ul>	More than 0.36 V

	nal No. e color)	Description		Condition	Value	
+		Signal name	Input/ Output	Condition	(Approx.)	
35	35 48 Throttle position se	Throttle position sensor 2	Throttle position sensor 2	Input	<ul><li>[Ignition switch: ON]</li><li>Engine stopped</li><li>Selector lever: D</li><li>Accelerator pedal: Fully released</li></ul>	Less than 4.75 V
(W)	(B)	(bank 2)	mput	<ul><li>[Ignition switch: ON]</li><li>Engine stopped</li><li>Selector lever: D</li><li>Accelerator pedal: Fully depressed</li></ul>	More than 0.36 V	
37	128	Crankshaft position sensor	Input	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed NOTE: The pulse cycle changes depending on rpm at idle</li> </ul>	4.0 - 5.0 V★  1mSec/div  2V/div  JMBIA0041GB	
(W)	(B)	Grankshan position consort	mput	[Engine is running] • Engine speed: 2,000 rpm	4.0 - 5.0 V★  1mSec/div  2V/div  JMBIA0042GB	
40 (W/L)	_	Sensor ground [Throttle position sensor (bank 1)]	_	_	_	
43 (G)	48 (B)	Sensor power supply [Throttle position sensor (bank 2)]	_	[Ignition switch: ON]	5 V	
44 (W)	40 (W/L)	Sensor power supply [Throttle position sensor (bank 1)]	_	[Ignition switch: ON]	5 V	
46 (R)	47 (B/W)	Sensor power supply [Crankshaft position sensor]	_	[Ignition switch: ON]	5 V	
47 (B/W)	_	Sensor ground [Crankshaft position sen- sor]	_	_	_	
48 (B)	_	Sensor ground [Throttle position sensor (bank 2)]	_	_	_	
49 (L/Y)	128 (B)	Throttle control motor (Close) (bank 2)	Output	[Ignition switch: ON]  • Engine stopped  • Selector lever: D  • Accelerator pedal: In the middle of releasing operation	0 - 14 V★  500μSec/div  5V/div  JMBIA0033GB	

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	inal No. e color)	Description		Condition	Value	А	
+		Signal name	Input/ Output	Condition	(Approx.)		
50	128	Throttle control motor	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	0 - 14 V★  500μSec/div  5V/div  JMBIA0031GB	C	
(L)	(B)	(Open) (bank 2)		[Ignition switch: ON]  • Engine stopped  • Selector lever: D  • Accelerator pedal: Fully released	0 - 14 V★  500μSec/div  5V/div  JMBIA0032GB	E F	
52 (R)	128 (B)	Throttle control motor relay power supply (bank 2)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	G	
	400				[Ignition switch: OFF]	0 V	
53 (W)	128 (B)	Ignition switch	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	Н	
57 (L)	128 (B)	A/F sensor 1 (bank 1)	Input	[Ignition switch: ON]	2.2 V	I	
58	88	Exhaust valve timing con-		<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed NOTE:  The pulse cycle changes depending on rpm at idle</li> </ul>	4.0 - 5.0 V★  20mSec/div  2V/div  JMBIA0043GB	J	
(V)	(L/G)	trol position sensor (bank 1)	Input	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>	4.0 - 5.0 V★  20mSec/div  2V/div  JMBIA0044GB	L M	

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	inal No. e color)	Description		Condition	Value	
+		Signal name	Input/ Output	Condition	(Approx.)	
59 96	96	Camshaft position sensor	lnout	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed NOTE: The pulse cycle changes depending on rpm at idle</li> </ul>	3.0 - 5.0 V★  20mSec/div  2V/div  JMBIA0045GB	
(LG)	(G/B)	(bank 1)	Input	[Engine is running] • Engine speed: 2,000 rpm	3.0 - 5.0 V★  20mSec/div  2V/div  2V/div  3.0 - 5.0 V★	
60 (R)	128 (B)	Sensor power supply [Camshaft position sensor (bank 1), Exhaust valve timing control position sen- sor (bank 1), Power steer- ing pressure sensor]	_	[Ignition switch: ON]	5 V	
61 (P)	128 (B)	A/F sensor 1 (bank 1)	Input	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>	1.8 V Output voltage varies with air fuel ratio.	
62	88	Exhaust valve timing control position sensor (bank 2)	Input	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed NOTE: The pulse cycle changes depending on rpm at idle</li> </ul>	4.0 - 5.0 V★  20mSec/div  2V/div  2V/div  2DmSec/div  3MBIA0043GB	
(B/Y)	(LG)			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.0 - 5.0 V★  20mSec/div  2V/div  2V/div  3MBIA0044GB	

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	nal No. e color)	Description		Condition	Value	А
+		Signal name	Input/ Output	Condition	(Approx.)	
63	128	Camshaft position sensor	Input	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed NOTE: The pulse cycle changes depending on rpm at idle</li> </ul>	3.0 - 5.0 V★  20mSec/div  2V/div  JMBIA0045GB	C
(L)	(B)	(bank 2)	mput	[Engine is running] • Engine speed: 2,000 rpm	3.0 - 5.0 V★  20mSec/div  2V/div  JMBIA0046GB	E
64 (BR)	128 (B)	Sensor power supply [Camshaft position sensor (bank 2), Exhaust valve timing control position sen- sor (bank 2), Battery cur- rent sensor]	_	[Ignition switch: ON]	5 V	G
65 (V)	128 (B)	A/F sensor 1 (bank 2)	Input	[Ignition switch: ON]	2.2 V	I
66 (LG)	128 (B)	A/F sensor 1 (bank 2)	Input	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>	1.8 V Output voltage varies with air fuel ratio.	J
67 (Y)	68 (P)	Intake air temperature sensor (bank 1)	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.	Į,
68 (P)	_	Sensor ground [Mass air flow sensor (bank 1), Intake air temperature sensor (bank 1)]	_	_	_	K L
69 (W)	72 (—)	Knock sensor (bank 2)	Input	[Engine is running] • Idle speed	2.5 V* <sup>1</sup>	
71 (O)	84 (B)	Engine coolant tempera- ture sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.	N
72 (—)	_	Sensor ground (Knock sensor)	_	_	_	N
73 (W)	72 (—)	Knock sensor (bank 1)	Input	[Engine is running] • Idle speed	2.5 V* <sup>1</sup>	
76 (GR)	84 (B)	Heated oxygen sensor 2 (bank 1)	Input	<ul> <li>[Engine is running]</li> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met</li> <li>Engine: after warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0 V	F

	nal No. color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
				[Ignition switch: ON]	0.4 V
				<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	0.9 - 1.2 V
77 (L)	68 (P)	Mass air flow sensor (bank 1)	Input	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,500 rpm</li></ul>	1.6 - 1.9 V
				<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed to approx. 4,000 rpm</li></ul>	0.9 – 1.2 to 2.4 V
78 (G)	84 (B)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine oil temperature.
				[Ignition switch: ON]	0.4 V
				<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	0.9 - 1.2 V
79 (W)	94 (B)	Mass air flow sensor (bank 2)	Input	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,500 rpm</li></ul>	1.6 - 1.9 V
				<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed to approx. 4,000 rpm</li></ul>	0.9 – 1.2 to 2.4 V
80 (BR)	84 (B)	Heated oxygen sensor 2 (bank 2)	Input	<ul> <li>[Engine is running]</li> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met</li> <li>Engine: after warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0 V
81 (P)		Fuel injector No. 3			BATTERY VOLTAGE
82 (V)		Fuel injector No. 6		<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li><li>NOTE:</li></ul>	(11 - 14 V)★ 50mSec/div
85 (GR)	400	Fuel injector No. 2		The pulse cycle changes depending on rpm at idle	10V/div JMBIA0047GB
86 (O)	128 (B)	Fuel injector No. 5	Output		BATTERY VOLTAGE (11 - 14 V)★
89 (L)	Fuel injector No. 1		[Engine is running]  • Warm-up condition	50mSec/div	
90 (BR)		Fuel injector No. 4		Engine speed: 2,000 rpm	10V/div JMBIA0048GB
83 (Y)	94 (B)	Intake air temperature sensor (bank 2)	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.

## **ECM**

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	inal No. e color)	Description		Condition	Value (Approx.)
+		Signal name	Input/ Output		(Approx.)
84 (B)	_	Sensor ground (Heated oxygen sensor 2, Engine coolant tempera- ture sensor, Engine oil tem- perature sensor)	_	_	_
87 (O)	96 (G/B)	Power steering pressure sensor	Output	<ul><li>[Engine is running]</li><li>Steering wheel: Being turned</li><li>[Engine is running]</li></ul>	0.5 - 4.5 V
(-)	(=: )			Steering wheel: Not being turned	0.4 - 0.8 V
88 (LG)	_	Sensor ground [Exhaust valve timing control position sensor (bank 1), Exhaust valve timing control position sensor (bank 2)]	_	_	_
91 (G)	95 (G/W)	Battery current sensor	Input	<ul> <li>[Engine is running]</li> <li>Battery: Fully charged*<sup>2</sup></li> <li>Idle speed</li> </ul>	2.6 - 3.5 V
92 (R)	_	Sensor ground [Camshaft position sensor (bank 2)]	_	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	0 V
93 (R)	128 (B)	Power supply for ECM (Back-up)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
94 (B)	_	Sensor ground [Mass air flow sensor (bank 2)]	_	_	_
95 (G/W)	_	Sensor ground (Battery current sensor)	_	_	_
96 (G/B)	_	Sensor ground [Camshaft position sensor (bank 1), Power steering pressure sensor]	_	_	_
97	100	Accelerator pedal position	loout	[Ignition switch: ON]  • Engine stopped  • Accelerator pedal: Fully released	0.45 - 1.0 V
(R)	(W)	sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	4.4 - 4.8 V
98	104	104 Accelerator pedal position	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.22 - 0.50 V
(LG)	(W)	sensor 2	mput	<ul><li>[Ignition switch: ON]</li><li>Engine stopped</li><li>Accelerator pedal: Fully depressed</li></ul>	2.1 - 2.5 V
99 (L)	100 (W)	Sensor power supply (Accelerator pedal position sensor 1)	_	[Ignition switch: ON]	5 V
100 (W)	_	Sensor ground (Accelerator pedal position sensor 1)	_	_	

	inal No. e color)	Description		Condition	Value	
+		Signal name	Input/ Output	Condition	(Approx.)	
				[Ignition switch: ON] • ICC steering switch: OFF	4.0 V	
				[Ignition switch: ON] • MAIN switch: Pressed	0 V	
				[Ignition switch: ON] • CANCEL switch: Pressed	1.6 V	
101 (Y)	108 (B/Y)	ICC steering switch (models with ICC system)	Input	[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3.4 V	
				[Ignition switch: ON] • SET/COAST switch: Pressed	2.9 V	
				[Ignition switch: ON] • DISTANCE switch: Pressed	2.2 V	
				[Ignition switch: ON] • LDP switch: Pressed	0.8 V	
				[Ignition switch: ON] • ASCD steering switch: OFF	4 V	
				[Ignition switch: ON] • MAIN switch: Pressed	0 V	
101 (Y)	108 (B/Y)	ASCD steering switch (models with ASCD system)	Input	[Ignition switch: ON] • CANCEL switch: Pressed	1 V	
(.,	(5,1)			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3 V	
				[Ignition switch: ON] • SET/COAST switch: Pressed	2 V	
102 (R/G)	112 (B/W)	EVAP control system pres- sure sensor	Input	[Ignition switch: ON]	1.8 - 4.8 V	
103 (G)	104 (W)	Sensor power supply (Accelerator pedal position sensor 2)	_	[Ignition switch: ON]	5 V	
104 (W)	_	Sensor ground (Accelerator pedal position sensor 2)	_	_	_	
105 (L)	116 (W)	Refrigerant pressure sensor	Input	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Both A/C switch and blower fan motor switch: ON (Compressor operates)</li> </ul>	1.0 - 4.0 V	
106 (W)	128 (B)	Fuel tank temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with fuel tank temperature.	
107 (L/B)	112 (B/W)	Sensor power supply (EVAP control system pressure sensor)	_	[Ignition switch: ON]	5 V	
108 (B/Y)	_	Sensor ground (ASCD/ICC steering switch)	_	_	_	
109	128			[Ignition switch: ON] • Selector lever: P or N	BATTERY VOLTAGE (11 - 14 V)	
(B/R)	(B)	PNP signal	Input	[Ignition switch: ON] • Selector lever: Except above	0 V	

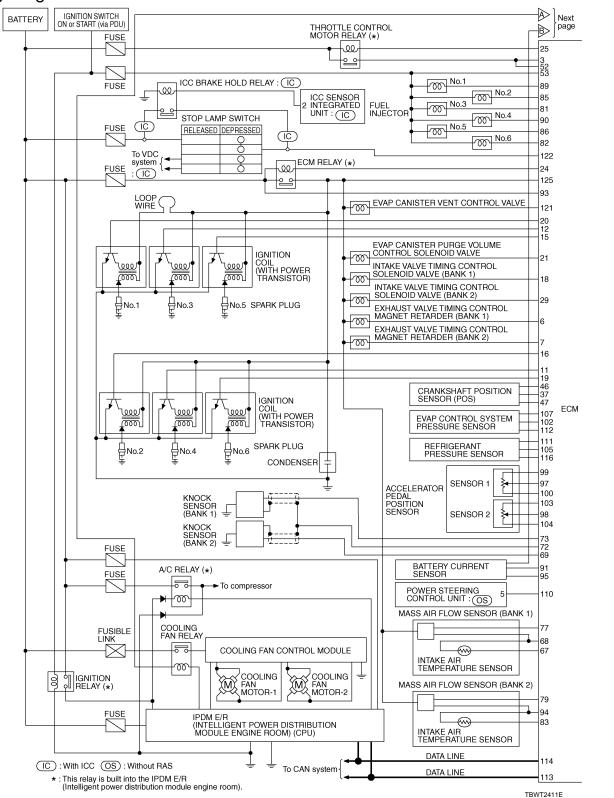
	inal No. e color)  Description			2 ""	Value
+		Signal name	Input/ Output	Condition	(Approx.)
110	128	Engine speed signal output	Output	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed NOTE: The pulse cycle changes depending on rpm at idle</li> </ul>	1 V★  10mSec/div  5  2V/div  JMBIA0076GB
(R)	(B)		·	[Engine is running] • Engine speed is 2,000 rpm	1 V★  10mSec/div  2V/div  JMBIA0077GB
111 (Y)	116 (W)	Sensor power supply (Refrigerant pressure sensor)	_	[Ignition switch: ON]	5 V
112 B/W)	_	Sensor ground (EVAP control system pressure sensor)	_	_	_
113 (P)	_	CAN communication line	Input/ Output	_	_
114 (L)	_	CAN communication line	Input/ Output	_	_
116 (W)	_	Sensor ground (Refrigerant pressure sensor)	_	_	_
117 (V)	_	Data link connector	Input/ Output	_	_
121 GR/L)	128 (B)	EVAP canister vent control valve	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
122 (P)	128 (B)	Stop lamp switch	Input	[Ignition switch: OFF]  • Brake pedal: Fully released  [Ignition switch: OFF]  • Brake pedal: Slightly depressed	0 V  BATTERY VOLTAGE (11 - 14 V)
123 (B) 124 (B)	_	ECM ground	_	_	_
125 (R)	128 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
126	128	ICC brake switch (models with ICC system)	Input	[Ignition switch: ON] • Brake pedal: Slightly depressed	0 V
(BR)	(B)	ASCD brake switch (models with ASCD system)	трас	[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)
127 (B) 128 (B)	_	ECM ground	_	_	_

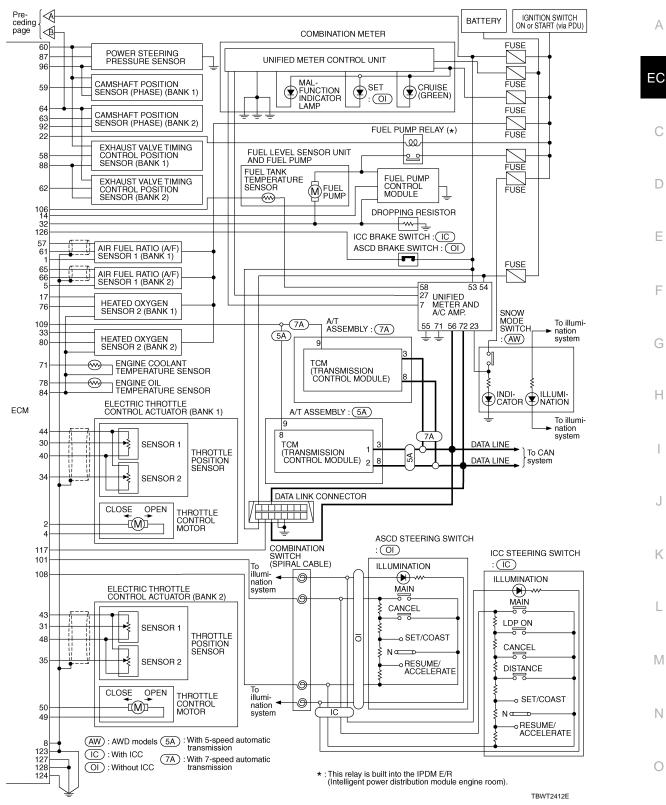
<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

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- \*1: This may vary depending on internal resistance of the tester.
- \*2: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to SC-4, "How to Handle Battery".

# Wiring Diagram - ENGINE CONTROL SYSTEM -





Fail-safe

NON DTC RELATED ITEM

Engine operating condition in fail-safe mode	Detected items	Remarks	Reference page
Engine speed will not rise more than 2,500 rpm due to the fuel cut	Malfunction indicator lamp circuit	When there is an open circuit on MIL circuit, the ECM cannot warn the driver by illuminating MIL when there is malfunction on engine control system.  Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating the fail-safe function.  The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.	EC-626

# DTC RELATED ITEM

DTC No.	Detected items	Engine opera	ting condition in fail-safe mode		
P0011 P0021	Intake valve timing control	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function.			
P0014 P0024	Exhaust valve timing control	The signal is not energized to the exhaust valve timing control magnet retarder and the magnet retarder control does not function.			
P0102 P0103 P010C P010D	Mass air flow sensor circuit	Engine speed will not rise more than	n 2,400 rpm due to the fuel cut.		
P0117 P0118	Engine coolant tempera- ture sensor circuit	Engine coolant temperature will be determined by ECM based on the following co CONSULT-III displays the engine coolant temperature decided by ECM.			
		Condition	Engine coolant temperature decided (CONSULT-III display)		
		Just as ignition switch is turned ON or START	40°C (104°F)		
		Approx. 4 minutes or more after engine starting	80°C (176°F)		
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)		
		When the fail-safe system for engine fan operates while engine is running	e coolant temperature sensor is activated, the cooling g.		
P0122 P0123 P0222 P0223 P0227 P0228 P1239 P2132 P2133 P2135	Throttle position sensor	order for the idle position to be withi	eed of the throttle valve to be slower than the normal		
P0196 P0197 P0198	Engine oil temperature sensor	Exhaust valve timing control does no	ot function.		
P0500	Vehicle speed sensor	The cooling fan operates (Highest)	while engine is running.		
P0605	ECM	(When ECM calculation function is malfunctioning:) ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. ECM deactivates ASCD operation.			
P0643	Sensor power supply	ECM stops the electric throttle contr fixed opening (approx. 5 degrees) b	rol actuator control, throttle valve is maintained at a y the return spring.		
P1233 P2101	Electric throttle control function	ECM stops the electric throttle contr fixed opening (approx. 5 degrees) b	ol actuator control, throttle valve is maintained at a y the return spring.		

## **ECM**

< ECU DIAGNOSIS > [VQ35HR]

DTC No.	Detected items	Engine oper	ating condition in fail-safe mode	
P1236 P2118	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.		
P1238 P2119	Electric throttle control actuator	malfunction:)	ator does not function properly due to the return spring actuator by regulating the throttle opening around the II not rise more than 2,000 rpm.	
			e in fail-safe mode is not in specified range:) ontrol actuator because regulating the throttle opening	
		vehicle stops, the engine stalls.	alve is stuck open:) It slows down gradually because of fuel cut. After the position, and engine speed will not exceed 1,000 rpm or	
P1290 P2100 P2103	Throttle control motor relay	ECM stops the electric throttle confixed opening (approx. 5 degrees)	trol actuator control, throttle valve is maintained at a by the return spring.	
P1805	Brake switch	ECM controls the electric throttle of small range.  Therefore, acceleration will be poor	control actuator by regulating the throttle opening to a	
		Vehicle condition	Driving condition	
		When engine is idling	Normal	
		When accelerating	Poor acceleration	
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	order for the idle position to be witl	peed of the throttle valve to be slower than the normal	

# DTC Inspection Priority Chart

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If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

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Priority	Detected items (DTC)
Priority 1	Detected items (DTC)  • U0101 U0164 U1001 CAN communication line  • P0101 P0102 P0103 P010B P010C P010D Mass air flow sensor  • P0112 P0113 P0127 Intake air temperature sensor  • P0116 P0117 P0118 P0125 Engine coolant temperature sensor  • P0122 P0123 P0222 P0223 P0227 P0228 P1225 P1226 P1234 P1235 P1239 P2132 P2133 P2135 Throttle position sensor  • P0128 Thermostat function  • P0181 P0182 P0183 Fuel tank temperature sensor  • P0181 P0182 P0183 Fuel tank temperature sensor  • P0196 P0197 P0198 Engine oil temperature sensor  • P0327 P0328 P0332 P0333 Knock sensor  • P0335 Crankshaft position sensor  • P0340 P0345 Camshaft position sensor  • P0460 P0461 P0462 P0463 Fuel level sensor  • P0500 Vehicle speed sensor  • P0643 Sensor power supply  • P0705 Transmission range switch  • P0850 Park/neutral position (PNP) switch  • P1550 P1551 P1552 P1553 P1554 Battery current sensor
-	<ul> <li>P1610 - P1614 NATS</li> <li>P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor</li> </ul>
2	<ul> <li>P0031 P0032 P0051 P0052 Air fuel ratio (A/F) sensor 1 heater</li> <li>P0037 P0038 P0057 P0058 Heated oxygen sensor 2 heater</li> <li>P0075 P0081 Intake valve timing control solenoid valve</li> <li>P0078 P0084 Exhaust valve timing control magnet retarder</li> <li>P0130 P0131 P0132 P0133 P0150 P0151 P0152 P0153 P2A00 P2A03 Air fuel ratio (A/F) sensor 1</li> <li>P0137 P0138 P0139 P0157 P0158 P0159 Heated oxygen sensor 2</li> <li>P0441 EVAP control system purge flow monitoring</li> <li>P0443 P0444 P0445 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>P0550 Power steering pressure sensor</li> <li>P0603 ECM power supply</li> <li>P0710 P0717 P0720 P0729 P0730 P0731 P0732 P0733 P0734 P0735 P0740 P0744 P0745 P0750 P0775 P0780 P0795 P1730 P1734 P1752 P1757 P1762 P1767 P1772 P1774 P2713 P2722 P2731 P2307 A/T related sensors, solenoid valves and switches</li> <li>P1078 P1084 Exhaust valve timing control position sensor</li> <li>P1217 Engine over temperature (OVERHEAT)</li> <li>P1233 P2101 Electric throttle control function</li> <li>P1236 P2118 Throttle control motor</li> <li>P1290 P2100 P2103 Throttle control motor relay</li> <li>P1805 Brake switch</li> </ul>
3	<ul> <li>P0011 P0021 Intake valve timing control</li> <li>P0014 P0024 Exhaust valve timing control</li> <li>P0171 P0172 P0174 P0175 Fuel injection system function</li> <li>P0300 - P0306 Misfire</li> <li>P0420 P0430 Three way catalyst function</li> <li>P0442 P0456 EVAP control system (SMALL LEAK, VERY SMALL LEAK)</li> <li>P0455 EVAP control system (GROSS LEAK)</li> <li>P0506 P0507 Idle speed control system</li> <li>P1148 P1168 Closed loop control</li> <li>P1211 TCS control unit</li> <li>P1212 TCS communication line</li> <li>P1218 P2119 Electric throttle control actuator</li> <li>P1421 Cold start control</li> <li>P1564 ICC steering switch / ASCD steering switch</li> <li>P1568 ICC command value</li> <li>P1572 ICC brake switch / ASCD brake switch</li> <li>P1574 ICC vehicle speed sensor / ASCD vehicle speed sensor</li> <li>P1715 Input speed sensor</li> </ul>

< ECU DIAGNOSIS > DTC Index [VQ35HR]

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Α

×: Applicable —: Not applicable

					×.Applicable	—: Not applicable	
DTC	; <del>*</del> 1	Items				Reference	E
CONSULT-III GST* <sup>2</sup>	ECM*3	(CONSULT-III screen terms)	SRT code	Trip	MIL	page	
U0101	0101*4	LOST COMM (ECM)	_	1	×	EC-160	(
U0164	0164*4	LOST COMM (HVAC)	_	1	×	EC-162	
U1001	1001*4	CAN COMM CIRCUIT	_	2 (2WD) 1 (4WD)	_	EC-164	
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_	— (4WD)	Blinking* <sup>7</sup>		E
P0011	0011	INT/V TIM CONT-B1	_	2	×	EC-166	F
P0014	0014	EXH/V TIM CONT-B1	_	2	×	EC-170	- 1
P0021	0021	INT/V TIM CONT-B2		2	×	EC-166	
P0024	0024	EXH/V TIM CONT-B2	_	2	×	EC-170	(
P0031	0031	A/F SEN1 HTR (B1)	_	2	×	EC-174	
P0032	0032	A/F SEN1 HTR (B1)	_	2	×	EC-174	
P0037	0037	HO2S2 HTR (B1)	_	2	×	EC-179	
P0038	0038	HO2S2 HTR (B1)	_	2	×	EC-179	
P0051	0051	A/F SEN1 HTR (B2)	_	2	×	EC-174	
P0052	0052	A/F SEN1 HTR (B2)		2	×	EC-174	
P0057	0057	HO2S2 HTR (B2)	_	2	×	EC-179	
P0058	0058	HO2S2 HTR (B2)	_	2	×	EC-179	
P0075	0075	INT/V TIM V/CIR-B1	_	2	×	EC-185	
P0078	0078	EX V/T ACT/CIRC-B1	_	2	×	EC-190	
P0081	0081	INT/V TIM V/CIR-B2	_	2	×	EC-185	
P0084	0084	EX V/T ACT/CIRC-B2	_	2	×	EC-190	
P0101	0101	MAF SEN/CIRCUIT-B1	_	2	×	EC-195	
P0102	0102	MAF SEN/CIRCUIT-B1	_	1	×	EC-205	
P0103	0103	MAF SEN/CIRCUIT-B1	_	1	×	EC-205	
P010B	010B	MAF SEN/CIRCUIT-B2	_	2	×	EC-195	
P010C	010C	MAF SEN/CIRCUIT-B2	_	1	×	EC-205	
P010D	010D	MAF SEN/CIRCUIT-B2	_	1	×	EC-205	
P0112	0112	IAT SEN/CIRCUIT-B1	_	2	×	EC-214	
P0113	0113	IAT SEN/CIRCUIT-B1	_	2	×	EC-214	
P0116	0116	ECT SEN/CIRC	_	2	×	EC-218	,
P0117	0117	ECT SEN/CIRC	_	1	×	EC-220	
P0118	0118	ECT SEN/CIRC	_	1	×	EC-220	
P0122	0122	TP SEN 2/CIRC-B1	_	1	×	EC-224	
P0123	0123	TP SEN 2/CIRC-B1	_	1	×	EC-224	
P0125	0125	ECT SENSOR	_	2	×	EC-230	
P0127	0127	IAT SENSOR-B1	_	2	×	EC-233	
P0128	0128	THERMSTAT FNCTN	_	2	×	EC-235	

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DTC	<u>)*1</u>	Items				Referenc
CONSULT-III GST* <sup>2</sup>	ECM*3	(CONSULT-III screen terms)	SRT code	Trip	MIL	page
P0130	0130	A/F SENSOR1 (B1)	_	2	×	EC-237
P0131	0131	A/F SENSOR1 (B1)	_	2	×	EC-244
P0132	0132	A/F SENSOR1 (B1)	_	2	×	EC-250
P0133	0133	A/F SENSOR1 (B1)	×	2	×	EC-256
P0137	0137	HO2S2 (B1)	×	2	×	EC-264
P0138	0138	HO2S2 (B1)	×	2	×	EC-273
P0139	0139	HO2S2 (B1)	×	2	×	EC-285
P0150	0150	A/F SENSOR1 (B2)	_	2	×	EC-237
P0151	0151	A/F SENSOR1 (B2)	_	2	×	EC-244
P0152	0152	A/F SENSOR1 (B2)	_	2	×	EC-250
P0153	0153	A/F SENSOR1 (B2)	×	2	×	EC-256
P0157	0157	HO2S2 (B2)	×	2	×	EC-264
P0158	0158	HO2S2 (B2)	×	2	×	EC-273
P0159	0159	HO2S2 (B2)	×	2	×	EC-285
P0171	0171	FUEL SYS-LEAN-B1	_	2	×	EC-294
P0172	0172	FUEL SYS-RICH-B1	_	2	×	EC-301
P0174	0174	FUEL SYS-LEAN-B2	_	2	×	EC-294
P0175	0175	FUEL SYS-RICH-B2	_	2	×	EC-301
P0181	0181	FTT SENSOR	_	2	×	EC-307
P0182	0182	FTT SEN/CIRCUIT	_	2	×	EC-312
P0183	0183	FTT SEN/CIRCUIT	_	2	×	EC-312
P0196	0196	EOT SENSOR	_	2	×	EC-316
P0197	0197	EOT SEN/CIRC	_	2	×	EC-319
P0198	0198	EOT SEN/CIRC	_	2	×	EC-319
P0222	0222	TP SEN 1/CIRC-B1	_	1	×	EC-323
P0223	0223	TP SEN 1/CIRC-B1	_	1	×	EC-323
P0227	0227	TP SEN 2/CIRC-B2	_	1	×	EC-224
P0228	0228	TP SEN 2/CIRC-B2	_	1	×	EC-224
P0300	0300	MULTI CYL MISFIRE	_	2	×	EC-329
P0301	0301	CYL 1 MISFIRE	_	2	×	EC-329
P0302	0302	CYL 2 MISFIRE	_	2	×	EC-329
P0303	0303	CYL 3 MISFIRE	_	2	×	EC-329
P0304	0304	CYL 4 MISFIRE	_	2	×	EC-329
P0305	0305	CYL 5 MISFIRE	_	2	×	EC-329
P0306	0306	CYL 6 MISFIRE	_	2	×	EC-329
P0327	0327	KNOCK SEN/CIRC-B1	_	2	_	EC-335
P0328	0328	KNOCK SEN/CIRC-B1	_	2	_	EC-335
P0332	0332	KNOCK SEN/CIRC-B2	_	2	_	EC-335
P0333	0333	KNOCK SEN/CIRC-B2	_	2	_	EC-335
P0335	0335	CKP SEN/CIRCUIT	_	2	×	EC-340
P0340	0340	CMP SEN/CIRC-B1	_	2	×	EC-346
P0345	0345	CMP SEN/CIRC-B2	_	2	×	EC-346

DTC*1						
CONSULT-III GST*2	ECM* <sup>3</sup>	Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page
P0420	0420	TW CATALYST SYS-B1	×	2	×	EC-353
P0430	0430	TW CATALYST SYS-B2	×	2	×	EC-353
P0441	0441	EVAP PURG FLOW/MON	×	2	×	EC-358
P0442	0442	EVAP SMALL LEAK	×	2	×	EC-363
P0443	0443	PURG VOLUME CONT/V	_	2	×	EC-369
P0444	0444	PURG VOLUME CONT/V	_	2	×	EC-375
P0445	0445	PURG VOLUME CONT/V	_	2	×	EC-375
P0447	0447	VENT CONTROL VALVE	_	2	×	EC-379
P0448	0448	VENT CONTROL VALVE	_	2	×	EC-385
P0451	0451	EVAP SYS PRES SEN	_	2	×	EC-391
P0452	0452	EVAP SYS PRES SEN	_	2	×	EC-395
P0453	0453	EVAP SYS PRES SEN	_	2	×	EC-402
P0455	0455	EVAP GROSS LEAK	_	2	×	EC-410
P0456	0456	EVAP VERY SML LEAK	×* <sup>6</sup>	2	×	EC-416
P0460	0460	FUEL LEV SEN SLOSH	_	2	×	EC-423
P0461	0461	FUEL LEVEL SENSOR	_	2	×	EC-425
P0462	0462	FUEL LEVL SEN/CIRC	_	2	×	EC-427
P0463	0463	FUEL LEVL SEN/CIRC		2	×	EC-427
P0500	0500	VEH SPEED SEN/CIRC*5	<u> </u>	2	×	EC-429
P0506	0506	ISC SYSTEM		2	×	EC-431
P0507	0507	ISC SYSTEM		2	×	EC-433
P0550	0550	PW ST P SEN/CIRC	_	2	_	EC-435
P0603	0603	ECM BACK UP/CIRCUIT	<u> </u>	2	×	EC-439
P0605	0605	ECM	_	1 or 2	× or —	EC-442
P0607	0607	ECM	_	1	×	EC-444
P0643	0643	SENSOR POWER/CIRC	_	1	×	EC-445
P0705	0705	T/M RANGE SENSOR A	_	2	×	AT-402
P0710	0710	ATF TEMP SEN/CIRC	_	2	×	AT-403
P0717	0717	INPUT SPEED SENSOR A	_	2	×	AT-405
P0720	0720	OUTPUT SPEED SENSOR	_	2	×	AT-407
P0729	0729	AT 6TH FUNCTN	_	2	×	AT-411
P0730	0730	BELT DAMG	_	2	×	AT-413
P0731	0731	1GR INCORRECT RATIO	_	2	×	AT-414
P0732	0732	2GR INCORRECT RATIO	_	2	×	AT-416
P0733	0733	3GR INCORRECT RATIO	_	2	×	AT-418
P0734	0734	4GR INCORRECT RATIO	_	2	×	AT-420
P0735	0735	5GR INCORRECT RATIO		2	×	AT-422
P0740	0740	TORQUE CONVERTER	_	2	×	AT-424
P0744	0744	TORQUE CONVERTER	_	2	×	AT-426
P0745	0745	PC SOLENOID A		2	×	AT-427

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DTC	<sub>*</sub> *1					
CONSULT-III GST*2	ECM* <sup>3</sup>	ltems (CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page
P0750	0750	SHIFT SOLENOID A	_	2 (2WD) 1 (4WD)	×	AT-428
P0775	0775	PC SOLENOID B	_	2	×	AT-429
P0780	0780	SHIFT	_	1	×	AT-430
P0795	0795	PC SOLENOID C	_	2	×	AT-431
P0850	0850	P-N POS SW/CIRCUIT	_	2	×	EC-449
P1078	1078	EXH TIM SEN/CIRC-B1	_	2	×	EC-453
P1084	1084	EXH TIM SEN/CIRC-B2	_	2	×	EC-453
P1148	1148	CLOSED LOOP-B1	_	1	×	EC-461
P1168	1168	CLOSED LOOP-B2	_	1	×	EC-461
P1211	1211	TCS C/U FUNCTN	_	2	_	EC-462
P1212	1212	TCS/CIRC	_	2	_	EC-463
P1217	1217	ENG OVER TEMP	_	1	×	EC-464
P1225	1225	CTP LEARNING-B1	_	2	_	EC-468
P1226	1226	CTP LEARNING-B1	_	2	_	EC-470
P1233	1233	ETC FNCTN/CIRC-B2	_	1	×	EC-472
P1234	1234	CTP LEARNING-B2	_	2	_	EC-468
P1235	1235	CTP LEARNING-B2	_	2	_	EC-470
P1236	1236	ETC MOT-B2	_	1	×	EC-479
P1238	1238	ETC ACTR-B2	_	1	×	EC-484
P1239	1239	TP SENSOR-B2	_	1	×	EC-486
P1290	1290	ETC MOT PWR-B2	_	1	×	EC-492
P1421	1421	COLD START CONTROL	_	2	×	EC-496
P1550	1550	BAT CURRENT SENSOR	_	2	_	EC-498
P1551	1551	BAT CURRENT SENSOR	_	2	_	EC-504
P1552	1552	BAT CURRENT SENSOR	_	2	_	EC-504
P1553	1553	BAT CURRENT SENSOR	_	2	_	EC-510
P1554	1554	BAT CURRENT SENSOR	_	2	_	EC-516
P1564	1564	ASCD SW	_	1	_	EC-522 (with ASCI EC-527 (with ICC
P1568	1568	ICC COMMAND VALUE	_	1	_	EC-532
P1572	1572	ASCD BRAKE SW	_	1	_	EC-533 (with ASC EC-541 (with ICC
P1574	1574	ASCD VHL SPD SEN	-	1	_	EC-549 (with ASC EC-551 (with ICC
P1610	1610	LOCK MODE	_	2	_	BL-5
P1611	1611	ID DISCORD IMMU-ECM	_	2	_	BL-5
P1612	1612	CHAIN OF ECM-IMMU	_	2	_	BL-5

DT	C* <sup>1</sup>					5.6	
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	(CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page	,
P1614	1614	CHAIN OF IMMU-KEY	_	2	_	BL-5	E
P1715	1715	IN RULY SPEED	_	2	_	EC-553	=
P1730	1730	INTERLOCK	_	2 (2WD) 1 (4WD)	×	AT-435	(
P1734	1734	AT 7TH GR FNCTN	_	2	×	AT-437	-
P1752	1752	INPUT CLUTCH SOL	_	1	×	AT-151	
P1757	1757	FR BRAKE SOLENOID		1	×	AT-153	-
P1762	1762	DRCT CLUTCH SOL	_	1	×	AT-155	.
P1767	1767	HLR CLUTCH SOLENOID	_	1	×	AT-157	-
P1772	1772	L C BRAKE SOLENOID	_	1	×	AT-159	=
P1774	1774	L C BRAKE SOLENOID	_	1	×	AT-161	-
P1805	1805	BRAKE SW/CIRCUIT	_	2	_	EC-554	=
P2100	2100	ETC MOT PWR-B1	_	1	×	EC-492	- (
P2101	2101	ETC FNCTN/CIRC-B1	_	1	×	EC-472	-
P2103	2103	ETC MOT PWR	_	1	×	EC-492	=
P2118	2118	ETC MOT-B1	_	1	×	EC-479	-
P2119	2119	ETC ACTR-B1	_	1	×	EC-484	=
P2122	2122	APP SEN 1/CIRC	_	1	×	EC-558	-
P2123	2123	APP SEN 1/CIRC	_	1	×	EC-558	-
P2127	2127	APP SEN 2/CIRC	_	1	×	EC-563	-
P2128	2128	APP SEN 2/CIRC	_	1	×	EC-563	- ,
P2132	2132	TP SEN 1/CIRC-B2	_	1	×	EC-323	-
P2133	2133	TP SEN 1/CIRC-B2	_	1	×	EC-323	- 1
P2135	2135	TP SENSOR-B1	_	1	×	EC-486	- '
P2138	2138	APP SENSOR	_	1	×	EC-569	-
P2713	2713	PC SOLENOID D	_	2	×	AT-445	-
P2722	2722	PC SOLENOID E	_	2	×	AT-446	-
P2731	2731	PC SOLENOID F	_	2	×	AT-447	- 1
P2807	2807	PC SOLENOID G	_	2	×	AT-448	. 1
P2A00	2A00	A/F SENSOR1 (B1)	_	2	×	EC-575	-
P2A03	2A03	A/F SENSOR1 (B2)	_	2	×	EC-575	

<sup>\*1: 1</sup>st trip DTC No. is the same as DTC No.

#### How to Set SRT Code

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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.

<sup>\*2:</sup> This number is prescribed by SAE J2012.

<sup>\*3:</sup> In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

<sup>\*4:</sup> The troubleshooting for this DTC needs CONSULT-III.

<sup>\*5:</sup> When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

<sup>\*6:</sup> SRT code will not be set if the self-diagnostic result is NG.

<sup>\*7:</sup> When the ECM is in the mode that displays SRT status, MIL may blink. For the details, refer to "How to Display SRT Status".

<sup>\*8:</sup> When erasing this DTC, always use CONSULT-III or GST.

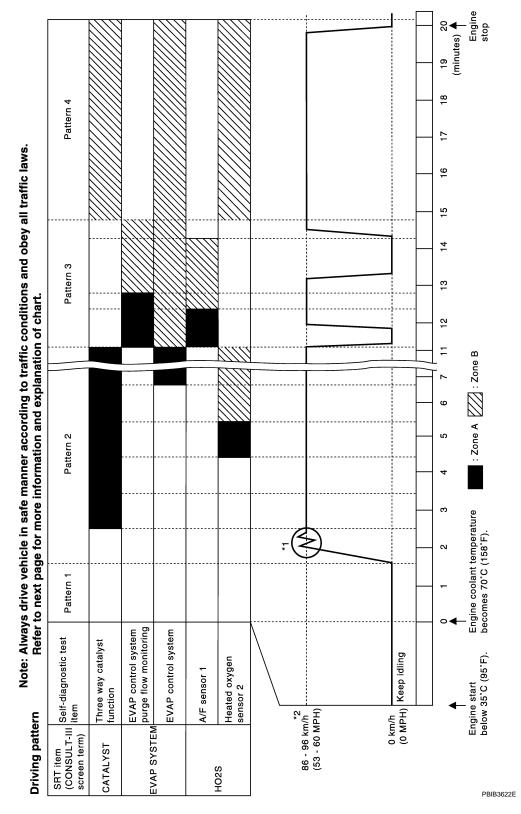
#### (P)WITH CONSULT-III

Perform corresponding DTC Confirmation Procedure one by one based on Performance Priority in the table on "SRT Item".

#### **WITHOUT CONSULT-III**

The most efficient driving pattern in which SRT codes can be properly set is explained below. The driving pattern should be performed one or more times to set all SRT codes.

#### **DRIVING PATTERN**



 The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.

Zone A refers to the range where the time, required for the diagnosis under normal conditions\*, is the shortest.

Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

- \*: Normal conditions refer to the following:
- Sea level
- Flat road
- Ambient air temperature: 20 30°C (68 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
   Under different conditions [For example: ambient air temperature other than 20 30°C (68 86°F)], diagnosis may also be performed.

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 71 and ground is 3.0 - 4.3 V).
- The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 71 and ground is lower than 1.4 V).
- The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 106 and ground is less than 4.1 V).

Pattern 2:

• When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during deceleration of vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).

Pattern 4:

- The accelerator pedal must be held very steady during steadystate driving.
- If the accelerator pedal is moved, the test must be conducted again.
- \*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.
- \*2: Checking the vehicle speed with GST is advised.

Suggested Transmission Gear Position for A/T Models

Set the selector lever position in the D with the overdrive switch turned ON.

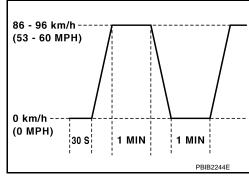


The following is the information specified in Service \$06 of SAE J1979.

The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

These data (test value and test limit) are specified by On Board Monitor ID(OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.

The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (eg., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)



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ltom	OBD-	Colf diagnostic took its	DTC	li	e and Test mit display)	Description	
Item	MID	Self-diagnostic test item	DIC	TID	Unit and Scaling ID	Description	
			P0131	83H	0BH	Minimum sensor output voltage for to cycle	
			P0131	84H	0BH	Maximum sensor output voltage for te	
			P0130	85H	0BH	Minimum sensor output voltage for to cycle	
		Air fuel ratio (A/F) sensor 1	P0130	86H	0BH	Maximum sensor output voltage for te cycle	
	01H	(Bank 1)	P0133	87H	04H	Response rate: Response ratio (Lean Rich)	
			P0133	88H	04H	Response rate: Response ratio (Rich Lean)	
			P2A00	89H	84H	The amount of shift in air fuel ratio	
			P2A00	8AH	84H	The amount of shift in air fuel ratio	
HO2S			P0130	8BH	0BH	Difference in sensor output voltage	
			P0133	8CH	83H	Response gain at the limited frequer	
			P0138	07H	0CH	Minimum sensor output voltage for to cycle	
	02H	Heated oxygen sensor 2 (Bank 1)	P0137	08H	0CH	Maximum sensor output voltage for to cycle	
			P0138	80H	0CH	Sensor output voltage	
			P0139	81H	0CH	Difference in sensor output voltage	
		Heated oxygen sensor 3 (Bank 1)	P0143	07H	0CH	Minimum sensor output voltage for to cycle	
	03H		P0144	08H	0CH	Maximum sensor output voltage for to cycle	
			P0146	80H	0CH	Sensor output voltage	
			P0145	81H	0CH	Difference in sensor output voltage	

L.	OBD-		DTO	li	e and Test mit display)			
Item	MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description		
			P0151	83H	0BH	Minimum sensor output voltage for test cycle		
			P0151	84H	0BH	Maximum sensor output voltage for test cycle		
			P0150	85H	0BH	Minimum sensor output voltage for test cycle		
		Air fuel ratio (A/F) sensor 1	P0150	86H	0BH	Maximum sensor output voltage for test cycle		
	05H	(Bank 2)	P0153	87H	04H	Response rate: Response ratio (Lean to Rich)		
			P0153	88H	04H	Response rate: Response ratio (Rich to Lean)		
			P2A03	89H	84H	The amount of shift in air fuel ratio		
			P2A03	8AH	84H	The amount of shift in air fuel ratio		
lO2S			P0150	8BH	0BH	Difference in sensor output voltage		
			P0153	8CH	83H	Response gain at the limited frequency		
			P0158	07H	0CH	Minimum sensor output voltage for test cycle		
	06H	Heated oxygen sensor 2 (Bank 2)	P0157	08H	0CH	Maximum sensor output voltage for test cycle		
			P0158	80H	0CH	Sensor output voltage		
			P0159	81H	0CH	Difference in sensor output voltage		
			P0163	07H	0CH	Minimum sensor output voltage for test cycle		
	07H	07H	07H	Heated oxygen sensor 3 (Bank2)	P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage		
			P0165	81H	0CH	Difference in sensor output voltage		
			P0420	80H	01H	O2 storage index		
	21H	Three way catalyst function	P0420	82H	01H	Switching time lag engine exhaust index value		
	Δ1Π	(Bank1)	P2423	83H	0CH	Difference in 3rd O2 sensor output volt age		
CATA-			P2423	84H	84H	O2 storage index in HC trap catalyst		
YST			P0430	80H	01H	O2 storage index		
	2011	Three way catalyst function	P0430	82H	01H	Switching time lag engine exhaust index value		
	22H	(Bank2)	P2424	83H	0CH	Difference in 3rd O2 sensor output volt age		
			P2424	84H	84H	O2 storage index in HC trap catalyst		

					e and Test						
	OBD-	0 11 11 11 11			mit display)						
Item	MID	Self-diagnostic test item	DTC	TID	Unit and Scaling ID	Description					
			P0400	80H	96H	Low Flow Faults: EGR temp change rate (short term)					
			P0400	81H	96H	Low Flow Faults: EGR temp change rate (long term)					
EGR SYSTEM	31H	EGR function	P0400	82H	96H	Low Flow Faults: Difference between max EGR temp and EGR temp under idling condition					
			P0400	83H	96H	Low Flow Faults: Max EGR temp					
			P1402	84H	96H	High Flow Faults: EGR temp increase rate					
			P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)					
	35H	VVT Monitor (Bank1)	P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)					
	3311	VVI Monitor (Banki)	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	VV/T Manitor (Pank2)	P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)					
	30П	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)					
	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down					
	3ВН	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)					
EVAP SYSTEM	3СН	EVAP control system leak	P0456	80H	05H	Leak area index (for more than 0.02 inch)					
	3011	(Very small leak)	P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring					
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close					
	41H	A/F sensor 1 heater (Bank 1)	Low Input:P0031 High Input:P0032	81H	0BH	Converted value of Heater electric current to voltage					
	42H	Heated oxygen sensor 2 heater (Bank 1)	Low Input:P0037 High Input:P0038	80H	0CH	Converted value of Heater electric current to voltage					
O2 SEN-	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of Heater electric current to voltage					
O2 SEN- SOR HEATER	45H	A/F sensor 1 heater (Bank 2)	Low Input:P0051 High Input:P0052	81H	0BH	Converted value of Heater electric current to voltage					
	46H	Heated oxygen sensor 2 heater (Bank 2)	Low Input:P0057 High Input:P0058	80H	0CH	Converted value of Heater electric current to voltage					
	47H	Heated oxygen sensor 3 heater (Bank 2)	P0063	80H	0CH	Converted value of Heater electric current to voltage					

## **ECM**

< ECU DIAGNOSIS > [VQ35HR]

< ECO D	IAOIN	2010 >								
Item	OBD-	Test value and Test limit (GST display)		Description	Α					
item	MID	Self-diagnostic test item	ыс	TID	Unitand Scaling ID	Безоприон				
			P0411	80H	01H	Secondary Air Injection System Incor- rect Flow Detected				
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary Air Injection System Insufficient Flow				
			P2445	82H	01H	Secondary Air Injection System Pump Stuck Off	D			
SEC- OND- ARY AIR	71H	Secondary Air system	P2448	83H	01H	Secondary Air Injection System High Airflow	Е			
711(1711)			Bank1: P2440 Bank2: P2442	84H	01H	Secondary Air Injection System Switching Valve Stuck Open				
			P2440	85H	01H	Secondary Air Injection System Switching Valve Stuck Open	F			
			P2444	86H	01H	Secondary Air Injection System Pump Stuck On				
	0411	Fuel injection system function	P0171 or P0172	80H	2FH	Long term fuel trim	G			
FUEL	81H	(Bank 1)	P0171 or P0172	81H	24H	The number of lambda control clamped				
SYSTEM	0011	Fuel injection system function	P0174 or P0175	80H	2FH	Long term fuel trim	-			
	82H	(Bank 2)	P0174 or P0175	81H	24H	The number of lambda control clamped				

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	000			li	e and Test mit display)	
Item	OBD- MID	Self-diagnostic test item	DTC	TID	Unit and Scaling ID	Description
			P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second cylinder
			P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000 revolution of the fourth cylinder
			P0305	84H	24H	Misfiring counter at 1000 revolution of the fifth cylinder
			P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder
			P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder
		Multiple Cylinder Misfires	P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder
			P0300	88H	24H	Misfiring counter at 1000 revolution of the multiple cylinders
MISFIRE	A1H		P0301	89H	24H	Misfiring counter at 200 revolution of th first cylinder
MISFIRE	AIII		P0302	8AH	24H	Misfiring counter at 200 revolution of th second cylinder
			P0303	8BH	24H	Misfiring counter at 200 revolution of th third cylinder
			P0304	8CH	24H	Misfiring counter at 200 revolution of th fourth cylinder
			P0305	8DH	24H	Misfiring counter at 200 revolution of th fifth cylinder
			P0306	8EH	24H	Misfiring counter at 200 revolution of th sixth cylinder
			P0307	8FH	24H	Misfiring counter at 200 revolution of th seventh cylinder
			P0308	90H	24H	Misfiring counter at 200 revolution of th eighth cylinder
			P0300	91H	24H	Misfiring counter at 1000 revolution of the single cylinder
			P0300	92H	24H	Misfiring counter at 200 revolution of th single cylinder
			P0300	93H	24H	Misfiring counter at 200 revolution of the multiple cylinders

< ECU D	IAGING	)313 <i>&gt;</i>				[VQ35HK]	
Item	OBD-	Self-diagnostic test item	DTC	li	ne and Test mit display)	Description	
nom	MID	Con diagnostic test tem	Dio	TID	Unitand Scaling ID	Description	E
	A2H	No. 1 Cylinder Misfire	P0301	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	
		,	P0301	0CH	24H	Misfire counts for last/current driving cycles	
	АЗН	No. 2 Cylinder Misfire	P0302	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles	
			P0302	0CH	24H	Misfire counts for last/current driving cycles	
	A4H	No. 3 Cylinder Misfire	P0303	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	
		,	P0303	0CH	24H	Misfire counts for last/current driving cycles	
	A5H	No. 4 Cylinder Misfire	P0304	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	
MICEIDE			P0304	0CH	24H	Misfire counts for last/current driving cycles	
MISFIRE	A6H	No. 5 Cylinder Misfire	P0305	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles	
			P0305	0CH	24H	Misfire counts for last/current driving cycles	
	А7Н	No. 6 Cylinder Misfire	P0306	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles	
			P0306	0CH	24H	Misfire counts for last/current driving cycles	
	A8H	No. 7 Cylinder Misfire	P0307	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles	
		.,	P0307	0CH	24H	Misfire counts for last/current driving cycles	
	А9Н	No. 8 Cylinder Misfire	P0308	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles	
			P0308	0CH	24H	Misfire counts for last/current driving cycles	

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# SYMPTOM DIAGNOSIS

# **ENGINE CONTROL SYSTEM SYMPTOMS**

Symptom Table

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM														
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page	
Warranty	y symptom code	AA	AB	AC	AD	AE	AF	AG	АН	AJ	AK	AL	AM	НА		
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-602	
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-692	
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-598	
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-86	
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-635	
	Incorrect idle speed adjustment						1	1	1	1		1			EC-22	
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-472, EC-484	
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-22	
	Ignition circuit	1	1	2	2	2		2	2			2			EC-617	
Main po	wer supply and ground circuit	2	2	3	3	3		3	3		2	3			EC-155	
Mass air	r flow sensor circuit	1			2										EC-195, EC-205	
Engine o	coolant temperature sensor circuit						3			3					EC-220, EC-230	
Air fuel r	ratio (A/F) sensor 1 circuit		1	2	3	2		2	2			2			EC-237, EC-244, EC-250, EC-256, EC-575	
Throttle	position sensor circuit						2			2					EC-224, EC-323, EC-468, EC-470, EC-486	
Accelera	ator pedal position sensor circuit			3	2	1									EC-558, EC-563, EC-569	
Knock so	ensor circuit			2								3			EC-335	

## **ENGINE CONTROL SYSTEM SYMPTOMS**

< SYMPTOM DIAGNOSIS >

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		SYMPTOM												
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	АН	AJ	AK	AL	AM	НА	
Engine oil temperature sensor			4		2						3			EC-316, EC-319
Crankshaft position sensor circuit	2	2												EC-340
Camshaft position sensor circuit	3	2												EC-346
Vehicle speed signal circuit		2	3		3						3			EC-429
Power steering pressure sensor circuit		2					3	3						EC-435
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-439, EC-442
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-185
Exhaust valve timing control magnet retarder circuit		3	2		1	3	2	2	3		3			EC-190
PNP signal circuit			3		3		3	3			3			EC-449
Refrigerant pressure sensor circuit		2				3			3		4			EC-637
Electrical load signal circuit							3							EC-596
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	ATC-34
ABS actuator and electric unit (control unit)			4											BRC-12

<sup>1 - 6:</sup> The numbers refer to the order of inspection. (continued on next figure)

## SYSTEM — ENGINE MECHANICAL & OTHER

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		SYMPTOM													
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
	ymptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	НА	
Fuel	Fuel tank	5													FL-10
	Fuel piping			5	5	5		5	5			5			<u>EM-40</u>
	Vapor lock		5												
	Valve deposit	5		5	5	5		5	5		5	5			
	Poor fuel (Heavy weight gasoline, Low octane)			3											_
Air	Air duct														EM-17
	Air cleaner														EM-17
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)	5	5	5	5	5	5	5	5	5		5			<u>EM-17</u>
	Electric throttle control actuator	5			5		5			5					<u>EM-19</u>
	Air leakage from intake manifold/ Collector/Gasket														<u>EM-19,</u> <u>EM-22</u>
Cranking	Battery	1	1	1		1		1	1					1	<u>SC-4</u>
	Generator circuit						•								SC-21
	Starter circuit	3										1			SC-8
	Signal plate	6	-												EM-120
	PNP signal	4													<u>AT-110</u>
Engine	Cylinder head	5	5	5	5	5		5	5			5			<u>EM-96</u>
	Cylinder head gasket										4		3		
	Cylinder block												4		
	Piston ring												4		
	Piston ring	6	6	6	6	6		6	6			6	-		EM-119
	Connecting rod														
	Bearing Crankshaft														
	Cialiksilait														

# **ENGINE CONTROL SYSTEM SYMPTOMS**

< SYMPTOM DIAGNOSIS >

			SYMPTOM												
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty	symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	НА	
Valve	Timing chain														EM-59
mecha- nism	Camshaft														EM-79
HISH	Intake valve timing control	_	5	5	5	_		5	_			5			EM-59
	Exhaust valve timing control	5			3	5		5	5						EM-59
	Intake valve												3		EM-96
	Exhaust valve												3		<u>=IVI-90</u>
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			EM-24, EX-3
	Three way catalyst														<u>LX-3</u>
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-28, EM-32, LU-16, LU-
	Oil level (Low)/Filthy oil														<u>LU-5</u>
Cooling	Radiator/Hose/Radiator filler cap														<u>CO-13</u> , <u>CO-17</u>
	Thermostat									5					CO-26
	Water pump	_	_	5	_	_		_	E		А	_			<u>CO-23</u>
	Water gallery	5	5	5	5	5		5	5		4	5			<u>CO-28</u>
	Cooling fan														CO-21
	Coolant level (Low)/Contaminat- ed coolant									5					<u>CO-10</u>
IVIS (INFII NATS)	NITI Vehicle Immobilizer System —	1	1												BL-220

<sup>1 - 6:</sup> The numbers refer to the order of inspection.

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## NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS > [VQ35HR]

## NORMAL OPERATING CONDITION

**Description** 

### FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,400 rpm under no load (for example, the selector lever position is neutral and engine speed is over 2,400 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled. **NOTE:** 

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, <u>EC-41</u>. "System Description".

< PRECAUTION > [VQ35HR]

### **PRECAUTION**

### **PRECAUTIONS**

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the "SUPPLEMENTAL RESTRAINT SYSTEM" and "SEAT BELTS" 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 "SUPPLEMENTAL RESTRAINT SYSTEM".
- 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.

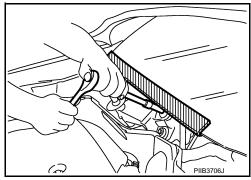
PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

#### **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

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



Precautions For Xenon Headlamp Service

### **WARNING:**

Comply with the following warnings to prevent any serious accident.

- Disconnect the battery cable (negative terminal) or the power supply fuse before installing, removing, or touching the xenon headlamp (bulb included). The xenon headlamp contains high-voltage generated parts.
- Never work with wet hands.
- Check the xenon headlamp ON-OFF status after assembling it to the vehicle. Never turn the xenon headlamp ON in other conditions. Connect the power supply to the vehicle-side connector. (Turning it ON outside the lamp case may cause fire or visual impairments.)

Never touch the bulb glass immediately after turning it OFF. It is extremely hot.

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Revision: 2009 June **EC-685** 2010 M35/M45

[VQ35HR1 < PRECAUTION >

#### **CAUTION:**

Comply with the following cautions to prevent any error and malfunction.

- Install the xenon bulb securely. (Insufficient bulb socket installation may melt the bulb, the connector, the housing, etc. by high-voltage leakage or corona discharge.)
- Never perform HID circuit inspection with a tester.
- Never touch the xenon bulb glass with hands. Never put oil and grease on it.
- Dispose of the used xenon bulb after packing it in thick vinyl without breaking it.
- Never wipe out dirt and contamination with organic solvent (thinner, gasoline, etc.).

### On Board Diagnostic (OBD) System of Engine and A/T

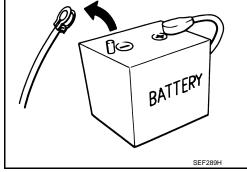
The ECM has an on board diagnostic system. It will illuminate the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

#### CAUTION:

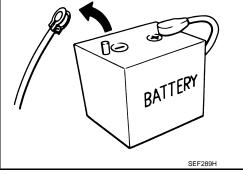
- Always turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to illuminate.
- Always connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to illuminate due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-74, "Description".
- Always route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to illuminate due to the short circuit.
- Always connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to illuminate due to the malfunction of the EVAP system or fuel injection system, etc.
- Always erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

#### **General Precautions**

- Always use a 12 volt battery as power source.
- Never attempt to disconnect battery cables while engine is runnina.
- 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.

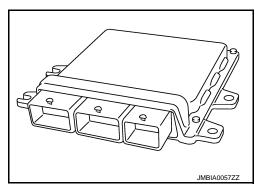


- Never disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.
  - The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Never replace parts because of a slight variation.
- If the battery is disconnected, the following emission-related diagnostic information will be 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



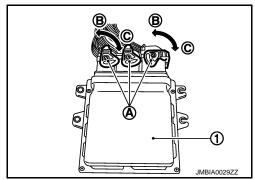
INFOID:0000000005353858

INFOID:0000000005353859



< PRECAUTION > [VQ35HR]

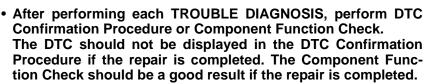
- When connecting ECM harness connector (A), fasten (B) it securely with a lever as far as it will go as shown in the figure.
  - 1. ECM
  - C. Loosen

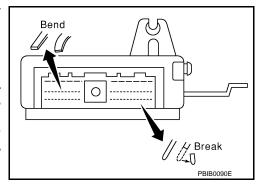


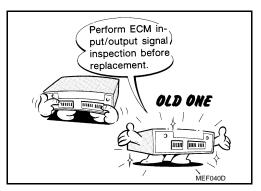
 When connecting or disconnecting pin connectors into or from ECM, never damage pin terminals (bends or break).
 Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.

Securely connect ECM harness connectors.
 A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.

- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harness dry.
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-645, "Reference Value".
- Handle mass air flow sensor carefully to avoid damage.
- Never clean mass air flow sensor with any type of detergent.
- Never disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Never shock or jar the camshaft position sensor, crankshaft position sensor.









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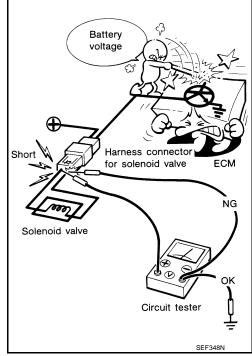
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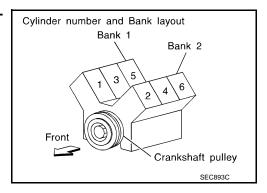
Ρ

< PRECAUTION > [VQ35HR]

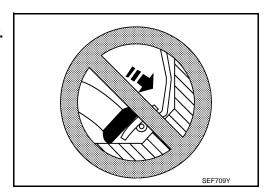
- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.
  - Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- Never use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



- B1 indicates bank 1, B2 indicates bank 2 as shown in the figure.
- Never operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.



- · Never depress accelerator pedal when starting.
- · Immediately after starting, never rev up engine unnecessarily.
- · Never rev up engine just prior to shutdown.

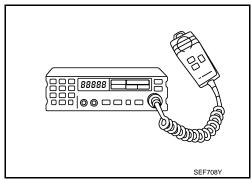


### **PRECAUTIONS**

< PRECAUTION > [VQ35HR]

 When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.

- Keep the antenna as far as possible from the electronic control units.
- Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.
  - Never let them run parallel for a long distance.
- Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
- Be sure to ground the radio to vehicle body.



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< PREPARATION > [VQ35HR]

## **PREPARATION**

### **PREPARATION**

### Special Service Tools

INFOID:0000000005353860

### NOTE:

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name		Description
(J-44321) Fuel pressure gauge kit	LEC642	Checks fuel pressure

### **Commercial Service Tools**

INFOID:0000000005353861

Tool name (Kent-Moore No.)		Description
Leak detector i.e.: (J-41416)	S-NT703	Locates the EVAP leak
EVAP service port adapter i.e.: (J-41413-OBD)	S-NT704	Applys positive pressure through EVAP service port
Fuel filler cap adapter i.e.: (MLR-8382)	S-NT815	Checks fuel tank vacuum relief valve opening pressure
Socket wrench	19 mm (0.75 in) Note than 32 mm (1.26 in)	Removes and installs engine coolant temperature sensor

### **PREPARATION**

< PREPARATION > [VQ35HR]

	Description	А
a Mating b Surface shave cylinder	Reconditions the exhaust system threads before installing a new oxygen sensor. Use with antiseize lubricant shown below.  a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Tita-	EC
FlutesAEM488		_ _
	when reconditioning exhaust system threads.	D
S-N1779		Е
	surface shave cylinder  Flutes  AEM488	Reconditions the exhaust system threads before installing a new oxygen sensor. Use with antiseize lubricant shown below.  a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor  b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor  Lubricates oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

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### ON-VEHICLE MAINTENANCE

### **FUEL PRESSURE**

Inspection INFOID:0000000005353862

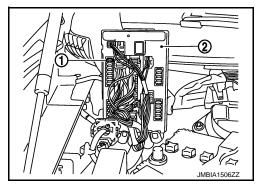
#### **FUEL PRESSURE RELEASE**

#### (P) With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT-III.
- 3. Start engine.
- 4. After engine stalls, crank it 2 or 3 times to release all fuel pressure.
- Turn ignition switch OFF.

#### **Without CONSULT-III**

- 1. Remove fuel pump fuse (1) located in IPDM E/R (2).
- Start engine.
- After engine stalls, crank it 2 or 3 times to release all fuel pressure.
- 4. Turn ignition switch OFF.
- 5. Reinstall fuel pump fuse after servicing fuel system.



#### **FUEL PRESSURE CHECK**

#### **CAUTION:**

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

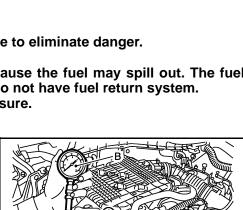
- Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel
  pressure cannot be completely released because S51 models do not have fuel return system.
- Use Fuel Pressure Gauge Kit [SST:(J-44321)] to check fuel pressure.
- 1. Release fuel pressure to zero.
- Install the inline fuel quick disconnect fitting (A) between fuel damper (1) and injector tube.
- 3. Connect the fuel pressure test gauge (with quick connector adapter hose) (B) to the inline fuel quick disconnect fitting.
- 4. Turn ignition switch ON and check for fuel leakage.
- 5. Start engine and check for fuel leakage.
- Read the indication of fuel pressure gauge.

### At idling : Approximately 350 kPa (3.57 kg/cm<sup>2</sup>, 51 psi)

7. If result is unsatisfactory, check fuel hoses and fuel tubes for clogging.

If OK, Replace "fuel filter and fuel pump assembly".

If NG, Repair or replace malfunctioning part.



### **EVAP LEAK CHECK**

Inspection INFOID:000000005353863

#### **CAUTION:**

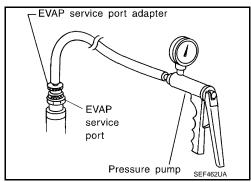
- Never use compressed air or a high pressure pump.
- Never exceed 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi) of pressure in EVAP system.

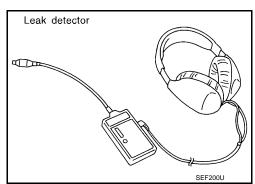
#### NOTE:

- Do not start engine.
- Improper installation of EVAP service port adapter (commercial service tool) to the EVAP service port may cause a leak.

### (P) WITH CONSULT-III

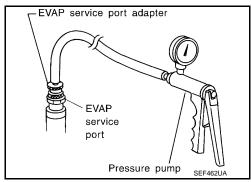
- To locate the EVAP leak, install EVAP service port adapter (commercial service tool) and pressure pump to EVAP service port.
- 2. Turn ignition switch ON.
- 3. Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-III.
- 4. Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
- 5. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
- Remove EVAP service port adapter (commercial service tool) and hose with pressure pump.
- Locate the leak using a leak detector (commercial service tool).
   Refer to <u>EC-86, "System Diagram"</u>.





#### 

- To locate the EVAP leak, install EVAP service port adapter (commercial service tool) and pressure pump to EVAP service port.
- 2. Apply battery voltage between the terminals of EVAP canister vent control valve to make a closed EVAP system.
- To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm<sup>2</sup>, 0.2 to 0.4 psi).
- 4. Remove EVAP service port adapter (commercial service tool) and hose with pressure pump.



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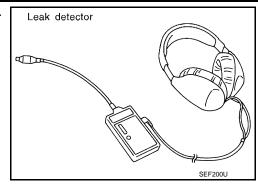
Revision: 2009 June **EC-693** 2010 M35/M45

### **EVAP LEAK CHECK**

### < ON-VEHICLE MAINTENANCE >

[VQ35HR]

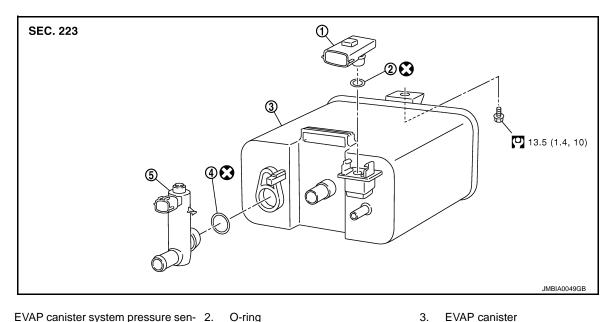
 Locate the leak using a leak detector (commercial service tool). Refer to <u>EC-86, "System Diagram"</u>.



### **ON-VEHICLE REPAIR**

### **EVAP CANISTER**

**Exploded View** INFOID:0000000005353864 EC



- EVAP canister system pressure sen- 2.
  - EVAP canister vent control valve

Refer to GI-8, "Contents" for symbols not described on the above.

Removal and Installation

### **REMOVAL**

4.

1. Lift up the vehicle.

O-ring

- 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:

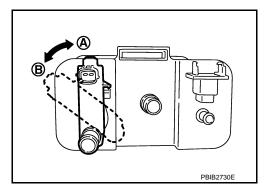
Tighten EVAP canister fixing bolt to the specified torque.

#### DISASSEMBLY

Turn EVAP canister vent control valve counterclockwise.

A : Lock B : Unlock

2. Remove the EVAP canister vent control valve.



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< ON-VEHICLE REPAIR > [VQ35HR]

### **ASSEMBLY**

Assemble in the reverse order of disassembly.

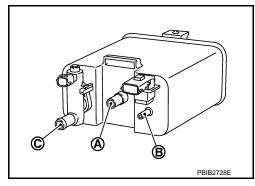
#### **CAUTION:**

Always replace O-ring with a new one.

Inspection INFOID:0000000005353866

Check EVAP canister as per the following:

- 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.



### **SERVICE DATA AND SPECIFICATIONS (SDS)**

< SERVICE DATA AND SPECIFICATIONS (SDS)

[VQ35HR]

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## SERVICE DATA AND SPECIFICATIONS (SDS)

### SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed INFOID:0000000005353887 EC

Condition	Specification	
No load* (in P or N position)	$650 \pm 50 \text{ rpm}$	

<sup>\*:</sup> Under the following conditions

- · A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

**Ignition Timing** 

Condition	Specification	
No load* (in P or N position)	15 ± 5° BTDC	

<sup>\*:</sup> Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

### Calculated Load Value

INFOID:0000000005353869

INFOID:0000000005353868

Condition	Specification (Using CONSULT-III or GST)	
At idle	5 – 35%	
At 2,500 rpm	5 – 35%	

### Mass Air Flow Sensor

INFOID:0000000005353870

Supply voltage	Battery voltage (11 – 14 V)	
Output voltage at idle	0.8 – 1.1 V*	
Mass air flow (Using CONSULT-III or GST)	2.0 – 6.0 g·m/sec at idle* 7.0 – 20.0 g·m/sec at 2,500 rpm*	

<sup>\*:</sup> Engine is warmed up to normal operating temperature and running under no load.

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Revision: 2009 June **EC-697** 2010 M35/M45

## SERVICE INFORMATION

### INDEX FOR DTC

U0101 - U1001

DTC* <sup>1</sup>		Itama	
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	ltems (CONSULT-III screen terms)	Reference page
U0101	0101*4	LOST COMM (TCM)	EC-829
U1001	1001* <sup>4</sup>	CAN COMM CIRCUIT	EC-831

<sup>\*1: 1</sup>st trip DTC No. is the same as DTC No.

P0011 - P0081

DTC* <sup>1</sup>		Itama	
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	Items (CONSULT-III screen terms)	Reference page
P0011	0011	INT/V TIM CONT-B1	EC-833
P0021	0021	INT/V TIM CONT-B2	EC-833
P0031	0031	A/F SEN1 HTR (B1)	EC-845
P0032	0032	A/F SEN1 HTR (B1)	EC-845
P0037	0037	HO2S2 HTR (B1)	EC-852
P0038	0038	HO2S2 HTR (B1)	EC-852
P0051	0051	A/F SEN1 HTR (B2)	EC-845
P0052	0052	A/F SEN1 HTR (B2)	EC-845
P0057	0057	HO2S2 HTR (B2)	EC-852
P0058	0058	HO2S2 HTR (B2)	EC-852
P0075	0075	INT/V TIM V/CIR-B1	EC-860
P0081	0081	INT/V TIM V/CIR-B2	EC-860

<sup>\*1: 1</sup>st trip DTC No. is the same as DTC No.

P0101 - P0128

DTC* <sup>1</sup>		Items	
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	(CONSULT-III screen terms)	Reference page
P0101	0101	MAF SEN/CIRCUIT-B1	EC-867
P0102	0102	MAF SEN/CIRCUIT-B1	EC-874
P0103	0103	MAF SEN/CIRCUIT-B1	EC-874
P0112	0112	IAT SEN/CIRCUIT-B1	EC-881
P0113	0113	IAT SEN/CIRCUIT-B1	EC-881

Revision: 2009 June **EC-698** 2010 M35/M45

<sup>\*2:</sup> This number is prescribed by SAE J2012.

<sup>\*3:</sup> In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

<sup>\*4:</sup> The troubleshooting for this DTC needs CONSULT-III.

<sup>\*2:</sup> This number is prescribed by SAE J2012.

 $<sup>^{\</sup>star}3$ : In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

### **INDEX FOR DTC**

### < SERVICE INFORMATION >

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DTC*1		ltomo	
CONSULT-III GST* <sup>2</sup>	ECM*3	(CONSULT-III screen terms)	Reference page
P0116	0116	ECT SEN/CIRC	EC-885
P0117	0117	ECT SEN/CIRC	EC-888
P0118	0118	ECT SEN/CIRC	EC-888
P0122	0122	TP SEN 2/CIRC-B1	EC-893
P0123	0123	TP SEN 2/CIRC-B1	EC-893
P0125	0125	ECT SENSOR	EC-899
P0127	0127	IAT SENSOR-B1	EC-902
P0128	0128	THERMSTAT FNCTN	EC-905

<sup>\*1: 1</sup>st trip DTC No. is the same as DTC No.

### P0130 - P0159

INFOID:0000000005353874

DTC* <sup>1</sup>		ltems	
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	(CONSULT-III screen terms)	Reference page
P0130	0130	A/F SENSOR1 (B1)	EC-907
P0131	0131	A/F SENSOR1 (B1)	EC-907
P0132	0132	A/F SENSOR1 (B1)	EC-923
P0133	0133	A/F SENSOR1 (B1)	EC-931
P0137	0137	HO2S2 (B1)	EC-940
P0138	0138	HO2S2 (B1)	EC-949
P0139	0139	HO2S2 (B1)	EC-961
P0150	0150	A/F SENSOR1 (B2)	EC-907
P0151	0151	A/F SENSOR1 (B2)	EC-907
P0152	0152	A/F SENSOR1 (B2)	EC-923
P0153	0153	A/F SENSOR1 (B2)	EC-931
P0157	0157	HO2S2 (B2)	EC-940
P0158	0158	HO2S2 (B2)	EC-949
P0159	0159	HO2S2 (B2)	EC-961

<sup>\*1: 1</sup>st trip DTC No. is the same as DTC No.

### P0171 - P0223

NFOID:0000000005353875	- 1

DTO	C* <sup>1</sup>	ltems		
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	(CONSULT-III screen terms)	Reference page	
P0171	0171	FUEL SYS-LEAN-B1	EC-970	
P0172	0172	FUEL SYS-RICH-B1	EC-979	
P0174	0174	FUEL SYS-LEAN-B2	EC-970	
P0175	0175	FUEL SYS-RICH-B2	EC-979	

<sup>\*2:</sup> This number is prescribed by SAE J2012.

<sup>\*3:</sup> In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

<sup>\*2:</sup> This number is prescribed by SAE J2012.

<sup>\*3:</sup> In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

DT	C* <sup>1</sup>	Itama	
CONSULT-III GST* <sup>2</sup>	ECM*3	Items (CONSULT-III screen terms)	Reference page
P0181	0181	FTT SENSOR	EC-988
P0182	0182	FTT SEN/CIRCUIT	EC-992
P0183	0183	FTT SEN/CIRCUIT	EC-992
P0222	0222	TP SEN 1/CIRC-B1	EC-996
P0223	0223	TP SEN 1/CIRC-B1	EC-996

<sup>\*1: 1</sup>st trip DTC No. is the same as DTC No.

P0300 - P0308

DT	C* <sup>1</sup>	ltems	
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	(CONSULT-III screen terms)	Reference page
P0300	0300	MULTI CYL MISFIRE	EC-1002
P0301	0301	CYL 1 MISFIRE	EC-1002
P0302	0302	CYL 2 MISFIRE	EC-1002
P0303	0303	CYL 3 MISFIRE	EC-1002
P0304	0304	CYL 4 MISFIRE	EC-1002
P0305	0305	CYL 5 MISFIRE	EC-1002
P0306	0306	CYL 6 MISFIRE	EC-1002
P0307	0307	CYL 7 MISFIRE	EC-1002
P0308	0308	CYL 8 MISFIRE	EC-1002

<sup>\*1: 1</sup>st trip DTC No. is the same as DTC No.

P0327 - P0430

DTC	C* <sup>1</sup>	Items	
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	(CONSULT-III screen terms)	Reference page
P0327	0327	KNOCK SEN/CIRC-B1	EC-1009
P0328	0328	KNOCK SEN/CIRC-B1	EC-1009
P0332	0332	KNOCK SEN/CIRC-B2	EC-1009
P0333	0333	KNOCK SEN/CIRC-B2	EC-1009
P0335	0335	CKP SEN/CIRCUIT	EC-1014
P0340	0340	CMP SEN/CIRC-B1	EC-1020
P0420	0420	TW CATALYST SYS-B1	EC-1026
P0430	0430	TW CATALYST SYS-B2	EC-1026

<sup>\*1: 1</sup>st trip DTC No. is the same as DTC No.

<sup>\*2:</sup> This number is prescribed by SAE J2012.

<sup>\*3:</sup> In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

<sup>\*2:</sup> This number is prescribed by SAE J2012.

<sup>\*3:</sup> In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

<sup>\*2:</sup> This number is prescribed by SAE J2012.

<sup>\*3:</sup> In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0441 - P0456

INFOID:0000000005353878

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age	Reference pa	Items (CONSULT-III screen terms)	ECM* <sup>3</sup>	CONSULT-III GST* <sup>2</sup>
)	EC-1030	EVAP PURG FLOW/MON	0441	P0441
<u>i</u>	EC-1035	EVAP SMALL LEAK	0442	P0442
2	EC-1042	PURG VOLUME CONT/V	0443	P0443
)	EC-1050	PURG VOLUME CONT/V	0444	P0444
)	EC-1050	PURG VOLUME CONT/V	0445	P0445
<u>i</u>	EC-1056	VENT CONTROL VALVE	0447	P0447
_	EC-1061	VENT CONTROL VALVE	0448	P0448
	EC-1067	EVAP SYS PRES SEN	0451	P0451
)	EC-1070	EVAP SYS PRES SEN	0452	P0452
<u>i</u>	EC-1076	EVAP SYS PRES SEN	0453	P0453
<u> </u>	EC-1083	EVAP GROSS LEAK	0455	P0455
<u>)</u>	EC-1089	EVAP VERY SML LEAK	0456	P0456

<sup>\*1: 1</sup>st trip DTC No. is the same as DTC No.

P0460 - P0643 INFOID:0000000005353879

DTC* <sup>1</sup>			
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	Items (CONSULT-III screen terms)	Reference page
P0460	0460	FUEL LEV SEN SLOSH	EC-1097
P0461	0461	FUEL LEVEL SENSOR	EC-1099
P0462	0462	FUEL LEVL SEN/CIRC	EC-1101
P0463	0463	FUEL LEVL SEN/CIRC	EC-1101
P0500	0500	VEH SPEED SEN/CIRC*4	EC-1103
P0506	0506	ISC SYSTEM	EC-1105
P0507	0507	ISC SYSTEM	EC-1107
P0550	0550	PW ST P SEN/CIRC	EC-1109
P0603	0603	ECM BACK UP/CIRCUIT	EC-1114
P0605	0605	ECM	EC-1118
P0607	0607	ECM	EC-1120
P0643	0643	SENSOR POWER/CIRC	EC-1121

<sup>\*1: 1</sup>st trip DTC No. is the same as DTC No.

**EC-701** Revision: 2009 June 2010 M35/M45

<sup>\*2:</sup> This number is prescribed by SAE J2012.

<sup>\*3:</sup> In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

<sup>\*2:</sup> This number is prescribed by SAE J2012.

<sup>\*3:</sup> In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

<sup>\*4:</sup> When the fail-safe operations for both self-diagnoses (DTC P0500 and P0720) occur, the MIL illuminates.

P0700 - P0745

DTC*1		ltarra	
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	Items (CONSULT-III screen terms)	Reference page
P0700	0700	TRANSMISSION CONT	AT-109
P0705	0705	T/M RANGE SENSOR A	AT-110
P0710	0710	ATF TEMP SEN/CIRC	AT-140
P0717	0717	INPUT SPEED SENSOR A	AT-113
P0720	0720	OUTPUT SPEED SENSOR*4	AT-115
P0731	0731	1GR INCORRECT RATIO	AT-122
P0732	0732	2GR INCORRECT RATIO	<u>AT-124</u>
P0733	0733	3GR INCORRECT RATIO	<u>AT-126</u>
P0734	0734	4GR INCORRECT RATIO	AT-128
P0735	0735	5GR INCORRECT RATIO	AT-130
P0740	0740	TORQUE CONVERTER	AT-132
P0744	0744	TORQUE CONVERTER	AT-134
P0745	0745	PC SOLENOID A	<u>AT-136</u>

<sup>\*1: 1</sup>st trip DTC No. is the same as DTC No.

P0850 - P1421

DT	C* <sup>1</sup>	Itama	
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	(CONSULT-III screen terms)	Reference page
P0850	0850	P-N POS SW/CIRCUIT	EC-1126
P1140	1140	INTK TIM S/CIRC-B1	EC-1131
P1145	1145	INTK TIM S/CIRC-B2	EC-1131
P1148	1148	CLOSED LOOP-B1	EC-1139
P1168	1168	CLOSED LOOP-B2	EC-1139
P1211	1211	TCS C/U FUNCTN	EC-1140
P1212	1212	TCS/CIRC	EC-1141
P1217	1217	ENG OVER TEMP	EC-1142
P1220	1220	FPCM/CIRCUIT	EC-1152
P1225	1225	CTP LEARNING-B1	EC-1159
P1226	1226	CTP LEARNING-B1	EC-1161
P1421	1421	COLD START CONTROL	EC-1163

<sup>\*1: 1</sup>st trip DTC No. is the same as DTC No.

Revision: 2009 June **EC-702** 2010 M35/M45

<sup>\*2:</sup> This number is prescribed by SAE J2012.

<sup>\*3:</sup> In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

<sup>\*5:</sup> When the fail-safe operations for both self-diagnoses (DTC P0500 and P0720) occur, the MIL illuminates.

<sup>\*2:</sup> This number is prescribed by SAE J2012.

<sup>\*3:</sup> In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

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P1550 - P1574

INFOID:0000000005353882

D <sup>-</sup>	ГС* <sup>1</sup>	ltems	
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	(CONSULT-III screen terms)	Reference page
P1550	1550	BAT CURRENT SENSOR	EC-1165
P1551	1551	BAT CURRENT SENSOR	EC-1170
P1552	1552	BAT CURRENT SENSOR	EC-1170
P1553	1553	BAT CURRENT SENSOR	EC-1175
P1554	1554	BAT CURRENT SENSOR	EC-1180
P1564	1564	ASCD SW	EC-1186 (Models with ICC) EC-1192 (Models with ASCD)
P1568	1568	ICC COMMAND VALUE*4	EC-1198
P1572	1572	ASCD BRAKE SW	EC-1199 (Models with ICC) EC-1207 (Models with ASCD)
P1574	1574	ASCD VHL SPD SEN	EC-1214 (Models with ICC) EC-1216 (Models with ASCD)

<sup>\*1: 1</sup>st trip DTC No. is the same as DTC No.

P1610 - P1774

INFOID:0000000005353883

DT	C* <sup>1</sup>	Items		
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	(CONSULT-III screen terms)	Reference page	J
P1610	1610	LOCK MODE	<u>BL-5</u>	
P1611	1611	ID DISCORD, IMMU-ECM	BL-5	K
P1612	1612	CHAIN OF ECM-IMMU	BL-5	
P1614	1614	CHAIN OF IMMU-KEY	BL-5	L
P1715	1715	IN PULY SPEED	EC-1218	_
P1730	1730	A/T INTERLOCK	AT-147	
P1752	1752	INPUT CLUTCH SOL	AT-151	$\mathbb{N}$
P1757	1757	FR BRAKE SOLENOID	AT-153	
P1762	1762	DRCT CLUTCH SOL	AT-155	Ν
P1767	1767	HLR CLUTCH SOLENOID	AT-157	IN
P1772	1772	L C BRAKE SOLENOID	AT-159	
P1774	1774	L C BRAKE SOLENOID	<u>AT-161</u>	0

<sup>\*1: 1</sup>st trip DTC No. is the same as DTC No.

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<sup>\*2:</sup> This number is prescribed by SAE J2012.

<sup>\*3:</sup> In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

<sup>\*4:</sup> Models with ICC.

<sup>\*2:</sup> This number is prescribed by SAE J2012.

<sup>\*3:</sup> In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

### **INDEX FOR DTC**

< SERVICE INFORMATION >

[VK45DE]

P1800 - P2A03

DT	C* <sup>1</sup>	lta-sa-a	
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	ltems (CONSULT-III screen terms)	Reference page
P1800	1800	VIAS S/V-1	EC-1219
P1805	1805	BRAKE SW/CIRCUIT	EC-1224
P2100	2100	ETC MOT PWR-B1	EC-1231
P2101	2101	ETC FNCTN/CIRC-B1	EC-1235
P2103	2103	ETC MOT PWR	EC-1231
P2118	2118	ETC MOT-B1	EC-1241
P2119	2119	ETC ACTR-B1	EC-1246
P2122	2122	APP SEN 1/CIRC	EC-1248
P2123	2123	APP SEN 1/CIRC	EC-1248
P2127	2127	APP SEN 2/CIRC	EC-1253
P2128	2128	APP SEN 2/CIRC	EC-1253
P2135	2135	TP SENSOR-B1	EC-1259
P2138	2138	APP SENSOR	EC-1265
P2A00	2A00	A/F SENSOR1 (B1)	EC-1271
P2A03	2A03	A/F SENSOR1 (B2)	EC-1271

<sup>\*1: 1</sup>st trip DTC No. is the same as DTC No.

<sup>\*2:</sup> This number is prescribed by SAE J2012.

<sup>\*3:</sup> In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

### **PRECAUTIONS**

# Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the "SUPPLEMENTAL RESTRAINT SYSTEM" and "SEAT BELTS" 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 "SUPPLEMENTAL RESTRAINT SYSTEM".
- 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.

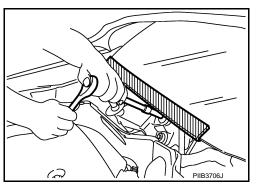
PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

#### **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

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



### On Board Diagnosis (OBD) System of Engine and A/T

The ECM has an on board diagnostic system. It will illuminate the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

#### **CAUTION:**

- 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 illuminate.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will
  cause the MIL to illuminate due to the open circuit. (Check that the connector is free from water,
  grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to <u>PG-74, "Description"</u>.
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to illuminate due to the short circuit.

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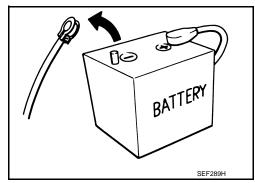
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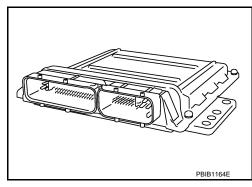
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube
  may cause the MIL to illuminate due to the malfunction of the EVAP system or fuel injection system,
  etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

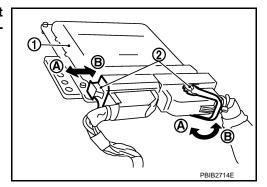
Precaution

- Always use a 12 volt battery as power source.
- Never attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- Before removing parts, turn ignition switch OFF and then disconnect negative battery cable.

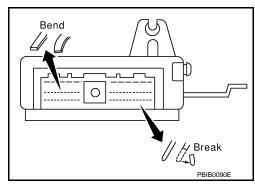


- Never disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.
  - The ECM will now start to self-control at its initial value. Thus, engine operation can vary slightly in this case. However, this is not an indication of a malfunction. Never replace parts because of a slight variation.
- If the battery is disconnected, the following emission-related diagnostic information will be cleared within 24 hours.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values
- When connecting ECM harness connector, fasten (B) it securely with a lever (2) as far as it will go as shown in the figure.
- ECM (1)
- Loosen (A)



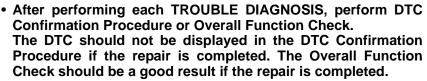


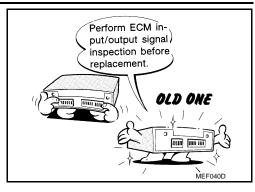
- When connecting or disconnecting pin connectors into or from ECM, never damage pin terminals (bends or breaks).
   Check that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors.
   A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- · Keep engine control system parts and harness dry.



#### < SERVICE INFORMATION >

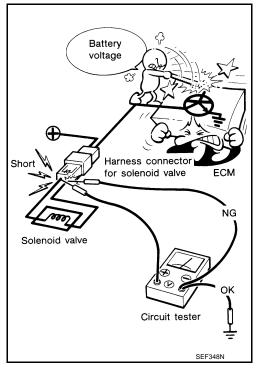
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and check that ECM functions properly. Refer to EC-791, "ECM Terminal and Reference Value".
- Handle mass air flow sensor carefully to avoid damage.
- Never clean mass air flow sensor with any type of detergent.
- Never disassemble electric throttle control actuator.
- Even a slight leakage in the air intake system can cause serious incidents.
- Never shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).







- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.
  - Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- Never 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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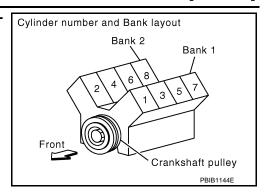
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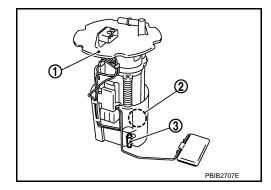
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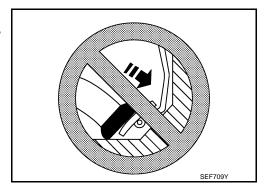
B1 indicates bank 1, B2 indicates bank 2 as shown in the figure.



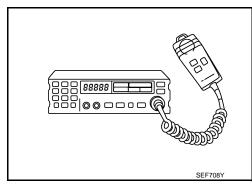
- Never operate fuel pump when there is no fuel in lines.
- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel tank temperature sensor (3)
- Tighten fuel hose clamps to the specified torque.



- Never depress accelerator pedal when starting.
- · Immediately after starting, never rev up engine unnecessarily.
- Never rev up engine just prior to shutdown.



- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.
- Keep the antenna as far as possible from the electronic control units.
- Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.
  - Never let them run parallel for a long distance.
- Adjust the antenna and feeder line so that the standing-wave radio can be kept smaller.
- Always ground the radio to vehicle body.



### **PREPARATION**

[VK45DE] < SERVICE INFORMATION >

### **PREPARATION**

#### Special Service Tool INFOID:0000000005353889

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.			EC
Tool number (Kent-Moore No.) Tool name		Description	
(J-44321)		Checks fuel pressure.	
Fuel pressure gauge kit			D
	LEC642		Е

### **Commercial Service Tool**

INFOID:0000000005353890

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ommerciai Service	5 1001	INFOID:000000005353890	
Tool name (Kent-Moore No.)		Description	(
Leak detector i.e.: (J-41416)		Locates the EVAP leak.	Ì
	S-NT703		
EVAP service port adapter i.e.: (J-41413-OBD)		Applies positive pressure through EVAP service port.	
	S-NT704		
Fuel filler cap adapter i.e.: (MLR-8382)		Checks fuel tank vacuum relief valve opening pressure.	
			ľ
	S-NT815		I
Socket wrench		Removes and installing engine coolant temperature sensor.	(
	19 mm (0.75 in) More than 32 mm (1.26 in)		
	S-NT705		

### **PREPARATION**

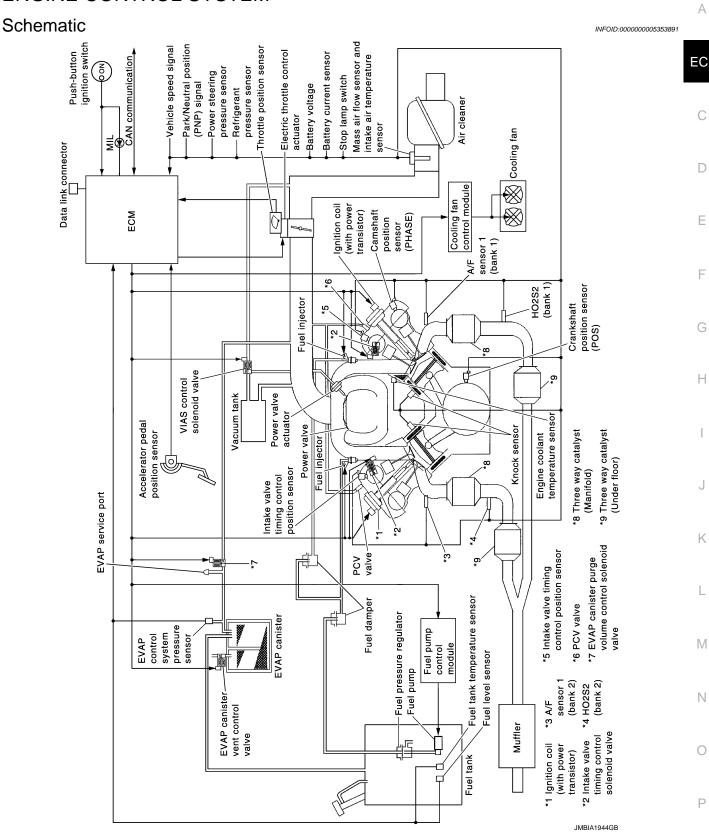
SERVICE INFORMATION ·	

[VK45DE]

Tool name (Kent-Moore No.)		Description
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)	a Mating surface shave cylinder	Reconditions the exhaust system threads before installing a new heated oxygen sensor. Use with anti-seize lubricant shown below. a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor
Anti-seize lubricant i.e.: (Permatex <sup>TM</sup> 133AR or equivalent meeting MIL specifica- tion MIL-A-907)	S-NT779	Lubricates oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

INFOID:0000000005353892

### **ENGINE CONTROL SYSTEM**



Multiport Fuel Injection (MFI) System

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*3		
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position	-	
Accelerator pedal position sensor	Accelerator pedal position	-	Fuel injector
TCM	Gear position	Fuel injection &	
Battery	Battery voltage*3	mixture ratio control	
Knock sensor	Engine knocking condition	-	
Power steering pressure sensor	Power steering operation	-	
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
ABS actuator and electric unit (control unit)	VDC/TCS operation command*2		
Air conditioner switch	Air conditioner operation*2		
unified meter and A/C amp.	Vehicle speed*2		

<sup>\*1:</sup> This sensor is not used to control the engine system under normal conditions.

#### 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.

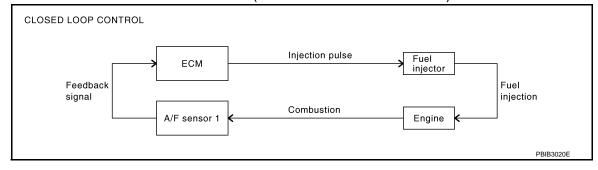
#### <Fuel increase>

- During warm-up
- · When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever position 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)



<sup>\*2:</sup> This signal is sent to the ECM via the CAN communication line.

<sup>\*3:</sup> ECM determines the start signal status by the signals of engine speed and battery voltage.

The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can better reduce CO, HC and NOx emissions. This system uses A/F sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about A/F sensor 1, refer to EC-907, "Component Description". This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

This stage is referred to as the closed loop control condition.

Heated oxygen sensor 2 is located downstream of the three way catalyst (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 designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.

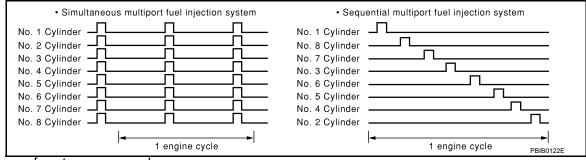
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes "short term fuel trim" and "long term fuel trim".

"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from A/F sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

"Long term fuel trim" is overall fuel compensation carried out over time to compensate for continual deviation of the "short term fuel trim" from the central value. Continual deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

#### FUEL INJECTION TIMING



Two types of systems are used.

Sequential Multiport Fuel Injection System

Fuel is injected into each cylinder during each engine cycle according to the ignition order. This system is used when the engine is running.

Simultaneous Multiport Fuel Injection System

Fuel is injected simultaneously into all eight cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.

The eight fuel injectors will then receive the signals two times for each engine cycle.

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### **ENGINE CONTROL SYSTEM**

< SERVICE INFORMATION >

[VK45DE]

This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

#### **FUEL SHUT-OFF**

Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

### Electronic Ignition (EI) System

INFOID:0000000005353893

#### INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2		
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position	Ignition timing	_
Accelerator pedal position sensor	Accelerator pedal position	control	Power transistor
Battery	Battery voltage*2		
Knock sensor	Engine knocking		
TCM	Gear position		
Unified meter and A/C amp.	Vehicle speed*1		

<sup>\*1:</sup> This signal is sent to the ECM via the CAN communication line.

#### SYSTEM DESCRIPTION

Ignition order: 1 - 8 - 7 - 3 - 6 - 5 - 4 - 2

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.

### Fuel Cut Control (At No Load and High Engine Speed)

INFOID:0000000005353894

### INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
TCM	Neutral position			
Accelerator pedal position sensor	Accelerator pedal position			
Engine coolant temperature sensor	Engine coolant temperature	Fuel cut control	Fuel injector	
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed	. See Succession	. 33,53.61	
Unified meter and A/C amp.	Vehicle speed*			

<sup>\*:</sup> This signal is sent to the ECM via the CAN communication line.

<sup>\*2:</sup> ECM determines the start signal status by the signals of engine speed and battery voltage.

### **ENGINE CONTROL SYSTEM**

[VK45DE] < SERVICE INFORMATION >

### SYSTEM DESCRIPTION

If the engine speed is above 1,400 rpm under no load (for example, the selector lever position is neutral and engine speed is over 1,400 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,000 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, EC-711, "Multiport Fuel Injection (MFI) System".

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### AIR CONDITIONING CUT CONTROL

### Input/Output Signal Chart

INFOID:0000000005353895

Sensor	Input signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner ON signal*1		
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2		
Engine coolant temperature sensor	Engine coolant temperature	Air conditioner	Air conditioner relay
Battery	Battery voltage*2	cut control	
Refrigerant pressure sensor	Refrigerant pressure		
Power steering pressure sensor	Power steering operation		
Unified meter and A/C amp.	Vehicle speed*1		

<sup>\*1:</sup> This signal is sent to the ECM via the CAN communication line.

### System Description

INFOID:0000000005353896

This system improves engine operation when the air conditioner is used. Under the following conditions, the air conditioner is turned OFF.

- When the accelerator pedal is fully depressed.
- · When cranking the engine.
- At high engine speeds.
- · When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

<sup>\*2:</sup> ECM determines the start signal status by the signals of engine speed and battery voltage.

### **AUTOMATIC SPEED CONTROL DEVICE (ASCD)**

< SERVICE INFORMATION >

[VK45DE]

### AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Description

INFOID:0000000005353897

#### INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Electric throttle control actuator	_
Stop lamp switch	Brake pedal operation			
ASCD steering switch	ASCD steering switch operation			
Unified meter and A/C amp.	Vehicle speed*			
ТСМ	Gear position			
	Powertrain revolution*			

<sup>\*:</sup> This signal is sent to the ECM through CAN communication line

#### BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.

Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/ h (25 MPH) and 144 km/h (89 MPH).

ECM controls throttle angle of electric throttle control actuator to regulate engine speed.

Operation status of ASCD is indicated by CRUISE lamp and SET lamp on combination meter. If any malfunction occurs in the ASCD system, it automatically deactivates control.

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

#### SET OPERATION

Press MAIN switch. (The CRUISE lamp in combination meter illuminates.)

When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH), press SET/COAST switch. (Then SET lamp in combination meter illuminates.)

#### ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system. And then ASCD will maintain the new set speed.

#### CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Selector lever is changed to the N, P, R position
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.
  - When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ ACCELERATE switch.
- Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF while ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

#### COAST OPERATION

When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will maintain the new set speed.

#### RESUME OPERATION

**EC-717** Revision: 2009 June 2010 M35/M45

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### **AUTOMATIC SPEED CONTROL DEVICE (ASCD)**

### < SERVICE INFORMATION >

[VK45DE]

When the RESUME/ACCELERATE switch is pressed after cancelling operation other than pressing MAIN switch, vehicle speed will return to the last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released
- A/T selector lever is in other than the P and N positions
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (89 MPH)

### Component Description

INFOID:0000000005353898

ASCD STEERING SWITCH

Refer to EC-1192.

ASCD BRAKE SWITCH

Refer to <u>EC-1207</u> and <u>EC-1281</u>.

STOP LAMP SWITCH

Refer to <u>EC-1207</u>, <u>EC-1224</u> and <u>EC-1281</u>.

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EC-1231, EC-1235, EC-1241 and EC-1246.

ASCD INDICATOR

Refer to EC-1286.

### **CAN COMMUNICATION**

< SERVICE INFORMATION > [VK45DE]

### 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-29, "CAN Communication Signal Chart", about CAN communication for detail.

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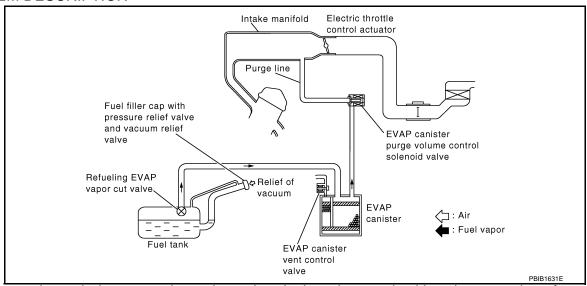
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### **EVAPORATIVE EMISSION SYSTEM**

Description INFOID:00000000053533900

#### SYSTEM DESCRIPTION



The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

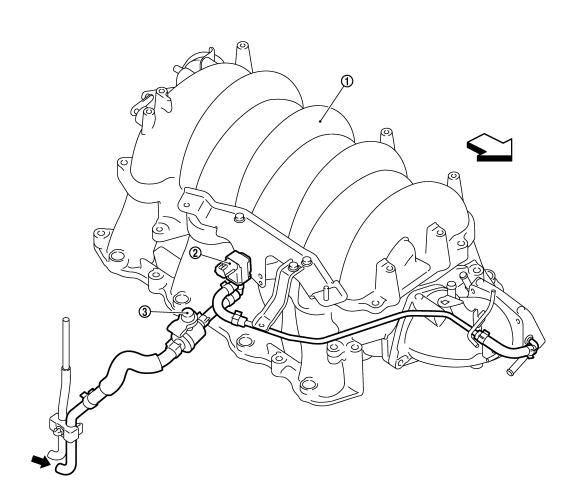
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.

The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.

EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

#### **EVAPORATIVE EMISSION LINE DRAWING**

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PBIB2726E

⟨□ : Vehicle front

= : From next figure

1. Intake manifold collector

EVAP canister purge volume control 3. EVAP service port solenoid valve

NOTE:

Never use soapy water or any type of solvent while installing vacuum hose or purge hoses.

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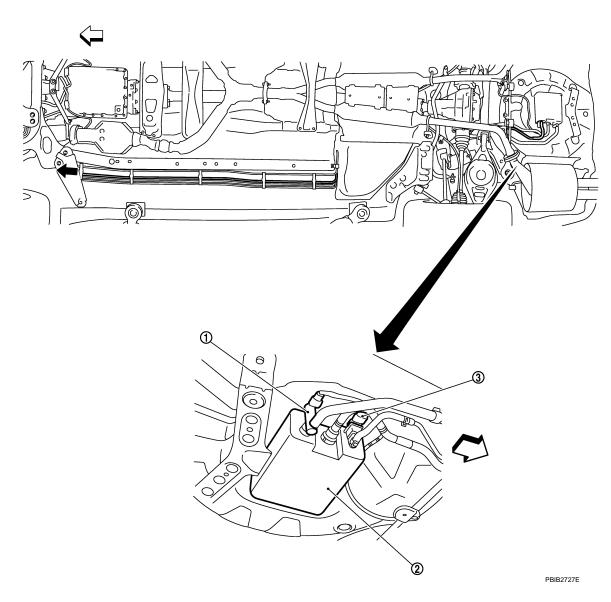
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<□ : Vehicle front

= : To previous figure

1. EVAP canister vent control valve

2. EVAP canister

3. EVAP control system pressure sensor

NOTE:

Never use soapy water or any type of solvent while installing vacuum hose or purge hoses.

## **Component Inspection**

INFOID:0000000005353901

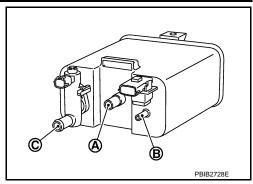
**EVAP CANISTER** 

### **EVAPORATIVE EMISSION SYSTEM**

### < SERVICE INFORMATION >

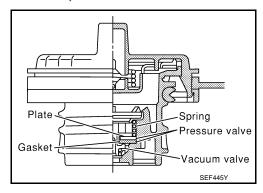
Check EVAP canister as per the following:

- 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.



## FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

1. Wipe clean valve housing.



2. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm<sup>2</sup>, 2.22 -

2.90 psi)

Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm<sup>2</sup>,

-0.87 to -0.48 psi)

3. If out of specification, replace fuel filler cap as an assembly.

### **CAUTION:**

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.



FUEL TANK TEMPERATURE SENSOR

Refer to EC-995.

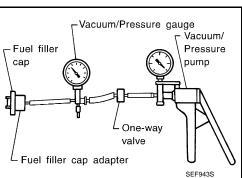
EVAP CANISTER VENT CONTROL VALVE

Refer to EC-1060.

EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to <u>EC-1067</u>.

**EVAP SERVICE PORT** 



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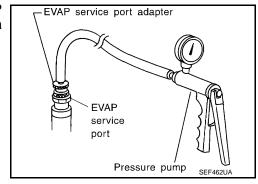
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### < SERVICE INFORMATION >

Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leakage.

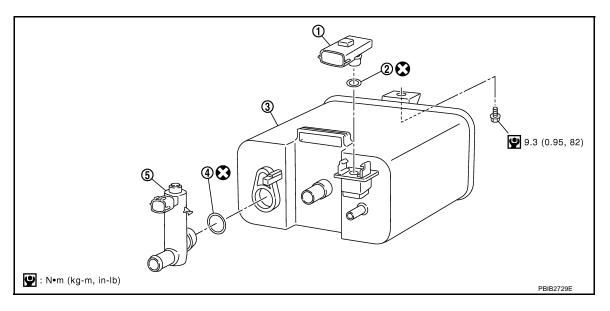


### Removal and Installation

INFOID:0000000005353902

### **EVAP CANISTER**

Tighten EVAP canister as shown in the figure.



- 1. EVAP control system pressure sensor
- O-ring

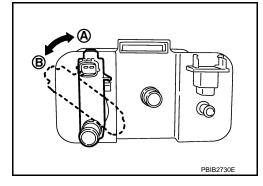
4. O-rina

- 5. EVAP canister vent control valve
- 3. EVAP canister

### EVAP CANISTER VENT CONTROL VALVE

- 1. Turn EVAP canister vent control valve counterclockwise.
  - Lock (A)
  - Unlock (B)
- 2. Remove the EVAP canister vent control valve.

Always replace O-ring with a new one.



## How to Detect EVAP Leakage

INFOID:0000000005353903

### **CAUTION:**

- Never use compressed air or a high pressure pump.
- Never exceed 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi) of pressure in EVAP system. NOTE:
- Do not start engine.

EVAP service port adapter

EVAP

port

service

Pressure pump

 Improper installation of EVAP service port adapter (commercial service tool) to the EVAP service port may cause a leakage.

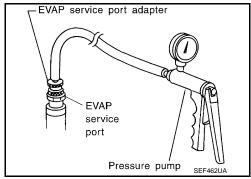
### (P) WITH CONSULT-III

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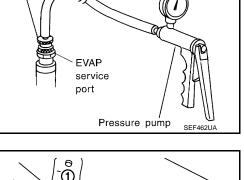
- Attach the EVAP service port adapter (commercial service tool) securely to the EVAP service port.
- 2. Also attach the pressure pump and hose to the EVAP service port adapter (commercial service tool).
- Turn ignition switch ON.
- Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-III.
- Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
- 6. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
- Remove EVAP service port adapter (commercial service tool) and hose with pressure pump.
- 8. Locate the leakage using a leak detector (commercial service tool). Refer to EC-720, "Description".

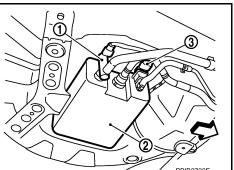
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- Attach the EVAP service port adapter (commercial service tool) securely to the EVAP service port.
- Also attach the pressure pump with pressure gauge to the EVAP service port adapter.



- 3. Apply battery voltage between the terminals of EVAP canister vent control valve (1) to make a closed EVAP system.
  - Illustration shows the view from under the vehicle
  - <: Vehicle front
  - EVAP canister (2)
  - EVAP control system pressure sensor (3)
- To locate the leakage, 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).
- 5. Remove EVAP service port adapter (commercial service tool) and hose with pressure pump.
- Locate the leakage using a leak detector (commercial service tool). Refer to EC-720, "Description".





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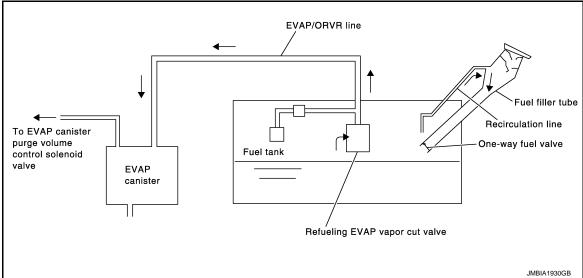
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[VK45DE]

## ON BOARD REFUELING VAPOR RECOVERY (ORVR)

## System Description

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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, always observe the following:

- Put a "CAUTION: FLAMMABLE" sign in workshop.
- Never smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Always furnish the workshop with a 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-766, "Fuel Pressure Check".
- Disconnect battery ground cable.
- Always replace O-ring when the fuel gauge retainer is removed.
- Never kink or twist hose and tube when they are installed.
- Never tighten hose and clamps excessively to avoid damaging hoses.
- After installation, run engine and check for fuel leakage at connection.
- Never attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically.
   Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

## Diagnosis Procedure

INFOID:0000000005353905

### SYMPTOM: FUEL ODOR FROM EVAP CANISTER IS STRONG.

## 1. CHECK EVAP CANISTER

- 1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.0 kg (4.4 lb).

### OK or NG

OK >> GO TO 2. NG >> GO TO 3.

2.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

### < SERVICE INFORMATION >

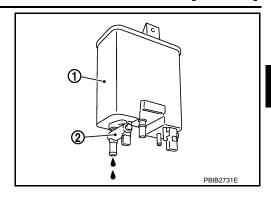
[VK45DE]

Does water drain from the EVAP canister (1)?

• EVAP canister vent control valve (2)

### Yes or No

Yes >> GO TO 3. No >> GO TO 5.



## 3.REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

## 4. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

## 5. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-728, "Component Inspection".

### OK or NG

OK >> INSPECTION END

NG >> Replace refueling EVAP vapor cut valve with fuel tank.

SYMPTOM: CANNOT REFUEL/FUEL ODOR FROM THE FUEL FILLER OPENING IS STRONG WHILE REFUELING.

## 1. CHECK EVAP CANISTER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.0 kg (4.4 lb).

### OK or NG

OK >> GO TO 2. NG >> GO TO 3.

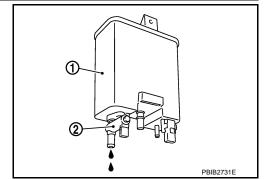
2.check if evap canister is saturated with water

Does water drain from the EVAP canister (1)?

EVAP canister vent control valve (2)

### Yes or No

Yes >> GO TO 3. No >> GO TO 5.



## 3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

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>> GO TO 4.

## 4. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

## 5. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kinks, looseness and improper connection.

### OK or NG

OK >> GO TO 6.

NG >> Repair or replace hoses and tubes.

## 6. CHECK RECIRCULATION LINE

Check recirculation line for clogging, dents and cracks.

### OK or NG

OK >> GO TO 7.

NG >> Replace fuel filler tube.

## 7.CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-728, "Component Inspection".

### OK or NG

OK >> GO TO 8.

NG >> Replace refueling EVAP vapor cut valve with fuel tank.

## 8.CHECK FUEL FILLER TUBE

Check fuel filler tube and hose connected to the fuel tank for clogging, dents and cracks.

### OK or NG

OK >> GO TO 9.

NG >> Replace fuel filler tube.

## 9. CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

### OK or NG

OK >> GO TO 10.

NG >> Repair or replace one-way fuel valve with fuel tank.

## 10.CHECK ONE-WAY FUEL VALVE-II

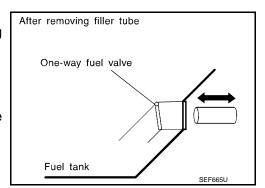
- 1. Check that fuel is drained from the tank.
- 2. Remove fuel filler tube and hose.
- Check one-way fuel valve for operation as per the following.
   When a stick is inserted, the valve should open, when removing stick it should close.

Never drop any material into the tank.

### OK or NG

OK >> INSPECTION END

NG >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.



## Component Inspection

INFOID:0000000005353906

### REFUELING EVAP VAPOR CUT VALVE

(II) With CONSULT-III

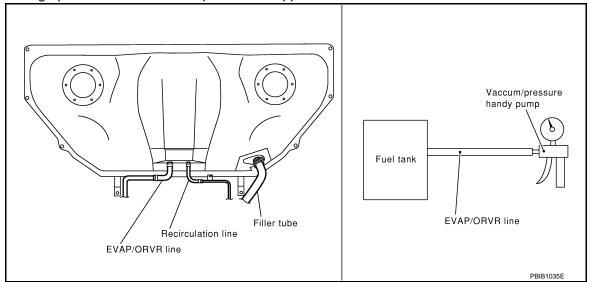
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- Remove fuel tank. Refer to <u>FL-10</u>, "<u>Removal and Installation</u>".
- 2. Drain fuel from the tank as per the following:
- a. Remove fuel feed hose located on the fuel gauge retainer.
- b. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
- c. Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Check refueling EVAP vapor cut valve for being stuck to close as per the following.

  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 per the following.
- Connect vacuum pump to hose end.
- b. Remove fuel gauge retainer with fuel gauge unit.

Always replace O-ring with new one.

- c. Turn fuel tank upside down.
- d. Apply vacuum pressure to hose end [–13.3 kPa (–0.136 kg/cm<sup>2</sup>, –1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



### Without CONSULT-III

- 1. Remove fuel tank. Refer to FL-10, "Removal and Installation".
- Drain fuel from the tank as per the following:
- a. Remove fuel gauge retainer.
- b. 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 per the following.
   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 per the following.
- Connect vacuum pump to hose end.
- b. Remove fuel gauge retainer with fuel gauge unit.

Always replace O-ring with new one.

Turn fuel tank upside down.

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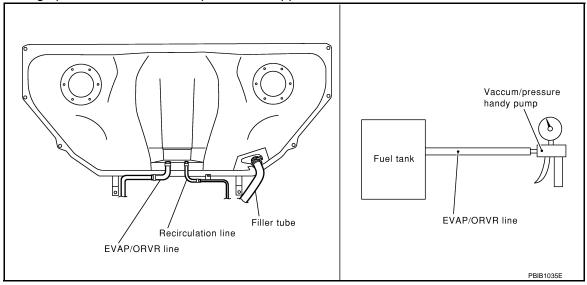
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d. Apply vacuum pressure to hose end [-13.3 kPa (-0.136 kg/cm<sup>2</sup>, -1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.

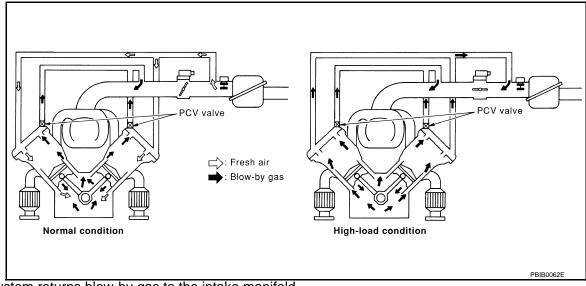


[VK45DE]

## POSITIVE CRANKCASE VENTILATION

Description

### SYSTEM DESCRIPTION



This system returns blow-by gas to the intake manifold.

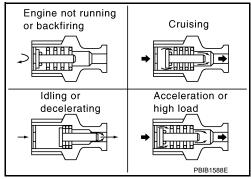
The positive crankcase ventilation (PCV) valve is provided to conductorankcase blow-by gas to the intake manifold.

During partial throttle operation of the engine, the intake manifoldsucks the blow-by gas through the PCV valve.

Normally, the capacity of the valve is sufficient to handle any blow-byand 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 airinlet tubes to rocker cover.

Under full-throttle condition, the manifold vacuum is insufficient todraw the blow-by flow through the valve. The flow goes through the hose connectionin the reverse direction.

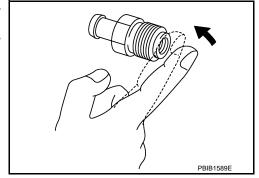
On vehicles with an excessively high blow-by, the valve does not meetthe requirement. This is because some of the flow will go through the hoseconnection to the air inlet tubes under all conditions.



## Component Inspection

## PCV (POSITIVE CRANKCASE VENTILATION) 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.



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Revision: 2009 June **EC-731** 2010 M35/M45

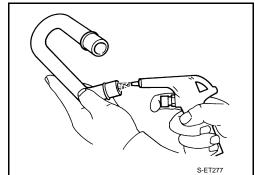
## **POSITIVE CRANKCASE VENTILATION**

< SERVICE INFORMATION >

[VK45DE]

### PCV VALVE VENTILATION HOSE

- 1. Check hoses and hose connections for leaking.
- 2. Disconnect all hoses and clean with compressed air. If any hosecannot be freed of obstructions, replace.



## IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM-NATS)

< SERVICE INFORMATION >

[VK45DE]

## IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM-NATS)

Description INFOID:000000005353909

- If the security indicator illuminates with the ignition switch ON or DTC P1610 P1615 is displayed in "SELF DIAGNOSTIC RESULT" mode, perform the trouble diagnosis for corresponding to the detected DTC. Refer to <a href="EC-698">EC-698</a>, "U0101 - U1001".
- Check that no DTC is displayed in "SELF DIAGNOSIS RESULT" mode of "BCM" before erasing the detected DTC in "ENGINE" mode with CONSULT-III.
- When replacing ECM, refer to EC-764, "Procedure After Replacing ECM".

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Introduction INFOID:0000000005353910

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	Diagnostic service			
Diagnostic Trouble Code (DTC)	Service \$03 of SAE J1979			
Freeze Frame data	Service \$02 of SAE J1979			
System Readiness Test (SRT) code	Service \$01 of SAE J1979			
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Service \$07 of SAE J1979			
1st Trip Freeze Frame data	_			
Test values and Test limits	Service \$06 of SAE J1979			
Calibration ID	Service \$09 of SAE J1979			

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	SRT status	Test value
CONSULT-III	×	×	×	×	×	×	_
GST	×	×	×	_	×	×	×
ECM	×	×*	_	_	_	×	_

<sup>\*:</sup> When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator lamp (MIL) on the instrument panel illuminates when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-773, "Fail-Safe Chart".)

## Two Trip Detection Logic

INFOID:0000000005353911

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not illuminate at this stage. <1st trip>

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL illuminates. The MIL illuminates at the same time the DTC is stored. <2nd trip> The "trip" in the "Two Trip Detection Logic" means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to illuminate or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: App	licable	—: Not	applicable
		1 ot trip [	)TC

7. Applicable . Het ap								tot applicable
	MIL				D.	TC	1st trip DTC	
Items	1:	st trip	2nd trip		1st trip	2nd trip	1st trip	2nd trip
	Blinking	Illuminated	Blinking	Illuminated	displaying	displaying	displaying	displaying
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0308 is being detected	×	_	_	_	_	_	×	_
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0308 is being detected	_	_	×	_	_	×	_	_
One trip detection diagnoses (Refer to EC-735, "Emission-Related Diagnostic Information".)	_	×	_	_	×	_	_	_
Except above	_	_	_	×	_	×	×	_

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by illuminating MIL when there is malfunction on engine control system.

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Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating the fail-safe function.

The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode Engine speed will not rise more than 2,500 rpm due to the fuel cut

## **Emission-Related Diagnostic Information**

#### INFOID:0000000005353912

### EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

DTC	; <b>*</b> 1	ltems				Doforana
CONSULT-III GST* <sup>2</sup>	ECM*3	(CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page
U0101	0101*4	LOST COMM (TCM)	_	1	×	EC-829
U1001	1001*4	CAN COMM CIRCUIT	_	1 or 2	_	EC-829
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_	_	Blinking* <sup>8</sup>	_
P0011	0011	INT/V TIM CONT-B1	_	2	×	EC-833
P0021	0021	INT/V TIM CONT-B2	_	2	×	EC-833
P0031	0031	A/F SEN1 HTR (B1)	_	2	×	EC-845
P0032	0032	A/F SEN1 HTR (B1)	_	2	×	EC-845
P0037	0037	HO2S2 HTR (B1)	_	2	×	EC-852
P0038	0038	HO2S2 HTR (B1)	_	2	×	EC-852
P0051	0051	A/F SEN1 HTR (B2)	_	2	×	EC-845
P0052	0052	A/F SEN1 HTR (B2)	_	2	×	EC-845
P0057	0057	HO2S2 HTR (B2)	_	2	×	EC-852
P0058	0058	HO2S2 HTR (B2)	_	2	×	EC-852
P0075	0075	INT/V TIM V/CIR-B1	_	2	×	EC-860
P0081	0081	INT/V TIM V/CIR-B2	_	2	×	EC-860
P0101	0101	MAF SEN/CIRCUIT-B1	_	2	×	EC-867
P0102	0102	MAF SEN/CIRCUIT-B1	_	1	×	EC-874
P0103	0103	MAF SEN/CIRCUIT-B1	_	1	×	EC-874
P0112	0112	IAT SEN/CIRCUIT-B1	_	2	×	EC-881
P0113	0113	IAT SEN/CIRCUIT-B1	_	2	×	EC-881
P0116	0116	ECT SEN/CIRC	_	2	×	EC-885
P0117	0117	ECT SEN/CIRC	_	1	×	EC-888
P0118	0118	ECT SEN/CIRC	_	1	×	EC-888
P0122	0122	TP SEN 2/CIRC-B1	_	1	×	EC-893
P0123	0123	TP SEN 2/CIRC-B1	_	1	×	EC-893
P0125	0125	ECT SENSOR	_	2	×	EC-899
P0127	0127	IAT SENSOR-B1	_	2	×	EC-902
P0128	0128	THERMSTAT FNCTN	_	2	×	EC-905
P0130	0130	A/F SENSOR1 (B1)	_	2	×	EC-907
P0131	0131	A/F SENSOR1 (B1)	_	2	×	EC-915
P0132	0132	A/F SENSOR1 (B1)	_	2	×	EC-923
P0133	0133	A/F SENSOR1 (B1)	×	2	×	EC-931

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DTC*1						Deference
CONSULT-III GST* <sup>2</sup>	ECM*3	(CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page
P0137	0137	HO2S2 (B1)	×	2	×	EC-940
P0138	0138	HO2S2 (B1)	×	2	×	EC-949
P0139	0139	HO2S2 (B1)	×	2	×	EC-961
P0150	0150	A/F SENSOR1 (B2)	_	2	×	EC-907
P0151	0151	A/F SENSOR1 (B2)	_	2	×	EC-915
P0152	0152	A/F SENSOR1 (B2)	_	2	×	EC-923
P0153	0153	A/F SENSOR1 (B2)	×	2	×	EC-931
P0157	0157	HO2S2 (B2)	×	2	×	EC-940
P0158	0158	HO2S2 (B2)	×	2	×	EC-949
P0159	0159	HO2S2 (B2)	×	2	×	EC-961
P0171	0171	FUEL SYS-LEAN-B1	_	2	×	EC-970
P0172	0172	FUEL SYS-RICH-B1	_	2	×	EC-979
P0174	0174	FUEL SYS-LEAN-B2	_	2	×	EC-970
P0175	0175	FUEL SYS-RICH-B2	_	2	×	EC-979
P0181	0181	FTT SENSOR	_	2	×	EC-988
P0182	0182	FTT SEN/CIRCUIT	_	2	×	EC-992
P0183	0183	FTT SEN/CIRCUIT	_	2	×	EC-992
P0222	0222	TP SEN 1/CIRC-B1	_	1	×	EC-996
P0223	0223	TP SEN 1/CIRC-B1	_	1	×	EC-996
P0300	0300	MULTI CYL MISFIRE	_	1 or 2	×	EC-1002
P0301	0301	CYL 1 MISFIRE	_	1 or 2	×	EC-100
P0302	0302	CYL 2 MISFIRE	_	1 or 2	×	EC-100
P0303	0303	CYL 3 MISFIRE	_	1 or 2	×	EC-1002
P0304	0304	CYL 4 MISFIRE	_	1 or 2	×	EC-100
P0305	0305	CYL 5 MISFIRE	_	1 or 2	×	EC-100
P0306	0306	CYL 6 MISFIRE	_	1 or 2	×	EC-100
P0307	0307	CYL 7 MISFIRE	_	1 or 2	×	EC-100
P0308	0308	CYL 8 MISFIRE	_	1 or 2	×	EC-100
P0327	0327	KNOCK SEN/CIRC-B1	_	2	_	EC-100
P0328	0328	KNOCK SEN/CIRC-B1	_	2	_	EC-100
P0332	0332	KNOCK SEN/CIRC-B2	_	2	_	EC-100
P0333	0333	KNOCK SEN/CIRC-B2	_	2	_	EC-100
P0335	0335	CKP SEN/CIRCUIT	_	2	×	EC-1014
P0340	0340	CMP SEN/CIRC-B1	_	2	×	EC-102
P0420	0420	TW CATALYST SYS-B1	×	2	×	EC-102
P0430	0430	TW CATALYST SYS-B2	×	2	×	EC-102
P0441	0441	EVAP PURG FLOW/MON	×	2	×	EC-1030
P0442	0442	EVAP SMALL LEAK	×	2	×	EC-103
P0443	0443	PURG VOLUME CONT/V	_	2	×	EC-1042
P0444	0444	PURG VOLUME CONT/V	_	2	×	EC-105
P0445	0445	PURG VOLUME CONT/V	_	2	×	EC-1050
P0447	0447	VENT CONTROL VALVE	_	2	×	EC-105

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DTC*1		Items				Reference
CONSULT-III GST* <sup>2</sup>	ECM*3	(CONSULT-III screen terms)	SRT code	Trip	MIL	page
P0448	0448	VENT CONTROL VALVE	_	2	×	EC-1061
P0451	0451	EVAP SYS PRES SEN	_	2	×	EC-1067
P0452	0452	EVAP SYS PRES SEN	_	2	×	EC-1070
P0453	0453	EVAP SYS PRES SEN	_	2	×	EC-1076
P0455	0455	EVAP GROSS LEAK	_	2	×	EC-1083
P0456	0456	EVAP VERY SML LEAK	×* <sup>7</sup>	2	×	EC-1089
P0460	0460	FUEL LEV SEN SLOSH	_	2	×	EC-1097
P0461	0461	FUEL LEVEL SENSOR	_	2	×	EC-1099
P0462	0462	FUEL LEVL SEN/CIRC	_	2	×	EC-1101
P0463	0463	FUEL LEVL SEN/CIRC	_	2	×	EC-1101
P0500	0500	VEH SPEED SEN/CIRC*5	_	2	×	EC-1103
P0506	0506	ISC SYSTEM	_	2	×	EC-1105
P0507	0507	ISC SYSTEM	_	2	×	EC-1107
P0550	0550	PW ST P SEN/CIRC	_	2	_	EC-1109
P0603	0603	ECM BACK UP/CIRCUIT	_	2	×	EC-1114
P0605	0605	ECM	_	1 or 2	× or —	EC-1118
P0607	0607	ECM	_	1	×	EC-1120
P0643	0643	SENSOR POWER/CIRC	_	1	×	EC-1121
P0700	0700	TRANSMISSION CONT	_	1	×	AT-109
P0705	0705	T/M RANGE SENSOR A	_	2	×	AT-110
P0710	0710	ATF TEMP SEN/CIRC	_	2	×	AT-140
P0717	0717	INPUT SPEED SENSOR A	_	2	×	AT-113
P0720	0720	OUTPUT SPEED SENSOR*5	_	2	×	AT-115
P0731	0731	1GR INCORRECT RATIO		2	×	AT-122
P0732	0731	2GR INCORRECT RATIO	_	2	×	AT-122 AT-124
P0733	0732	3GR INCORRECT RATIO	_	2		AT-124 AT-126
P0733	0733	4GR INCORRECT RATIO		2	×	AT-128
P0735	0735	5GR INCORRECT RATIO	_	2	×	AT-120 AT-130
P0740	0733	TORQUE CONVERTER	_	2	×	AT-130 AT-132
P0744	0740	TORQUE CONVERTER	_	2	×	AT-132 AT-134
P0744 P0745	0744	PC SOLENOID A	_	2	×	AT-134 AT-136
P0743	0850	P-N POS SW/CIRCUIT	_	2	×	EC-1126
P1140	1140	INTK TIM S/CIRC-B1	_	2		EC-1131
P1145	1145	INTK TIM S/CIRC-B1	_	2	×	EC-1131
P1148	1148	CLOSED LOOP-B1	_	1	×	EC-1131 EC-1139
P1168	1168	CLOSED LOOP-B2	_	1	×	EC-1139
		TCS C/U FUNCTN	_	2	×	
P1211	1211		_		_	EC-1140
P1212	1212	TCS/CIRC		2	_	EC-1141
P1217	1217	ENG OVER TEMP	_	1	×	EC-1142
P1220	1220	FPCM/CIRCUIT	_	2	×	EC-1152
P1225	1225	CTP LEARNING-B1	_	2	_	EC-1159

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DTC	*1	Itomo				Deferen
CONSULT-III GST* <sup>2</sup>	ECM*3	ltems (CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page
P1421	1421	COLD START CONTROL	_	2	×	EC-116
P1550	1550	BAT CURRENT SENSOR	_	2	_	EC-116
P1551	1551	BAT CURRENT SENSOR	_	2	_	EC-117
P1552	1552	BAT CURRENT SENSOR	_	2	_	EC-117
P1553	1553	BAT CURRENT SENSOR	_	2	_	EC-117
P1554	1554	BAT CURRENT SENSOR	_	2	_	EC-118
P1564	1564	ASCD SW	_	1	_	EC-118 (Models v ICC) EC-119 (Models v ASCD)
P1568	1568	ICC COMMAND VALUE*6	_	1	_	EC-119
P1572	1572	ASCD BRAKE SW	_	1	_	EC-119 (Models v ICC) EC-120 (Models v ASCD)
P1574	1574	ASCD VHL SPD SEN	_	1	_	EC-121 (Models v ICC) EC-121 (Models v ASCD)
P1610	1610	LOCK MODE	_	2	_	<u>BL-5</u>
P1611	1611	ID DISCORD, IMMU-ECM	_	2	_	BL-5
P1612	1612	CHAIN OF ECM-IMMU	_	2	_	<u>BL-5</u>
P1614	1614	CHAIN OF IMMU-KEY	_	2	_	<u>BL-5</u>
P1715	1715	IN PULY SPEED	_	2	_	EC-121
P1730	1730	A/T INTERLOCK	_	1	×	AT-14
P1752	1752	INPUT CLUTCH SOL	_	1	×	AT-15
P1757	1757	FR BRAKE SOLENOID	_	1	×	AT-15
P1762	1762	DRCT CLUTCH SOL	_	1	×	AT-15
P1767	1767	HLR CLUTCH SOLENOID	_	1	×	AT-15
P1772	1772	L C BRAKE SOLENOID	_	1	×	AT-15
P1774	1774	L C BRAKE SOLENOID	_	1	×	AT-16
P1800	1800	VIAS S/V-1	_	2	_	EC-121
P1805	1805	BRAKE SW/CIRCUIT	_	2	_	EC-122
P2100	2100	ETC MOT PWR-B1	_	1	×	EC-123
P2101	2101	ETC FNCTN/CIRC-B1	_	1	×	EC-123
P2103	2103	ETC MOT PWR	_	1	×	EC-123
P2118	2118	ETC MOT-B1	_	1	×	EC-124
P2119	2119	ETC ACTR-B1	_	1	×	EC-124
P2122	2122	APP SEN 1/CIRC	_	1	×	EC-124
P2123	2123	APP SEN 1/CIRC	_	1	×	EC-124
P2127	2127	APP SEN 2/CIRC	_	1	×	EC-125

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DT	C*1	Items				Reference
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	(CONSULT-III screen terms)	SRT code	Trip	MIL	page
P2128	2128	APP SEN 2/CIRC	_	1	×	EC-1253
P2135	2135	TP SENSOR-B1	_	1	×	EC-1259
P2138	2138	APP SENSOR	_	1	×	EC-1265
P2A00	2A00	A/F SENSOR1 (B1)	_	2	×	EC-1271
P2A03	2A03	A/F SENSOR1 (B2)	_	2	×	EC-1271

<sup>\*1: 1</sup>st trip DTC No. is the same as DTC No.

### DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not recur, the 1st trip DTC will not be displayed.

If a malfunction is detected during the 1st trip, the 1st trip DTC is saved in the ECM memory. The MIL will not illuminate (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL illuminates. In other words, the DTC is stored in the ECM memory and the MIL illuminates when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is saved and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or illuminate the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".

For malfunctions in which 1st trip DTCs are displayed, refer to "EMISSION-RELATED DIAGNOSTIC INFOR-MATION ITEMS". These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-III.

1st trip DTC is specified in Service \$07 of SAE J1979. 1st trip DTC detection occurs without 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 EC-768, "Trouble Diagnosis Introduction". Then perform DTC Confirmation Procedure or Overall Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

#### (P) With CONSULT-III

CONSULT-III displays the DTC in "Self Diagnostic Result" mode. Examples: P0340, P0850, P1148, etc.

These DTCs are prescribed by SAE J2012.

(CONSULT-III also displays the malfunctioning component or system.)

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].

### With GST

GST (Generic Scan Tool) displays the DTC in Diagnostic Service \$03. Examples: P0340, P0850, P1148, etc. These DTCs are prescribed by SAE J2012.

### 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.

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<sup>\*2:</sup> This number is prescribed by SAE J2012.

<sup>\*3:</sup> In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

<sup>\*4:</sup> The troubleshooting for this DTC needs CONSULT-III.

<sup>\*5:</sup> When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

<sup>\*6.</sup> Models with ICC

<sup>\*7:</sup> SRT code will not be set if the self-diagnostic result is NG.

<sup>\*8:</sup> When the ECM is in the mode of that displays SRT status, MIL may blink. For the details, refer to "How to Display SRT Status".

- 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 does 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. Therefore, using CONSULT-III (if available) is recommended.

### 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. For details, see <u>EC-799</u>, "CONSULT-III Function".

Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 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 illuminates) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items				
1	Freeze frame data	Misfire — DTC: P0300 - P0308 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175			
2		Except the above items (Includes A/T related items)			
3	1st trip freeze frame da	ata			

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 is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".

### SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Service \$01 of SAE J1979.

As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.

If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating "INCMP", use the information in this Service Manual to set the SRT to "CMPLT".

In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate "CMPLT" for each application system. Once set as "CMPLT", the SRT status remains "CMPLT" until the self-diagnosis memory is erased.

Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate "INCMP" for these items.

### NOTE:

The SRT will also indicate "INCMP" if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.

If, during the state emissions inspection, the SRT indicates "CMPLT" for all test items, the inspector will continue with the emissions test. However, if the SRT indicates "INCMP" for one or more of the SRT items the vehicle is returned to the customer untested.

#### NOTE:

If MIL illuminates during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates "CMPLT" for all test items. Therefore, it is important to check SRT ("CMPLT") and DTC (No DTCs) before the inspection.

SRT Item

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The table below shows required self-diagnostic items to set the SRT to "CMPLT".

SRT item (CONSULT-III indication)	Performance Priority*	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420, P0430
EVAP SYSTEM	2	EVAP control system purge flow monitoring	P0441
	1	EVAP control system	P0442
	2	EVAP control system	P0456
HO2S	2	Air fuel ratio (A/F) sensor 1	P0133, P0153
		Heated oxygen sensor 2	P0137, P0157
		Heated oxygen sensor 2	P0138, P0158
		Heated oxygen sensor 2	P0139, P0159

<sup>\*:</sup> If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT-III.

### SRT Set Timing

SRT is set as "CMPLT" after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

				Example		
Self-diagn	Self-diagnosis result		$\leftarrow$ ON $\rightarrow$ OF		ion cycle $OFF \ \leftarrow ON  o C$	DFF ← ON →
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	"CMPLT"	"CMPLT"	"CMPLT"	"CMPLT"
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	"INCMP"	"INCMP"	"CMPLT"	"CMPLT"
NG exists	Case 3	P0400	OK	OK	_	_
		P0402	_	_	_	_
		P1402	NG	_	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	_	1st trip DTC	DTC (= MIL ON)
		SRT of EGR	"INCMP"	"INCMP"	"INCMP"	"CMPLT"

OK: Self-diagnosis is carried out and the result is OK.

NG: Self-diagnosis is carried out and the result is NG.

When all SRT related self-diagnoses show OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate "CMPLT". → Case 1 above

When all SRT related self-diagnoses show OK results through several different cycles, the SRT will indicate "CMPLT" at the time the respective self-diagnoses have at least one OK result.  $\rightarrow$  Case 2 above

If one or more SRT related self-diagnoses show NG results in 2 consecutive cycles, the SRT will also indicate "CMPLT".  $\rightarrow$  Case 3 above

The table above shows that the minimum number of cycles for setting SRT as "INCMP" is the number one (1) for each self-diagnosis (Case 1 & 2) or the number two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

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<sup>-:</sup> Self-diagnosis is not carried out.

The SRT will indicate "CMPLT" at the time the respective self-diagnoses have one (1) OK result.

### < SERVICE INFORMATION >

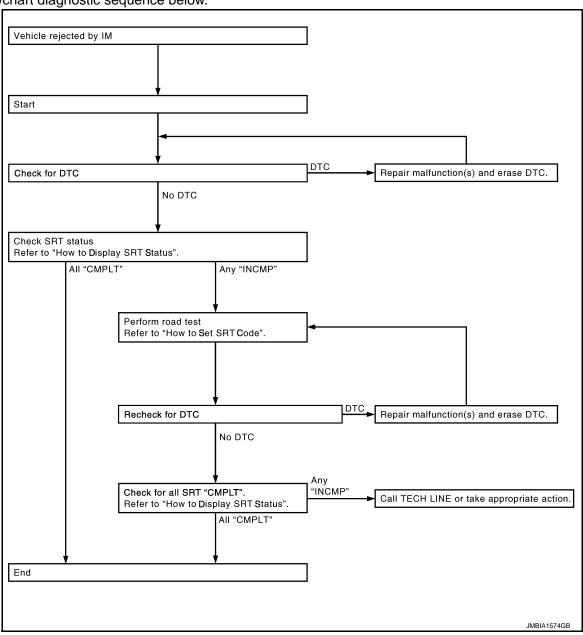
- [VK45DE]
- The emissions inspection requires "CMPLT" of the SRT only with OK self-diagnosis results. During SRT driving pattern, the 1st trip DTC (NG) is detected prior to "CMPLT" of SRT and the self-diagnosis memory must be erased from the ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate "INCMP".

#### NOTE:

SRT can be set as "CMPLT" together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates "CMPLT".

#### 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 below.



How to Display SRT Status

### (P) WITH CONSULT-III

Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-III.

For items whose SRT codes are set, "CMPLT" is displayed on the CONSULT-III screen; for items whose SRT codes are not set, "INCMP" is displayed.

"INCMP" means the self-diagnosis is incomplete and SRT is not set. "CMPLT" means the self-diagnosis is complete and SRT is set.

### NOTE:

Though displayed on the CONSULT-III screen, "HO2S HTR" is not SRT item.

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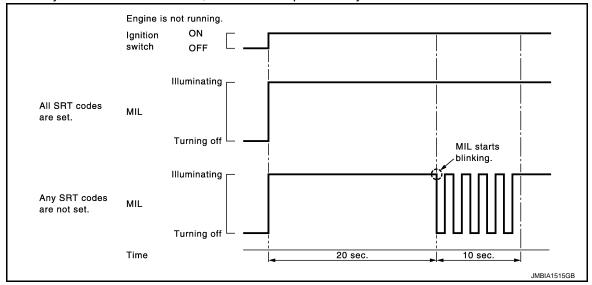
### **WITH GST**

Selecting Service \$01 with GST (Generic Scan Tool)

### NO TOOLS

A SRT code itself cannot be displayed, however SRT status can be.

- 1. Turn ignition switch ON and wait 20 seconds.
- 2. SRT status is indicated as shown below.
  - When all SRT codes are set, MIL illuminates continuously.
  - When any SRT codes are not set, MIL will blink periodically for 10 seconds.



How to Set SRT Code

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

### (P) WITH CONSULT-III

Perform corresponding DTC Confirmation Procedure one by one based on Performance Priority in the table on "SRT Item".

### **WITHOUT CONSULT-III**

The most efficient driving pattern in which SRT codes can be properly set is explained below. The driving pattern should be performed one or more times to set all SRT codes.

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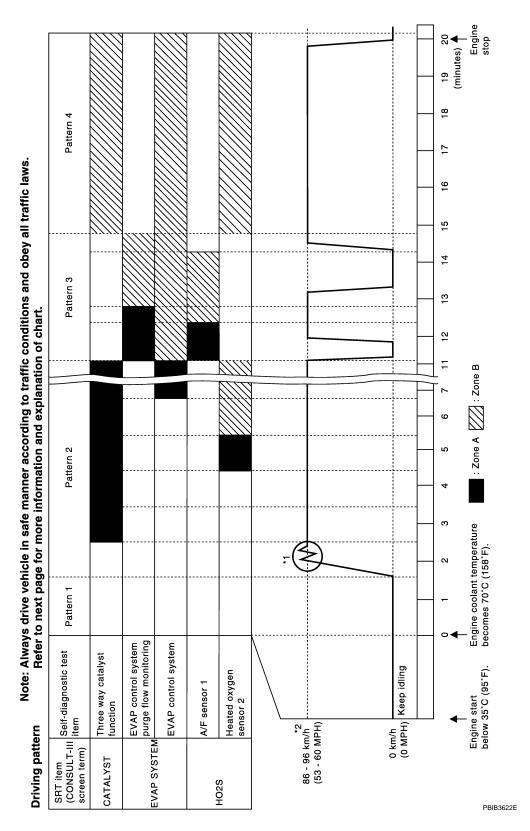
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**Driving Pattern** 



- 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:

## < SERVICE INFORMATION >

- Sea level
- Flat road
- Ambient air temperature: 20 30°C (68 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
   Under different conditions [For example: ambient air temperature other than 20 30°C (68 86°F)], diagnosis may also be performed.

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 73 and ground is 3.0 - 4.3V).
- The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 73 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 107 and ground is less than 4.1V).

Pattern 2:

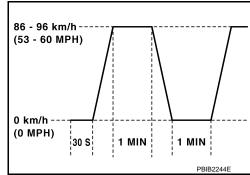
• When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during deceleration of vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).

Pattern 4:

- The accelerator pedal must be held very steady during steadystate driving.
- If the accelerator pedal is moved, the test must be conducted again.
- \*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.
- \*2: Checking the vehicle speed with GST is advised.



### **Suggested Transmission Gear Position**

Set the selector lever in the D position with the overdrive switch turned ON.

### TEST VALUE AND TEST LIMIT (GST ONLY — NOT APPLICABLE TO CONSULT-III)

The following is the information specified in Service \$06 of SAE J1979.

The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

These data (test value and test limit) are specified by On Board Monitor ID(OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.

The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (eg., if the bank 2 is not applied on this vehicle, only the items of the bank 1 is displayed)

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Item	OBD-	Self-diagnostic test item	DTC	li	e and Test mit display)	Description
пеш	MID	Sell-diagnostic test item		TID	Unit and Scaling ID	Description
			P0131	83H	0BH	Minimum sensor output voltage for test cycle
			P0131	84H	0BH	Maximum sensor output voltage for tes cycle
			P0130	85H	0BH	Minimum sensor output voltage for test cycle
		Air fuel ratio (A/F) sensor 1 (Bank 1)	P0130	86H	0BH	Maximum sensor output voltage for test cycle
	01H		P0133	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0133	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A00	89H	84H	The amount of shift in air fuel ratio
			P2A00	8AH	84H	The amount of shift in air fuel ratio
HO2S			P0130	8BH	0BH	Difference in sensor output voltage
			P0133	8CH	83H	Response gain at the limited frequency
			P0138	07H	0CH	Minimum sensor output voltage for tes cycle
	02H	Heated oxygen sensor 2 (Bank 1)	P0137	08H	0CH	Maximum sensor output voltage for tes cycle
			P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
		3H Heated oxygen sensor 3 (Bank 1)	P0143	07H	0CH	Minimum sensor output voltage for tes cycle
	03H		P0144	08H	0CH	Maximum sensor output voltage for tes cycle
			P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage

< SERVICE INFORMATION >

Item OBD-		Salf-diagnostic test item	DTC	li	e and Test mit display)	Description
nem	ntem MID	Self-diagnostic test item	DIC	TID	Unitand Scaling ID	Description
			P0151	83H	0BH	Minimum sensor output voltage for test cycle
			P0151	84H	0BH	Maximum sensor output voltage for test cycle
			P0150	85H	0BH	Minimum sensor output voltage for test cycle
		Air fuel ratio (A/F) sensor 1	P0150	86H	0BH	Maximum sensor output voltage for test cycle
	05H	(Bank 2)	P0153	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0153	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A03	89H	84H	The amount of shift in air fuel ratio
			P2A03	8AH	84H	The amount of shift in air fuel ratio
HO2S			P0150	8BH	0BH	Difference in sensor output voltage
			P0153	8CH	83H	Response gain at the limited frequency
	06H	Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle
			P0157	08H	0CH	Maximum sensor output voltage for test cycle
			P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
			P0163	07H	0CH	Minimum sensor output voltage for test cycle
	07H	Heated oxygen sensor 3 (Bank2)	P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage
			P0420	80H	01H	O2 storage index
	24⊔	Three way catalyst function	P0420	82H	01H	Switching time lag engine exhaust index value
	21H	(Bank1)	P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
CATA-			P2423	84H	84H	O2 storage index in HC trap catalyst
LYST			P0430	80H	01H	O2 storage index
	2011	Three way catalyst function	P0430	82H	01H	Switching time lag engine exhaust index value
	22H	(Bank2)	P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst

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Item	OBD-	Self-diagnostic test item	DTC	(GST	display)	Description
	MID			TID	Unit and Scaling ID	
			P0400	80H	96H	Low Flow Faults: EGR temp change rate (short term)
			P0400	81H	96H	Low Flow Faults: EGR temp change rate (long term)
EGR SYSTEM	31H	EGR function	P0400	82H	96H	Low Flow Faults: Difference between max EGR temp and EGR temp under idling condition
			P0400	83H	96H	Low Flow Faults: Max EGR temp
			P1402	84H	96H	High Flow Faults: EGR temp increase rate
	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3ВН	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04inch)
EVAP SYSTEM	3СН	H EVAP control system (Very small leak)	P0456	80H	05H	Leak area index (for more than 0.02inch)
	0011		P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control value close
	41H	A/F sensor 1 heater (Bank 1)	Low Input:P0031 High Input:P0032	81H	0BH	Converted value of Heater electric current to voltage
	42H	Heated oxygen sensor 2 (Bank 1)	Low Input:P0037 High Input:P0038	80H	0CH	Converted value of Heater electric current to voltage
O2 SEN- SOR	43H	Heated oxygen sensor 3 (Bank 1)	P0043	80H	0CH	Converted value of Heater electric current to voltage
HEATER	45H	A/F sensor 1 heater (Bank 2)	Low Input:P0051 High Input:P0052	81H	0BH	Converted value of Heater electric current to voltage
·	46H	Heated oxygen sensor 2 (Bank 2)	Low Input:P0057 High Input:P0058	80H	0CH	Converted value of Heater electric current to voltage
	47H	Heated oxygen sensor 3 (Bank 2)	P0063	80H	0CH	Converted value of Heater electric current to voltage
			P0411	80H	01H	Secondary Air Injection System Incorrect Flow Detected
SEC- OND- ARY AIR		Secondary Air system	Bank1: P0491 Bank2: P0492	81H	01H	Secondary Air Injection System Insufficient Flow
			P2445	82H	01H	Secondary Air Injection System Pump Stuck Off
	71H		P2448	83H	01H	Secondary Air Injection System High Airflow
			Bank1: P2440 Bank2: P2442	84H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2440	85H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2444	86H	01H	Secondary Air Injection System Pump Stuck On

Item	OBD-	Self-diagnostic test item	DTC	li	e and Test mit display)	Description
MID	Con diagnostic test item	510	TID	Unitand Scaling ID	Безоприон	
	81H	Fuel injection system function	P0171 or P0172	80H	2FH	Long term fuel trim
UEL	ОП	(Bank 1)	P0171 or P0172	81H	24H	The number of lambda control clamped
SYSTEM	82H	Fuel injection system function	P0174 or P0175	80H	2FH	Long term fuel trim
	0211	(Bank 2)	P0174 or P0175	81H	24H	The number of lambda control clamped
			P0301	80H	24H	Misfiring counter at 1000rev of the first cylinder
			P0302	81H	24H	Misfiring counter at 1000rev of the second cylinder
			P0303	82H	24H	Misfiring counter at 1000rev of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000rev of the fourth cylinder
			P0305	84H	24H	Misfiring counter at 1000rev of the fifth cylinder
			P0306	85H	24H	Misfiring counter at 1000rev of the sixth cylinder
			P0307	86H	24H	Misfiring counter at 1000rev of the seventh cylinder
		P0308	87H	24H	Misfiring counter at 1000rev of the eighth cylinder	
			P0300	88H	24H	Misfiring counter at 1000rev of the mul tiple cylinders
MISFIRE	A1H	Multiple Cylinder Misfire	P0301	89H	24H	Misfiring counter at 200rev of the first cylinder
WIIOI IIVE	AIII	Muluple Cylinder Misine	P0302	8AH	24H	Misfiring counter at 200rev of the second cylinder
			P0303	8BH	24H	Misfiring counter at 200rev of the third cylinder
			P0304	8CH	24H	Misfiring counter at 200rev of the fourth cylinder
			P0305	8DH	24H	Misfiring counter at 200rev of the fifth cylinder
			P0306	8EH	24H	Misfiring counter at 200rev of the fifth cylinder
			P0307	8FH	24H	Misfiring counter at 200rev of the fifth cylinder
			P0308	90H	24H	Misfiring counter at 200rev of the fifth cylinder
			P0300	91H	24H	Misfiring counter at 1000rev of the single cylinder
			P0300	92H	24H	Misfiring counter at 200rev of the single cylinder
			P0300	93H	24H	Misfiring counter at 200rev of the multi- ple cylinders

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Item	OBD- MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description
	A2H	No.1 Cylinder Misfire	P0301	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0301	0CH	24H	Misfire counts for last/current driving cycles
	АЗН	No.2 Cylinder Misfire	P0302	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0302	0CH	24H	Misfire counts for last/current driving cycles
	A4H	H No.3 Cylinder Misfire	P0303	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0303	0CH	24H	Misfire counts for last/current driving cycles
	A5H	No.4 Cylinder Misfire	P0304	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
MICEIDE			P0304	0CH	24H	Misfire counts for last/current driving cycles
MISFIRE	A6H	No.5 Cylinder Misfire	P0305	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0305	0CH	24H	Misfire counts for last/current driving cycles
	А7Н	H No.6 Cylinder Misfire	P0306	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0306	0CH	24H	Misfire counts for last/current driving cycles
	А8Н	No.7 Cylinder Misfire	P0307	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0307	0CH	24H	Misfire counts for last/current driving cycles
	А9Н	No.8 Cylinder Misfire	P0308	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
	7.011		P0308	0CH	24H	Misfire counts for last/current driving cycles

### HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC

(P) WITH CONSULT-III

### NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
- If the DTC is not for A/T related items (see "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS"), skip step 1.
- 1. Perform "HOW TO ERASE DTC" in <u>AT-47, "OBD-II Diagnostic Trouble Code (DTC)"</u>. (The DTC in TCM will be erased)

## < SERVICE INFORMATION >

- Select "ENGINE" with CONSUILT-III.
- 3. Select "Self Diagnostic Result".
- 4. Touch "ERASE". (DTC in ECM will be erased.)

### **WITH GST**

### NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
- 1. Select Service \$04 with GST (Generic Scan Tool).

### 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.
- Erase DTC in ECM. Refer to "How to Erase Diagnostic Test Mode II (Self-Diagnostic Results)" in <u>EC-751</u>, "<u>Malfunction Indicator Lamp (MIL)</u>".
- If the battery is disconnected, the emission-related diagnostic information will be cleared within 24 hours.
- The following data are cleared when the ECM memory is erased.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

### Malfunction Indicator Lamp (MIL)

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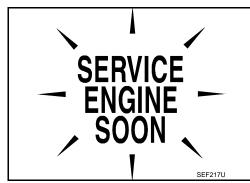
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### DESCRIPTION

The MIL is located on the combination meter.

- The MIL will illuminate when the ignition switch is turned ON without the engine running. This is a bulb check.
   If the MIL does not illuminate, check MIL circuit. Refer to EC-1335, "Wiring Diagram".
- When the engine is started, the MIL should turn off.If the MIL remains illuminating, the on board diagnostic system has detected an engine system malfunction.



### ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following three functions.

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Revision: 2009 June **EC-751** 2010 M35/M45

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.).  If the MIL does not illuminate, check MIL circuit.
	Engine running	MALFUNCTION WARNING	When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will illuminate to inform the driver that a malfunction has been detected.  The following malfunctions will illuminate or blink the MIL in the 1st trip.  • Misfire (Possible three way catalyst damage)  • One trip detection diagnoses
Mode II	Ignition switch in ON position  Engine stopped	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by illuminating MIL when there is malfunction on engine control system.

Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.

The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

### MIL Blinking Without DTC

When any SRT codes are not set, MIL may blink without DTC. For the details, refer to <u>EC-735</u>, "Emission-Related Diagnostic Information".

### HOW TO SWITCH DIAGNOSTIC TEST MODE

#### NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic test mode when an accelerator pedal position sensor circuit has a malfunction.
- ECM always returns to Diagnostic Test Mode I after the ignition switch is turned OFF.

How to Set Diagnostic Test Mode II (Self-diagnostic Results)

- 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.
- a. Fully depress the accelerator pedal.
- b. Fully release the accelerator pedal.
- Wait 7 seconds, fully depress the accelerator pedal and keep it depressed for approx. 10 seconds until the MIL starts blinking.

#### NOTE:

Do not release the accelerator pedal for 10 seconds if MIL starts blinking during this period. This blinking is displaying SRT status and is continued for another 10 seconds.

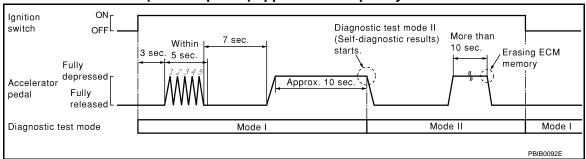
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4. Fully release the accelerator pedal.

ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).

#### NOTF:

Wait until the same DTC (or 1st trip DTC) appears to completely confirm all DTCs.



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)".
- Fully depress the accelerator pedal and keep it depressed 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 check that the DTC 0000 is displayed.

### DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the MIL on the combination meter should stay ON. If it remains OFF, check MIL circuit. Refer to <u>EC-1335</u>, "Wiring <u>Diagram"</u>.

### DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

MIL	Condition
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 uniden-

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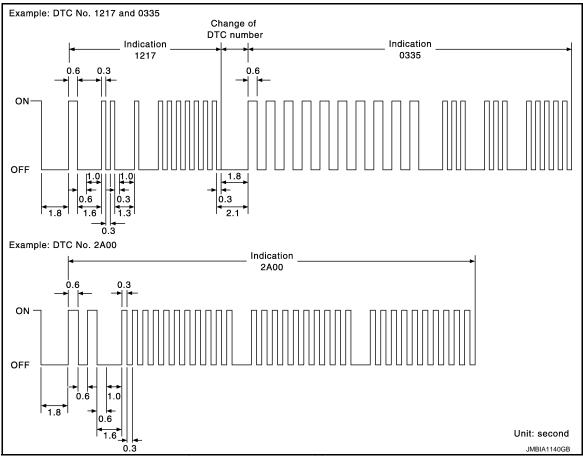
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tified codes can be identified by using the CONSULT-III or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral blinks. The "zero" is indicated by the number of 11 blink. The length of time the 1,000th-digit numeral blinks on and off is 1.2 seconds consisting of an ON (0.6-seconds) - OFF (0.6-seconds) cycle. The 100th-digit numeral and lower digit numerals consist of a 0.3-seconds ON and 0.3-seconds OFF cycle. A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later

numeral appears on the display 1.3 seconds after the former numeral has disappeared. A change from one trouble code to another occurs at an interval of 1.8-seconds OFF.

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction.

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to "How to Erase Diagnostic Test Mode II (Self-diagnostic Results)".

- If the battery is disconnected, the DTC will be cleared from the backup memory within 24 hours.
- Be careful not to erase the stored memory before starting trouble diagnoses.

## **OBD System Operation Chart**

## RELATIONSHIP BETWEEN MIL, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will illuminate. For details, refer to <a href="EC-734">EC-734</a>, "Two Trip Detection Logic".
- The MIL will turn off after the vehicle is driven 3 times (driving pattern B) with no malfunction. A drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- 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).

### < SERVICE INFORMATION >

[VK45DE]

C) without the same malfunction recurring. The "TIME" in "Self Diagnostic Result" mode of CONSULT-III will count the number of times the vehicle is driven.

• The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

### SUMMARY CHART

Items	Fuel Injection System	Misfire	Other
MIL (turns off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns B and C under "Fuel Injection System" and "Misfire", see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"".

For details about patterns A and B under Other, see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"".

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS FOR "MISFIRE" <EXHAUST QUALITY DETERIORATION>, "FUEL INJECTION SYSTEM"

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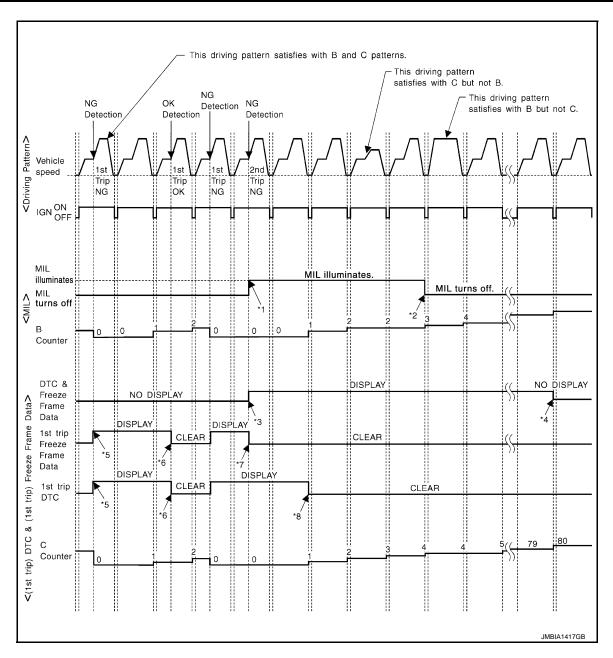
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<sup>\*1:</sup> Clear timing is at the moment OK is detected.

<sup>\*2:</sup> Clear timing is when the same malfunction is detected in the 2nd trip.



- \*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.
- \*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- \*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

- \*2: MIL will turn off after vehicle is driven 3 times (pattern B) without any malfunctions.
- \*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- \*8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.
- \*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.
- \*6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

# EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORA-TION>", "FUEL INJECTION SYSTEM"

<Driving Pattern B>

Driving pattern B means the vehicle operation as per the following:

## ON BOARD DIAGNOSTIC (OBD) SYSTEM

#### [VK45DE] < SERVICE INFORMATION >

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 turn off when the B counter reaches 3. (\*2 in "OBD SYSTEM OPERATION CHART")

#### <Driving Pattern C>

Driving pattern C means operating vehicle as per the following:

The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data) ±375 rpm

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 per the following:

Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)

To be satisfied with driving pattern C, the vehicle should run under the following conditions:

Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

- 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 are 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 <u>EXCEPT</u> FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

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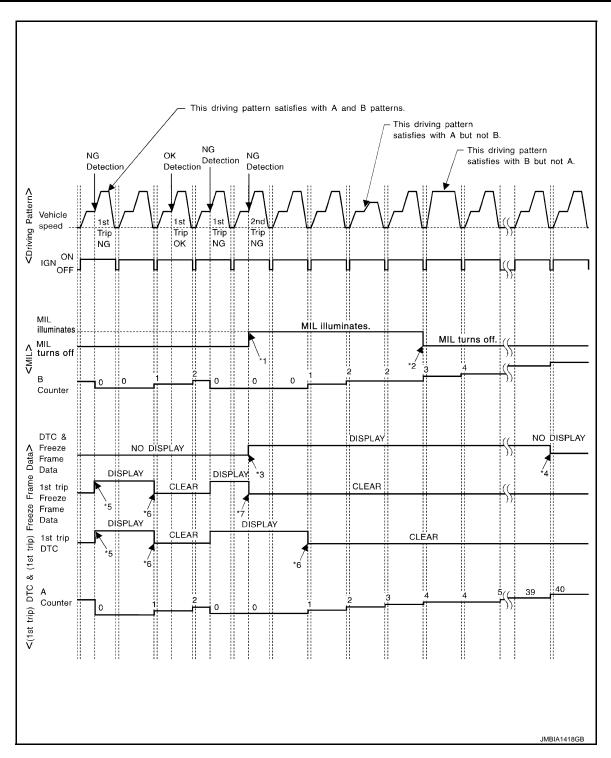
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- \*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.
- \*2: MIL will turn off after vehicle is driven \*3: When the same malfunction is de-3 times (pattern B) without any malfunctions.
  - tected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

## ON BOARD DIAGNOSTIC (OBD) SYSTEM

## < SERVICE INFORMATION >

[VK45DE]

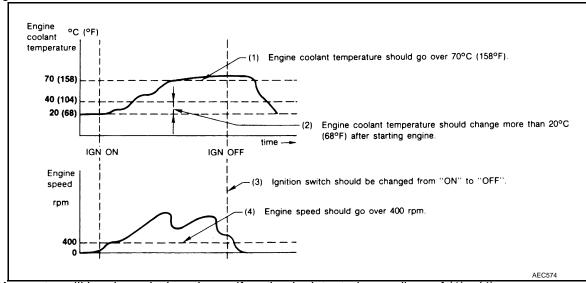
- \*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- \*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- \*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

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\*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

## EXPLANATION FOR DRIVING PATTERNS <u>EXCEPT</u> FOR "MISFIRE < EXHAUST QUALITY DETE-RIORATION>", "FUEL INJECTION SYSTEM"

<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 operating vehicle as per the following:

All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.

The MIL will turn off when the B counter reaches 3 (\*2 in OBD SYSTEM OPERATION CHART).

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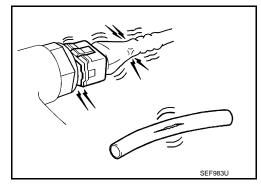
## BASIC SERVICE PROCEDURE

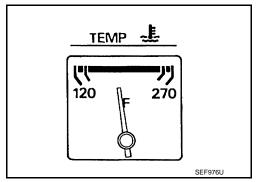
Basic Inspection

# 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 leakage
- Air cleaner clogging
- Gasket
- 3. Check that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
- 4. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.

  Check that engine stays below 1,000 rpm.

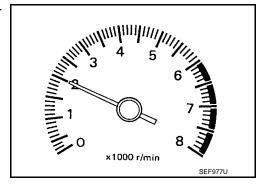




- 5. Run engine at approximately 2,000 rpm for approximately 2 minutes under no load.
- 6. Check that no DTC is displayed with CONSULT-III or GST.

## OK or NG

OK >> GO TO 3. NG >> GO TO 2.



# 2. REPAIR OR REPLACE

Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3

# 3. CHECK TARGET IDLE SPEED

1. Run engine at approximately 2,000 rpm for approximately 2 minutes under no load.

#### **BASIC SERVICE PROCEDURE**

#### < SERVICE INFORMATION >

[VK45DE]

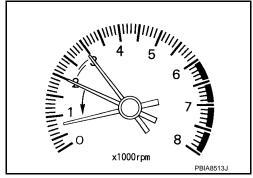
- Rev engine between 2,000 and 3,000 rpm two or three times under no load, then run engine at idle speed for approximately 1 minute.
- Check idle speed.

Refer to EC-763, "Idle Speed and Ignition Timing Check".

## $650 \pm 50$ rpm (in P or N position)

### OK or NG

OK >> GO TO 10. NG >> GO TO 4.



# f 4.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- Stop engine.
- 2. Perform EC-764, "Accelerator Pedal Released Position Learning".

>> GO TO 5.

# 5.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-764, "Throttle Valve Closed Position Learning".

>> GO TO 6.

## 6. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-765, "Idle Air Volume Learning".

#### Is Idle Air Volume Learning carried out successfully?

## Yes or No

Yes >> GO TO 7.

Nο >> 1. Follow the instructions of Idle Air Volume Learning.

GO TO 4.

## .CHECK TARGET IDLE SPEED AGAIN

- Start engine and warm it up to normal operating temperature.
- Check idle speed.

Refer to EC-763, "Idle Speed and Ignition Timing Check".

#### $650 \pm 50$ rpm (in P or N position)

### OK or NG

OK >> GO TO 10.

NG >> GO TO 8.

## 8. DETECT MALFUNCTIONING PART

Check the Following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-1020, "DTC Confirmation Procedure".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-1014, "DTC Confirmation Procedure".

#### OK or NG

OK >> GO TO 9.

NG >> 1. Repair or replace malfunctioning part.

2. GO TO 4.

# 9. CHECK ECM FUNCTION

- Substitute with non-malfunctioning ECM to check ECM function. (ECM may be the cause of the incident, although this is rare.)
- 2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to BL-224, "ECM Re-Communicating Function".

>> GO TO 4.

**EC-761** Revision: 2009 June 2010 M35/M45

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#### < SERVICE INFORMATION >

# 10. CHECK IGNITION TIMING

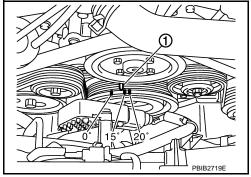
- 1. Run engine at idle.
- 2. Check ignition timing with a timing light.

  Refer to EC-763, "Idle Speed and Ignition Timing Check".
- Timing indicator (1)

## $12 \pm 5^{\circ}$ BTDC (in P or N position)

### OK or NG

OK >> GO TO 19. NG >> GO TO 11.



# 11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- 1. Stop engine.
- 2. Perform EC-764, "Accelerator Pedal Released Position Learning".

>> GO TO 12.

# 12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-764, "Throttle Valve Closed Position Learning".

>> GO TO 13.

# 13. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-765, "Idle Air Volume Learning".

## Is Idle Air Volume Learning carried out successfully?

## Yes or No

Yes >> GO TO 14.

No >> 1. Follow the instructions of Idle Air Volume Learning.

2. GO TO 4.

# 14. CHECK TARGET IDLE SPEED AGAIN

- 1. Start engine and warm it up to normal operating temperature.
- 2. Check idle speed.

Refer to EC-763, "Idle Speed and Ignition Timing Check".

#### $650 \pm 50$ rpm (in P or N position)

## OK or NG

OK >> GO TO 15.

NG >> GO TO 17.

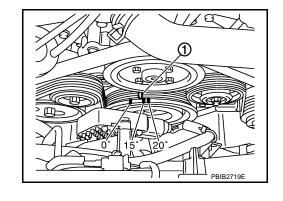
# 15. CHECK IGNITION TIMING AGAIN

- 1. Run engine at idle.
- Check ignition timing with a timing light.
   Refer to EC-763, "Idle Speed and Ignition Timing Check".
- Timing indicator (1)

## $12 \pm 5^{\circ}$ BTDC (in P or N position)

#### OK or NG

OK >> GO TO 19. NG >> GO TO 16.



## **BASIC SERVICE PROCEDURE**

< SERVICE INFORMATION > [VK45DE]

# 16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-200, "Removal and Installation".

#### OK or NG

OK >> GO TO 17.

NG >> 1. Repair the timing chain installation.

2. GO TO 4.

# 17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-1020, "DTC Confirmation Procedure".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-1014, "DTC Confirmation Procedure".

### OK or NG

OK >> GO TO 18.

NG >> 1. Repair or replace malfunctioning part.

2. GO TO 4.

# 18. CHECK ECM FUNCTION

- 1. Substitute with non-malfunctioning ECM to check ECM function. (ECM may be the cause of the incident, although this is rare.)
- 2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to BL-224, "ECM Re-Communicating Function".

>> GO TO 4.

# 19. INSPECTION END

If ECM is replaced during this Basic Inspection procedure, perform <u>EC-764, "Procedure After Replacing ECM"</u>

### >> INSPECTION END

# Idle Speed and Ignition Timing Check

IDLE SPEED

(P) With CONSULT-III

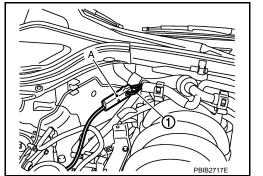
Check idle speed in "DATA MONITOR" mode with CONSULT-III.

With GST

Check idle speed with GST.

#### **IGNITION TIMING**

1. Attach timing light A to loop wire (1) as shown.



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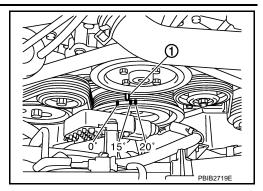
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- 2. Check ignition timing.
  - Timing indicator (1)



# Procedure After Replacing ECM

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When replacing ECM, the following procedure must be performed.

- Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to <u>BL-224</u>, "<u>ECM Re-Communicating Function</u>".
- Perform <u>EC-764</u>, "VIN Registration".
- Perform <u>EC-764</u>, "Accelerator Pedal Released Position Learning".
- 4. Perform EC-764, "Throttle Valve Closed Position Learning".
- 5. Perform EC-765, "Idle Air Volume Learning".

## VIN Registration

INFOID:0000000005353918

### **DESCRIPTION**

VIN Registration is a function of ECM to register 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).

#### **OPERATION PROCEDURE**

#### (P) With CONSULT-III

- 1. Check the VIN of the vehicle and note it. Refer to EM-189, "Component".
- 2. Turn ignition switch ON with engine stopped.
- 3. Select "VIN REGISTRATION" in "WORK SUPPORT" mode.
- 4. Follow the instructions on CONSULT-III display.

# Accelerator Pedal Released Position Learning

INFOID:0000000005353919

#### DESCRIPTION

Accelerator Pedal Released Position Learning is a function of ECM to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time the harness connector of the accelerator pedal position sensor or ECM is disconnected.

#### OPERATION PROCEDURE

- 1. Check that accelerator pedal is fully released.
- 2. Turn ignition switch ON and wait at least 2 seconds.
- Turn ignition switch OFF and wait at least 10 seconds.
- Repeat steps 2 and 3 for 4 times.

# Throttle Valve Closed Position Learning

INFOID:0000000005353920

#### 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 the harness connector of the electric throttle control actuator or ECM is disconnected.

#### OPERATION PROCEDURE

## **BASIC SERVICE PROCEDURE** [VK45DE] < SERVICE INFORMATION > Check that accelerator pedal is fully released. Α 2. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Check that throttle valve moves during above 10 seconds by confirming the operating sound. EC Idle Air Volume Learning INFOID:000000000535392 DESCRIPTION Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps each engine within the specific range. It must be performed under the following conditions: Each the time electric throttle control actuator or ECM is replaced. D Idle speed or ignition timing is out of the specification. PREPARATION Before performing Idle Air Volume Learning, check that all of the following conditions are satisfied. Е 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 - 105°C (158 - 221°F) Selector lever position: P or N Electric load switch: OFF (Air conditioner, headlamp, rear window defogger) On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is started the headlamp will not be illuminated. Steering wheel: Neutral (Straight-ahead position) Vehicle speed: Stopped Transmission: Warmed-up Н With CONSULT-III: Drive vehicle until "ATF TEMP SE 1" in "DATA MONITOR" mode of "TRANSMISSION" system indicates less than 0.9V. - Without CONSULT-III: Drive vehicle for 10 minutes. OPERATION PROCEDURE (P) With CONSULT-III

- Perform <u>EC-764</u>, "Accelerator Pedal Released Position Learning".
- 2. Perform EC-764, "Throttle Valve Closed Position Learning".
- 3. Start engine and warm it up to normal operating temperature.
- Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
- 5. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
- 6. Touch "START" and wait 20 seconds.
- Check that "CMPLT" is displayed on CONSULT-III screen. If "CMPLT" is not displayed, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the DIAGNOSTIC PROCEDURE below.
- Rev up engine two or three times and check that idle speed and ignition timing are within the specifications.

ITEM	SPECIFICATION
Idle speed	$650 \pm 50$ rpm (in P or N position)
Ignition timing	12 ± 5°BTDC (in P or N position)

### (R) Without CONSULT-III

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- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- Perform <u>EC-764</u>, "Accelerator <u>Pedal Released Position Learning</u>".
- 2. Perform EC-764, "Throttle Valve Closed Position Learning".
- Start engine and warm it up to normal operating temperature.

Revision: 2009 June **EC-765** 2010 M35/M45

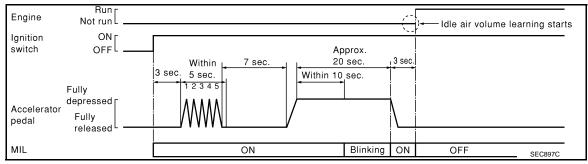
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#### < SERVICE INFORMATION >

- Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- 7. Repeat the following procedure quickly five times within 5 seconds.
- a. Fully depress the accelerator pedal.
- b. Fully release the accelerator pedal.
- Wait 7 seconds, fully depress the accelerator pedal for approx. 20 seconds until the MIL stops blinking and turns ON.
- 9. Fully release the accelerator pedal within 3 seconds after the MIL turns ON.
- 10. Start engine and let it idle.
- 11. Wait 20 seconds.



Rev up engine two or three times and check that idle speed and ignition timing are within the specifications.

ITEM	SPECIFICATION
Idle speed	$650 \pm 50$ rpm (in P or N position)
Ignition timing	12 ± 5° BTDC (in P or N position)

13. If idle speed and ignition timing are not within the specifications, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the Diagnostic Procedure below.

#### DIAGNOSTIC PROCEDURE

If idle air volume learning cannot be performed successfully, proceed as per the following:

- 1. Check that throttle valve is fully closed.
- 2. Check PCV valve operation.
- 3. Check that downstream of throttle valve is free from air leakage.
- 4. When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident. It is useful to perform <u>EC-814</u>, "<u>Inspection Procedure</u>".
- If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning again:
  - Engine stalls.
  - · Erroneous idle.

#### Fuel Pressure Check

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#### **FUEL PRESSURE RELEASE**

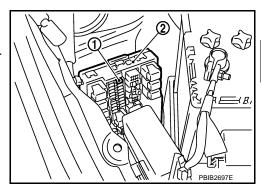
- (II) With CONSULT-III
- Turn ignition switch ON.
- 2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT-III.
- 3. Start engine.
- 4. After engine stalls, crank it 2 or 3 times to release all fuel pressure.
- Turn ignition switch OFF.

#### **BASIC SERVICE PROCEDURE**

## < SERVICE INFORMATION > [VK45DE]

#### (R) Without CONSULT-III

- 1. Remove fuel pump fuse (1) located in IPDM E/R (2).
- 2. Start engine.
- After engine stalls, crank it 2 or 3 times to release all fuel pressure.
- 4. Turn ignition switch OFF.
- Reinstall fuel pump fuse after servicing fuel system.



#### **FUEL PRESSURE CHECK**

#### **CAUTION:**

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger. NOTE:

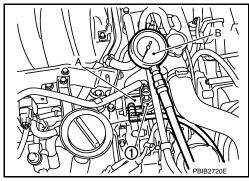
- Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel
  pressure cannot be completely released because Y50 models do not have fuel return system.
- Use Fuel Pressure Gauge Kit [SST (J-44321)] to check fuel pressure.
- 1. Release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".
- 2. Install the inline fuel quick disconnect fitting [SST (J-44321] (A) between fuel damper (1) and fuel tube.
- Connect the fuel pressure gauge [SST (J-44321] (B) (quick connect adapter hose) to the inline fuel quick disconnect fitting [SST (J-44321].
- 4. Turn ignition switch ON and check for fuel leakage.
- 5. Start engine and check for fuel leakage.
- 6. Read the indication of fuel pressure gauge.

# At idling: Approximately 350 kPa (3.57 kg/cm<sup>2</sup>, 51 psi)

- 7. If result is unsatisfactory, go to next step.
- 8. Check the following.
  - Fuel hoses and fuel tubes for clogging
  - Fuel filter for clogging
  - Fuel pump
  - Fuel pressure regulator for clogging

If OK, replace fuel level sensor unit, fuel filter and fuel pump assembly.

If NG, repair or replace malfunctioning part.



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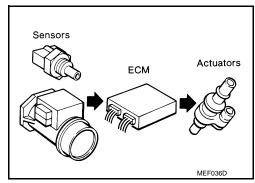
## TROUBLE DIAGNOSIS

## **Trouble Diagnosis Introduction**

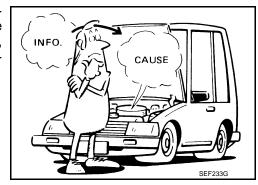
#### INFOID:0000000005353923

#### INTRODUCTION

The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leakage, fouled spark plugs, or other malfunctions with the engine.



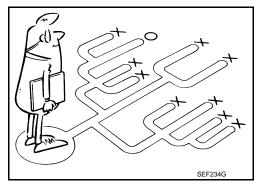
It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



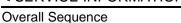
A visual check only may not find the cause of the incidents. A road test with CONSULT-III (or GST) or a circuit tester connected should be performed. Follow the WORK FLOW below.

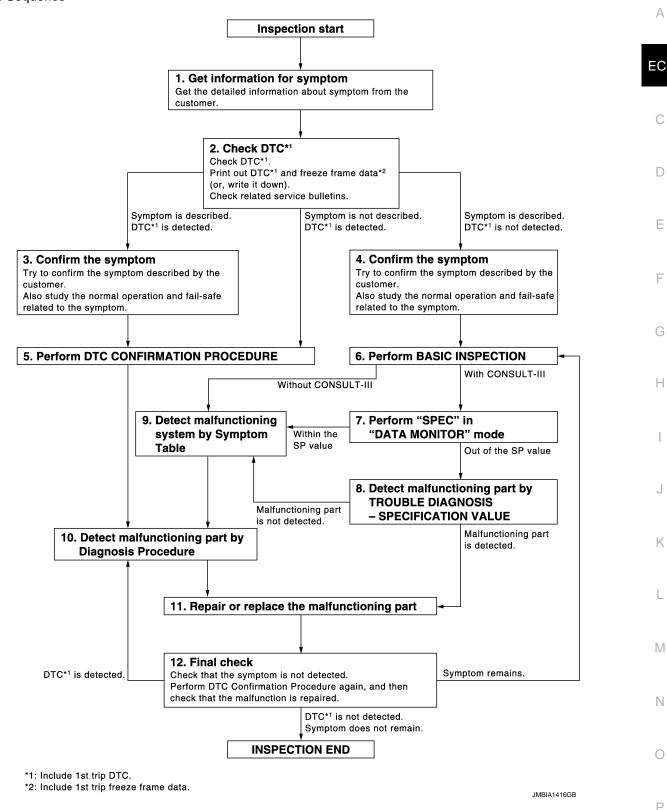
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic Worksheet like the example on "Worksheet Sample" should be used.

Start your diagnosis by looking for conventional malfunctions first. This will help troubleshoot driveability malfunctions on an electronically controlled engine vehicle.



**WORK FLOW** 





#### **Detailed Flow**

## 1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the DIAGNOSTIC WORKSHEET.

>> GO TO 2.

< SERVICE INFORMATION > [VK45DE]

# 2.CHECK DTC $^{*1}$

- 1. Check DTC\*1.
- 2. Perform the following procedure if DTC\*1 is displayed.
- Record DTC\*1 and freeze frame data\*2. (Print them out with CONSULT-III or GST.)
- Erase DTC\*1. (Refer to "How to Erase DTC" in <u>EC-735</u>, "Emission-Related Diagnostic Information".)
- Study the relationship between the cause detected by DTC\*<sup>1</sup> and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to <u>EC-775</u>, "Symptom Matrix Chart".)
- 3. Check related service bulletins for information.

### Are any symptoms described and any DTCs detected?

Symptom is described, DTC\*1 is displayed>>GO TO 3.

Symptom is described, DTC\*1 is not displayed>>GO TO 4.

Symptom is not described, DTC\*1 is displayed>>GO TO 5.

## 3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).

DIAGNOSIS WORKSHEET 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.

DIAGNOSIS WORKSHEET is useful to verify the incident.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

## PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC Confirmation Procedure for the displayed DTC\*<sup>1</sup>, and then check that DTC\*<sup>1</sup> is detected again. If two or more DTCs\*<sup>1</sup> are detected, refer to <u>EC-772</u>, "<u>DTC Inspection Priority Chart"</u> and determine trouble diagnosis order.

#### NOTE:

- Freeze frame data\*2 is useful if the DTC\*1 is not detected.
- Perform Overall Function Check if DTC Confirmation Procedure is not included on Service Manual. This simplified check procedure is an effective alternative though DTC\*1 cannot be detected during this check.
   If the result of Overall Function Check is NG, it is the same as the detection of DTC\*1 by DTC Confirmation Procedure.

## Is DTC\*1 detected?

Yes >> GO TO 10.

No >> Check according to EC-822, "Diagnosis Procedure".

#### O. PERFORM BASIC INSPECTION

Perform EC-760, "Basic Inspection".

With CONSULT-III>>GO TO 7. Without CONSULT-III>>GO TO 9.

# 7. PERFORM SPEC IN DATA MONITOR MODE

## (P) With CONSULT-III

Check that "MAS A/F SE-B1", "B/FUEL SCHDL", "A/F ALPHA-B1" and "A/F ALPHA-B2" are within the SP value using "SPEC" in "DATA MONITOR" mode with CONSULT-III. Refer to EC-814, "Inspection Procedure".

#### Are they within the SP value?

Yes >> GO TO 9. No >> GO TO 8.

Revision: 2009 June **EC-770** 2010 M35/M45

## TROUBLE DIAGNOSIS

[VK45DE] < SERVICE INFORMATION >

# $8.\mathsf{DETECT}$ MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-815, "Diagnosis Procedure".

Is a malfunctioning part detected?

Yes >> GO TO 11.

No >> GO TO 9.

 ${f 9.}$ DETECT MALFUNCTIONING SYSTEM BY SYMPTOM MATRIX CHART

Detect malfunctioning system according to EC-775, "Symptom Matrix Chart" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptoms.

>> GO TO 10.

# 10.DETECT MALFUNCTIONING PART BY DIAGNOSTIC PROCEDURE

Inspect according to Diagnostic Procedure of the system.

#### NOTE:

The Diagnostic Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to Circuit Inspection in GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident".

## Is a malfunctioning part detected?

Yes >> GO TO 11.

>> Monitor input data from related sensors or check voltage of related ECM terminals using CON-No SULT-III. Refer to EC-810, "CONSULT-III Reference Value in Data Monitor Mode", EC-791, "ECM Terminal and Reference Value".

# 11. REPAIR OR REPLACE THE MALFUNCTIONING PART

- Repair or replace the malfunctioning part.
- Reconnect parts or connectors disconnected during Diagnostic Procedure again after repair and replace-
- 3. Check DTC. If DTC is displayed, erase it, refer to "How to Erase DTC" in EC-735, "Emission-Related Diagnostic Information".

>> GO TO 12.

## 12. FINAL CHECK

When DTC was detected in step 2, perform DTC Confirmation Procedure or Overall Function Check again, and then check that the malfunction have been completely repaired.

When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and check that the symptom is not detected.

### OK or NG

OK

NG (DTC\*1 is detected)>>GO TO 10.

NG (Symptom remains)>>GO TO 6.

>> 1. Before returning the vehicle to the customer, always erase unnecessary DTC\*1 in TCM (Transmission Control Module) and ECM. (Refer to "How to Erase DTC" in AT-47, "OBD-II Diagnostic Trouble Code (DTC)" and "How to Erase DTC" in EC-735, "Emission-Related Diagnostic Information".)

- 2. If the completion of SRT is needed, drive vehicle under the specific driving pattern. Refer to "How to Set SRT Code" in EC-735, "Emission-Related Diagnostic Information".
- **INSPECTION END**
- \*1: Include 1st trip DTC.
- \*2: Include 1st trip freeze frame data.

#### DIAGNOSTIC WORKSHEET

Description

EC

Е

D

Н

K

M

Р

**EC-771** Revision: 2009 June 2010 M35/M45

## < SERVICE INFORMATION >

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 symptoms. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the Worksheet Sample below in order to organize all the information for troubleshooting.

Some conditions may cause the MIL to illuminate or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

#### **KEY POINTS**

WHAT ..... Vehicle & engine model WHEN ..... Date, Frequencies WHERE..... Road conditions **HOW** ..... Operating conditions, Weather conditions, Symptoms

#### Worksheet Sample

Customer nan	ne MR/MS	Model & Year	VIN							
Engine #		Trans.	Mileage							
Incident Date		Manuf. Date In Service Date								
Fuel and fuel	filler cap	☐ Vehicle ran out of fuel causing misfire☐ Fuel filler cap was left off or incorrectly	☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.							
	☐ Startability	☐ Partial combustion affected by th☐ Partial combustion NOT affected	☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position							
Symptoms	☐ Idling	□ No fast idle       □ Unstable       □ High idle       □ Low idle         □ Others [       □         □ Stumble       □ Surge       □ Knock       □ Lack of power         □ Intake backfire       □ Exhaust backfire         □ Others [       □								
- <b>,</b>	☐ Driveability									
☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading										
Incident occur	rence	☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐	☐ In the daytime							
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes								
Weather cond	itions	☐ Not affected								
	Weather	☐ Fine ☐ Raining ☐ Snowing	☐ Others [ ]							
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐	Cold ☐ Humid °F							
		☐ Cold ☐ During warm-up ☐ /	After warm-up							
Engine condit	ions	Engine speed0 2,000	4,000 6,000 8,000 rpm							
Road conditio	ns	☐ In town ☐ In suburbs ☐ Hig	hway 🗌 Off road (up/down)							
Driving condit	ions	□ Not affected     □ At starting    □ While idling    □ At racing     □ While accelerating    □ While cruising     □ While decelerating    □ While turning (RH/LH)  Vehicle speed    □    □    □    □    □    □								
Malfunction in	dicator lamp	<b>0</b> 10 20 ☐ Turned on ☐ Not turned on	30 40 50 60 MPH							

MTBL0017

# **DTC Inspection Priority Chart**

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

**EC-772** Revision: 2009 June 2010 M35/M45

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Priority	Detected items (DTC)
1	U0101 U1001 CAN communication line
	P0101 P0102 P0103 Mass air flow sensor
	P0112 P0113 P0127 Intake air temperature sensor
	P0116 P0117 P0118 P0125 Engine coolant temperature sensor
	P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor
	P0128 Thermostat function
	P0181 P0182 P0183 Fuel tank temperature sensor
	P0327 P0328 P0332 P0333 Knock sensor     P0327 P0328 P0332 P0333 Knock sensor
	P0335 Crankshaft position sensor (POS)  P0345 Crankshaft position sensor (PUS)  P0345 Crankshaft position sensor (POS)
	P0340 Camshaft position sensor (PHASE)     P0460 P0464 P0463 Fuel level conserved.
	<ul><li>P0460 P0461 P0462 P0463 Fuel level sensor</li><li>P0500 Vehicle speed sensor</li></ul>
	P0605 ECM
	• P0607 ECM
	P0643 Sensor power supply
	• P0700 TCM
	P0705 Transmission renge switch
	P0850 Park/Neutral position (PNP) switch
	P1550 P1551 P1552 P1553 P1554 Battery current sensor
	• P1610 - P1615 NATS
	P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	P0031 P0032 P0051 P0052 Air fuel ratio (A/F) sensor 1 heater
	P0037 P0038 P0057 P0058 Heated oxygen sensor 2 heater
	P0075 P0081 Intake valve timing control solenoid valve
	• P0130 P0131 P0132 P0133 P0150 P0151 P0152 P0153 P2A00 P2A03 Air fuel ratio (A/F) sensor 1
	P0137 P0138 P0139 P0157 P0158 P0159 Heated oxygen sensor 2
	P0441 EVAP control system purge flow monitoring
	P0443 P0444 P0445 EVAP canister purge volume control solenoid valve      P0443 P0440 EVAP canister purge volume control solenoid valve
	P0447 P0448 EVAP canister vent control valve     P0451 P0452 PVAP canister vent control system pressure cancer.
	P0451 P0452 P0453 EVAP control system pressure sensor     P0550 Power stocking pressure sensor
	<ul><li>P0550 Power steering pressure sensor</li><li>P0603 ECM power supply</li></ul>
	P0710 P0717 P0720 P0731 P0732 P0733 P0734 P0735 P0740 P0744 P0745 P1730 P1752 P1757 P1762 P1767
	P1772 P1774 A/T related sensors, solenoid valves and switches
	P1140 P1145 Intake valve timing control position sensor
	P1217 Engine over temperature (OVERHEAT)
	P1220 Fuel pump control module
	P1805 Brake switch
	P2100 P2103 Throttle control motor relay
	P2101 Electric throttle control function
	P2118 Throttle control motor
3	P0011 P0021 Intake valve timing control
	P0171 P0172 P0174 P0175 Fuel injection system function
	• P0300 - P0308 Misfire
	P0420 P0430 Three way catalyst function
	P0442 P0456 EVAP control system (SMALL LEAK, VERY SMALL LEAK)
	P0455 EVAP control system (GROSS LEAK)
	P0506 P0507 Idle speed control system
	P1148 P1168 Closed loop control     P1441 T00 control unit
	P1211 TCS control unit     P1212 TCS communication line
	P1212 TCS communication line     P1421 Cold start control
	P1421 Cold start control     P1564 ICC steering switch / ASCD steering switch
	P1568 ICC command value
	P1572 ICC brake switch / ASCD brake switch
	P1574 ICC vehicle speed sensor / ASCD vehicle speed sensor
	P1715 Turbine revolution sensor
	P1800 VIAS control solenoid valve

Fail-Safe Chart

When the DTC listed below is detected, the ECM enters fail-safe mode and the MIL illuminates.

Revision: 2009 June **EC-773** 2010 M35/M45

DTC No.	Detected items	Engine opera	ating condition in fail-safe mode						
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more that	n 2,400 rpm due to the fuel cut.						
P0117 P0118	Engine coolant tempera- ture sensor circuit		determined by ECM based on the following conditions. colant temperature decided by ECM.						
		Condition	Engine coolant temperature decided (CONSULT-III display)						
		Just as ignition switch is turned ON or START	40°C (104°F)						
		Approx. 4 minutes or more after engine starting.	80°C (176°F)						
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)						
		When the fail-safe system for engin fan operates while engine is runnin	e coolant temperature sensor is activated, the cooling g.						
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	order for the idle position to be within +10 degrees.  The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.  So, the acceleration will be poor.							
P0643	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.							
P2100 P2103	Throttle control motor relay	ECM stops the electric throttle cont fixed opening (approx. 5 degrees) by	rol actuator control, throttle valve is maintained at a by the return spring.						
P2101	Electric throttle control function	ECM stops the electric throttle cont fixed opening (approx. 5 degrees) by	rol actuator control, throttle valve is maintained at a by the return spring.						
P2118	Throttle control motor	ECM stops the electric throttle cont fixed opening (approx. 5 degrees) by	rol actuator control, throttle valve is maintained at a by the return spring.						
P2119	Electric throttle control actuator	malfunction:)	tor does not function properly due to the return spring ctuator by regulating the throttle opening around the not rise more than 2,000 rpm.						
			in fail-safe mode is not in specified range:) ontrol actuator by regulating the throttle opening to 20						
		<ul> <li>(When ECM detects the throttle valve is stuck open:)</li> <li>While the vehicle is being driven, it slows down gradually because of fuel cut. After vehicle stops, the engine stalls.</li> <li>The engine can restart in the N or P position, and engine speed will not exceed 1,0 or more.</li> </ul>							
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.  The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.  So, the acceleration will be poor.							

• When there is an open circuit on MIL circuit, the ECM cannot warn the driver by illuminating MIL when there is malfunction on engine control system.

Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating the fail-safe function.

The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut
--	--

## **TROUBLE DIAGNOSIS**

< SERVICE INFORMATION >

[VK45DE]

Symptom Matrix Chart

INFOID:0000000005353926

Α

## SYSTEM — BASIC ENGINE CONTROL SYSTEM

							S'	/MPT	OM							EC
		P. HA)				RATION					URE HIGH	z		E)		С
		START/RESTART (EXCP.		3/FLAT SPOT	NATION	OF POWER/POOR ACCELERATION		g		) IDLE	OVERHEATS/WATER TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference	D
		TART/RES	STALL	VSURGING	CK/DETO	OWER/POO	OW IDLE	E/HUNTIN	RATION	ETURN TO	S/WATER '	FUEL CO	OIL	EAD (UND	page	Е
		HARD/NO S	ENGINE ST	HESITATION/SURGING/FLAT	SPARK KNOCK/DETONATION	LACK OF PO	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT	EXCESSIVE	EXCESSIVE	BATTERY D		F
Warrant	y symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		G
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-1296	
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-766	
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-1291	Н
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-720	
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-731	I
	Incorrect idle speed adjustment						1	1	1	1		1			EC-760	
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-1235 EC-1246	J
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-760	
	Ignition circuit	1	1	2	2	2		2	2			2			EC-1307	K
Main po	wer supply and ground circuit	2	2	3	3	3		3	3		2	3			EC-823	
Mass ai	r flow sensor circuit				2										EC-867 EC-874	L
Engine	coolant temperature sensor circuit	1					3			3					EC-885 EC-888 EC-899	M
Air fuel	ratio (A/F) sensor 1 circuit		1	2	3	2		2	2			2			EC-907 EC-915 EC-923 EC-931 EC-1271	N
Throttle	position sensor circuit						2			2					EC-893 EC-996 EC-1159 EC-1161 EC-1259	O P
Accelera	ator pedal position sensor circuit			3	2	1									EC-1121 EC-1248 EC-1253 EC-1265	
Knock s	ensor circuit			2								3			EC-1009	
Cranksh	naft position sensor (POS) circuit	2	2												EC-1014	

						S'	/MPT	ОМ						
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	АН	AJ	AK	AL	AM	НА	
Camshaft position sensor (PHASE) circuit	3	2												EC-1020
Vehicle speed signal circuit		2	3		3						3			EC-1103
Power steering pressure sensor circuit		2					3	3						EC-1109
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-1114 EC-1118
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-860
PNP signal circuit			3		3		3	3			3			EC-1126
Refrigerant pressure sensor circuit		2				3			3		4			EC-1318
Electrical load signal circuit							3							EC-1289
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	ATC-34
VIAS control solenoid valve circuit					1									EC-1219
ABS actuator and electric unit (control unit)			4											BRC-30

<sup>1 - 6:</sup> The numbers refer to the order of inspection. (continued on next table)

SYSTEM — ENGINE MECHANICAL & OTHER

							S	/MPT(	MC							А
		A)				NOI					HIGH					
		.P. H.		5		ERAT					URE	z		ΞΈ		EC
		START (EXCP. HA)		G/FLAT SPOT	NATION	POWER/POOR ACCELERATION		PIG.		O IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	DER CHARGE)	Reference	С
		START/RESTART	TALL	HESITATION/SURGING/FLAT	SPARK KNOCK/DETONATION	OWER/PC	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	3RATION	SLOW/NO RETURN TO IDLE	TS/WATER	'E FUEL C(	E OIL CON	BATTERY DEAD (UNDER	page	D
		HARD/NO	ENGINE STALL	HESITATIC	SPARK KN	LACK OF F	HIGH IDLE	ROUGHID	IDLING VIBRATION	SLOW/NO	OVERHEA	EXCESSIV	EXCESSIV	BATTERY		Е
Warranty s	symptom code	AA	AB	AC	AD	AE	AF	AG	АН	AJ	AK	AL	AM	НА		F
Fuel	Fuel tank	5													FL-10	
	Fuel piping	7		5	5	5		5	5			5			EM-189	
	Vapor lock		5												_	G
	Valve deposit														_	_
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5			5			_	Н
Air	Air duct														<u>EM-172</u>	=
	Air cleaner							-							<u>EM-172</u>	- 1
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)		5	5		5		5	5			5			<u>EM-172</u>	ı
	Electric throttle control actuator	5			5		5			5					EM-174	J
	Air leakage from intake manifold/ Collector/Gasket														EM-174	K
Cranking	Battery	1	1	1		1		1	1					1	<u>SC-4</u>	=
	Generator circuit	•	·	·		·		·							<u>SC-21</u>	
	Starter circuit	3										1			<u>SC-8</u>	L
	Signal plate	6													EM-246	-
	Transmission range switch	4													<u>AT-110</u>	M
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-227	
	Cylinder head gasket										4		3			
	Cylinder block															Ν
	Piston												4			
	Piston ring	6	6	6	6	6		6	6			6		-	EM-246	0
	Connecting rod															
	Bearing															
	Crankshaft															Р
Valve mecha-	Timing chain														EM-199	
nism	Camshaft	_	_	_	_	_			_			_			EM-211	
	Intake valve timing control	5	5	5	5	5		5	5			5		-	EM-211	
	Intake valve												3		EM-227	
	Exhaust valve															i

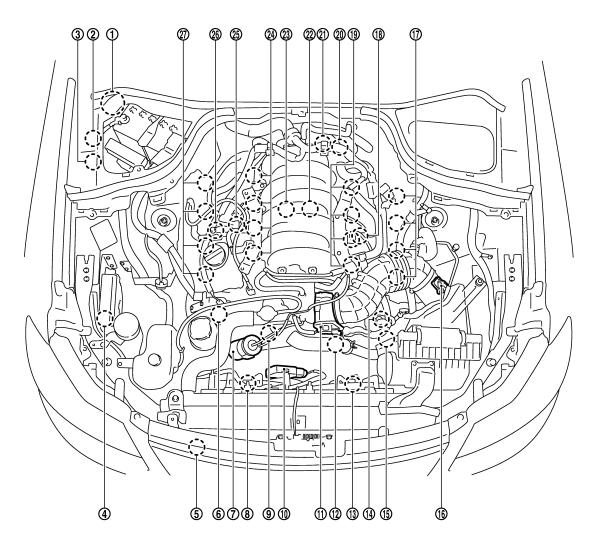
		SYMPTOM													
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty	symptom code	AA	AB	AC	AD	AE	AF	AG	АН	AJ	AK	AL	AM	НА	
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			EM-178 EX-3
	Three way catalyst														
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5			EM-182 LU-28 LU-27
	Oil level (Low)/Filthy oil														LU-24
Cooling	Radiator/Hose/Radiator filler cap														CO-39 CO-43
	Thermostat									5					<u>CO-51</u>
	Water pump	5	5	5	5	5		5	5		4	5			<u>CO-49</u>
	Water gallery	3	3					3			7	5			<u>CO-35</u>
	Cooling fan														<u>CO-47</u>
	Coolant level (Low)/Contaminated coolant									5					<u>CO-36</u>
IVIS (INFI NATS)	NITI Vehicle Immobilizer System —	1	1												EC-733 or BL-220

<sup>1 - 6:</sup> The numbers refer to the order of inspection.

[VK45DE]

# **Engine Control Component Parts Location**

INFOID:0000000005353927



PBIB2674F

1.	IPDM E/R
4.	Cooling fan relay

- Vacuum tank
- Cooling fan control module
- 13. Cooling fan motor-1
- 16. Mass air flow sensor (with intake air temperature sensor)
- 19. Fuel injector (bank 1)
- 22. Knock sensor (bank 1)
- 25. EVAP canister purge volume control 26. solenoid valve

- ICC brake hold relay (ICC models only)
- Refrigerant pressure sensor 5.
- 8. Cooling fan motor-2
- Electric throttle control actuator
- 14. Intake valve timing control position sensor (bank 1)
- 17. Ignition coil (with power transistor) and spark plug (bank 1)
- 20. Engine coolant temperature sensor
- 23. Knock sensor (bank 2)
- EVAP service port

- Battery current sensor
- Intake valve timing control position sensor (bank 2)
- Intake valve timing control solenoid valve (bank 2)
- Intake valve timing control solenoid valve (bank 1)
- 15. Camshaft position sensor (PHASE)
- VIAS control solenoid valve
- 21. Power valve actuator
- 24. Fuel injector (bank 2)
- 27. Ignition coil (with power transistor) and spark plug (bank 2)

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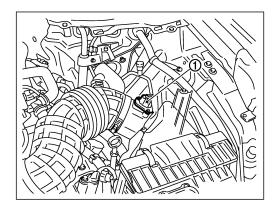
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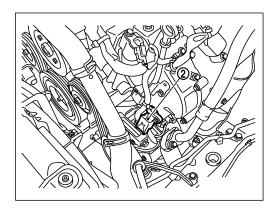
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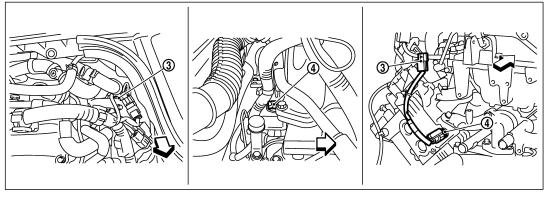
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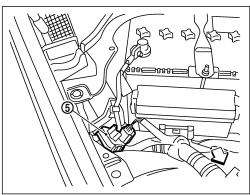
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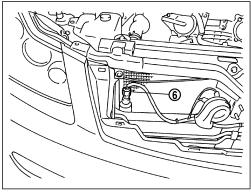
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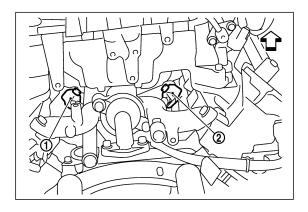


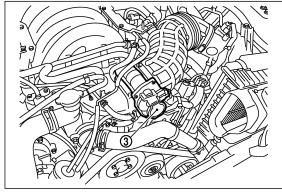


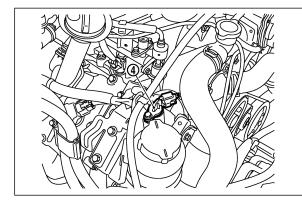
PBIB2675E

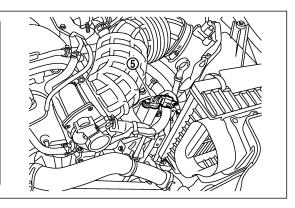
: Vehicle front

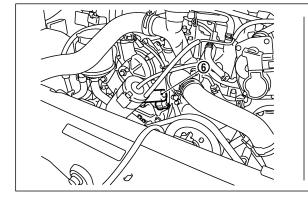
- 1. Mass air flow sensor
- 4. Engine coolant temperature sensor 5. Battery current sensor
- 2. Camshaft position sensor (PHASE) 3. Engine coolant temperature sensor sub-harness connector
  - 6. Refrigerant pressure sensor

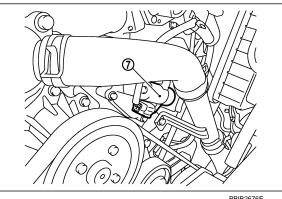












PBIB2676E

- 1. Knock sensor (bank 1)
- Intake valve timing control position sensor (bank 2)
- 7. Intake valve timing control solenoid valve (bank 1)
- Knock sensor (bank 2)
- Intake valve timing control position sensor (bank 1)
- Electric throttle control actuator
- Intake valve timing control solenoid valve (bank 2)

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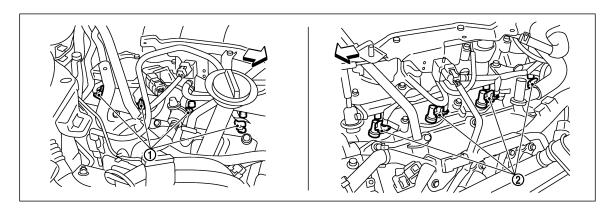
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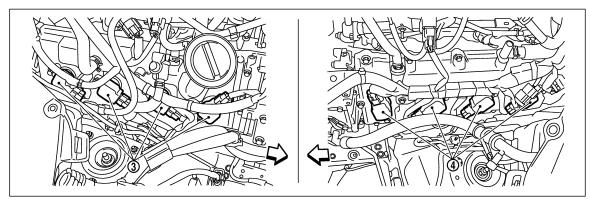
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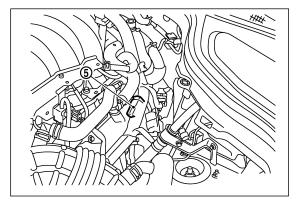
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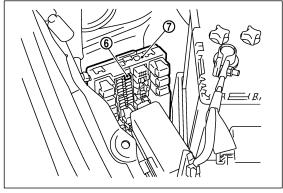
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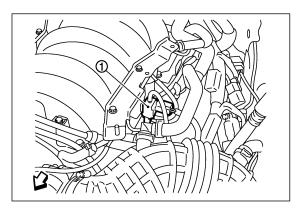
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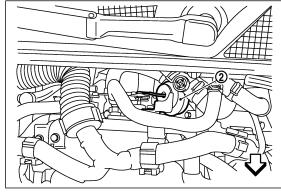
- 1. Fuel injector (bank 2)

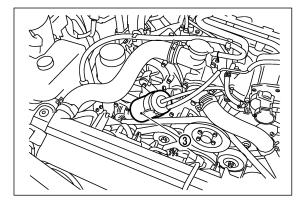
2. Fuel injector (bank 1)

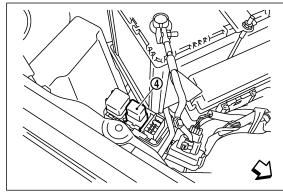
- 4. Ignition coil (with power transistor) 5. Condenser (bank 1)
- 7. IPDM E/R

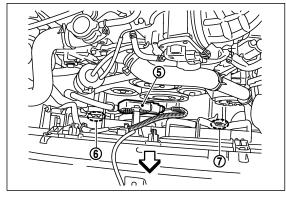
- 3. Ignition coil (with power transistor) (bank 2)
  - 6. Fuel pump fuse

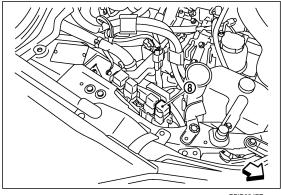












PBIB3347E

- 1. VIAS control solenoid valve
- 4. ICC brake hold relay (ICC models only)
- 7. Cooling fan motor-1
- 2. Power valve actuator
- 5. Cooling fan control module
- 8. Cooling fan relay

- 3. Vacuum tank
- 6. Cooling fan motor-2

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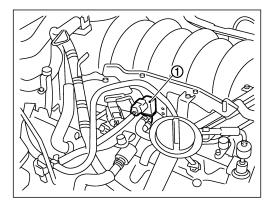
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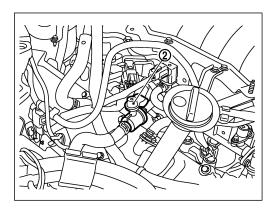
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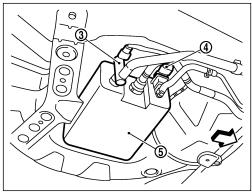
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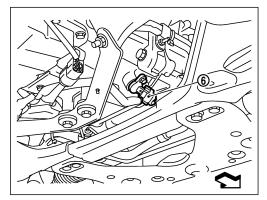
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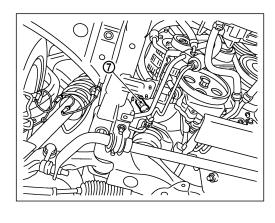
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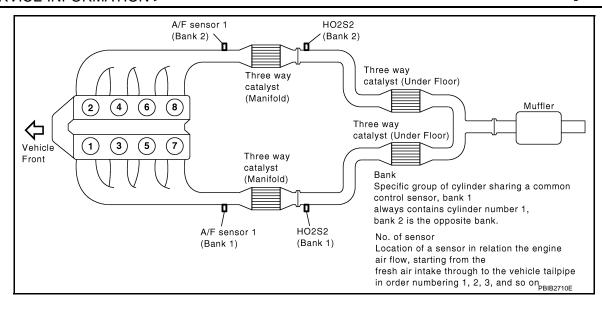


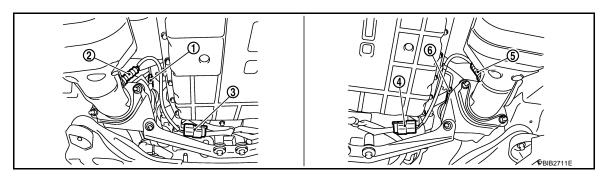
PBIB2679E

## <□ : Vehicle front

- 1. EVAP canister purge volume control 2. EVAP service port solenoid valve
- 4. EVAP control system pressure sensor 5. EVAP canister
- 7. Power steering pressure sensor

- 3. EVAP canister vent control valve
- 6. Crankshaft position sensor (POS)





- 1. Air fuel ratio (A/F) sensor 1 (bank 1)
- 2. Heated oxygen sensor 2 (bank 1)
- Heated oxygen sensor 2 (bank 2) harness connector
- . Heated oxygen sensor 2 (bank 2)
- 3. Heated oxygen sensor 2 (bank 1) harness connector
- 6. Air fuel ratio (A/F) sensor 1 (bank 2)

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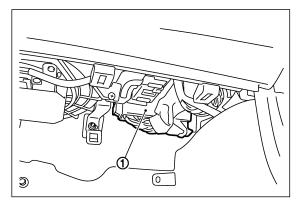
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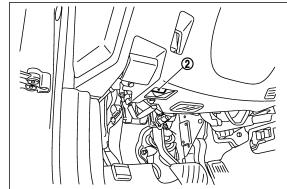
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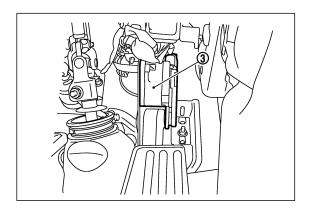
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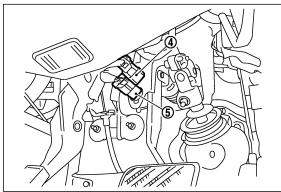
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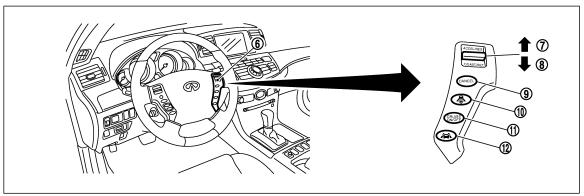
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JMBIA1088ZZ

- 1. ECM
- 4. Stop lamp switch
- 7. RESUME/ACCELERATE switch
- 10. DISTANCE switch (ICC models only)

- 2. Data link connector
- ICC brake switch (models with ICC) ASCD brake switch (models with ASCD)
- 8. SET/COAST switch
- 11. MAIN switch

- 3. Accelerator pedal position sensor
- 6. ICC steering switch (models with ICC)
  ASCD steering switch (models with ASCD)
- 9. CANCEL switch
- 12. LDP ON switch (ICC models only)

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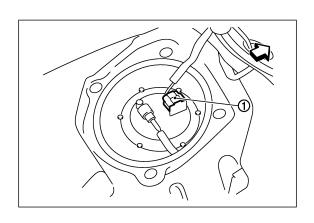
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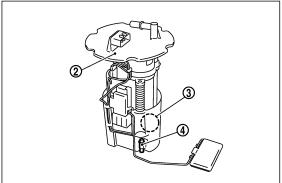
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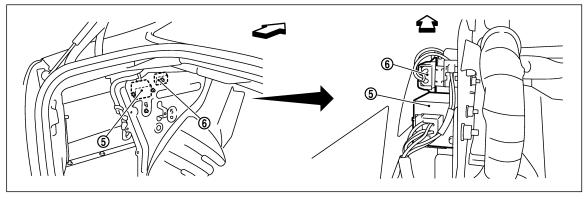
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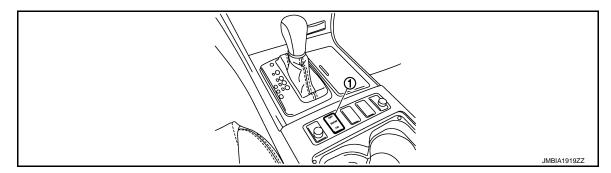


 $\triangleleft$  : Vehicle front

- harness connector
- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator

- 4. Fuel tank temperature sensor
- 5. FPCM

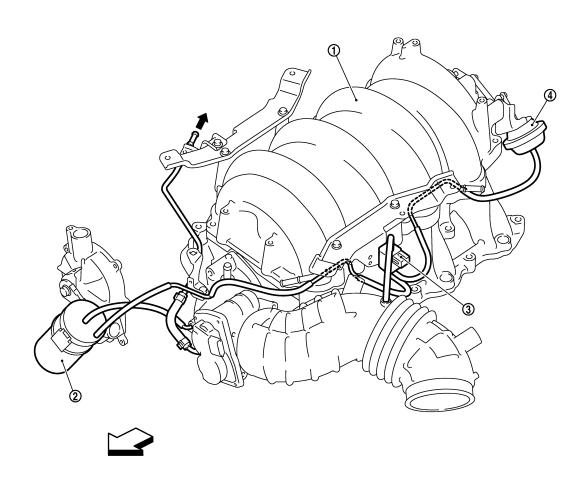
Dropping resistor



1. Snow mode switch

Vacuum Hose Drawing

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PBIB2732E

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→ : Vehicle front

1. Intake manifold collector

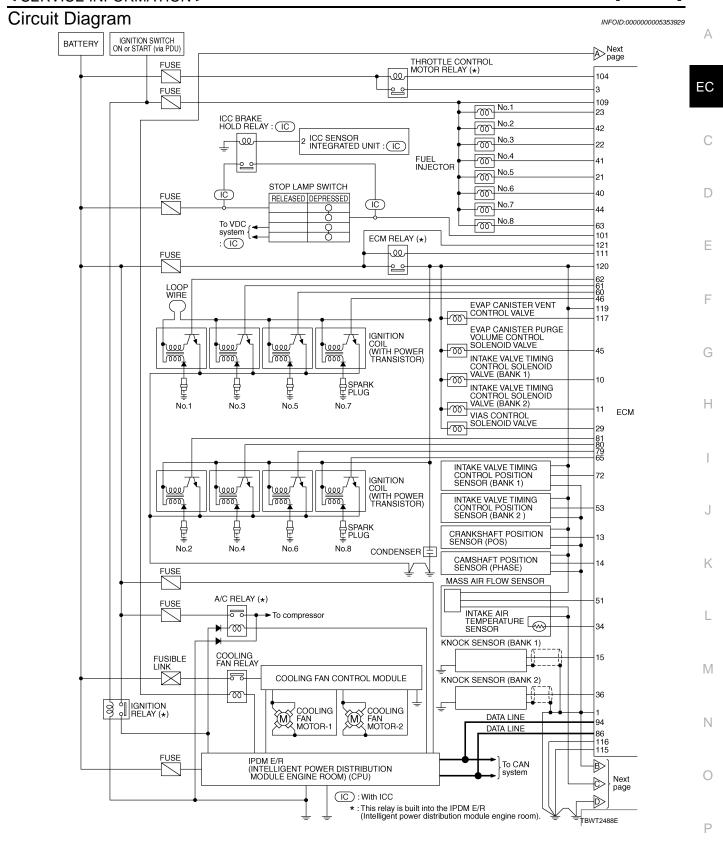
2. Vacuum tank

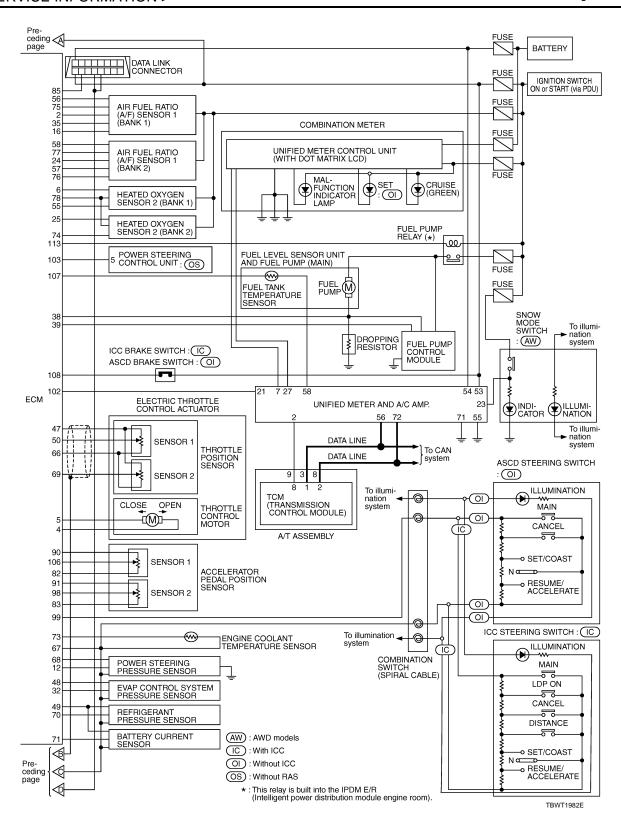
3. VIAS control solenoid valve

4. Power valve actuator **NOTE:** 

Never use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

Refer to EC-711, "Schematic" for Vacuum Control System.





## **TROUBLE DIAGNOSIS**

[VK45DE]

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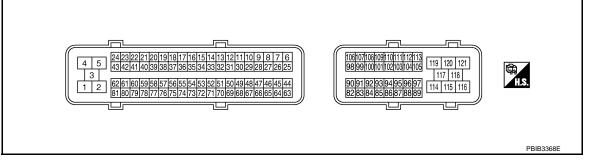
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## **ECM Harness Connector Terminal Layout**

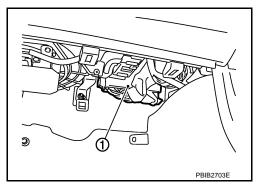


## ECM Terminal and Reference Value

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## **PREPARATION**

1. ECM (1) is located behind the passenger side instrument lower panel. For this inspection, remove passenger side instrument lower panel.



## **ECM INSPECTION TABLE**

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

## **CAUTION:**

Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	В	ECM ground	[Engine is running] • Idle speed	Body ground
2	SB	A/F sensor 1 heater (bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5 V★  N  N  N  N  N  N  N  N  N  PBIB1584E
3	R	Throttle control motor power supply	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
4	w	Throttle control motor (Close)	[Ignition switch: ON]  • Engine: Stopped  • Selector lever: D position  • Accelerator pedal: Released	0 - 14 V★  >> 5 V/DIV 1 ms/DIV T  PBIB1104E

## < SERVICE INFORMATION >

		CERTIFICE IN GRAMMINGTON				
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)		
5	В	Throttle control motor (Open)	[Ignition switch: ON]  • Engine: Stopped  • Selector lever: D position  • Accelerator pedal: Fully depressed	0 - 14 V★		
6	R/L	Heated oxygen sensor 2 heater (bank 1)	<ul> <li>[Engine is running]</li> <li>Engine speed: Below 3,600 rpm after the following conditions are met</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0 V		
			<ul><li>[Ignition switch: ON]</li><li>Engine: Stopped</li><li>[Engine is running]</li><li>Engine speed: Above 3,600 rpm</li></ul>	BATTERY VOLTAGE (11 - 14 V)		
10	W/G	Intake valve timing control solenoid valve (bank 1)	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	BATTERY VOLTAGE (11 - 14 V)		
			<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>	7 - 12 V★  → 10.0 V/Div PBIB1790E		
11	G/O	Intake valve timing control solenoid valve (bank 2)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)		
			<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>	7 - 12 V★  >>> 10.0 V/Div PBIB1790E		
12	R/G	Power steering pressure sensor	[Engine is running] • Steering wheel: Being turned	0.5 - 4.5 V		
			<ul><li>[Engine is running]</li><li>Steering wheel: Not being turned</li></ul>	0.4 - 0.8 V		

< SERVICE INFORMATION > [VK45DE]

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TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	Α
40	W/D	Crankshaft position sensor	[Engine is running]  • Warm-up condition  • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	1.0 - 2.0 V★  >> 5.0 V/Div 1 ms/Div T  PBIB1041E	C D
13	13 W/R Crankshalt position sensor (POS)			E	
44	Camshaft position sensor	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed NOTE: The pulse cycle changes depending on rpm at idle</li> </ul>	1.0 - 4.0 V★  >> 5.0 V/Div 20 ms/Div T  PBIB1039E	G H	
14 G	(PHASE)	[Engine is running] • Engine speed: 2,000 rpm	1.0 - 4.0 V★	J K	
15	W	Knock sensor (bank 1)	[Engine is running] • Idle speed	Approximately 2.5 V	L
16	W/L			Approximately 3.1 V	
35	GR/L	A /F	[Engine is running]	Approximately 2.6 V	IL A
56	LG/B	A/F sensor 1 (bank 1)	Warm-up condition     Idle speed	Approximately 2.3 V	M
75	Υ		·	Approximately 2.3 V	
					Ν

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TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	W/B R/Y R/B V/R	Fuel injector No. 5 Fuel injector No. 3 Fuel injector No. 1 Fuel injector No. 6	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed NOTE:  The pulse cycle changes depending on rpm at idle</li> </ul>	BATTERY VOLTAGE  (11 - 14 V)★  10.0V/Div 50 ms/Div  PBIB0042E
42 44	P/L R/W O G/Y	Fuel injector No. 4 Fuel injector No. 2 Fuel injector No. 7 Fuel injector No. 8	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE  (11 - 14 V)*  10.0V/Div 50 ms/Div  PBIB0043E
24	SB	A/F sensor 1 heater (bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5 V★  → 10.0V/Div 10 ms/Div T  PBIB1584E
25	P/B	Heated oxygen sensor 2 heater (bank 2)	<ul> <li>[Engine is running]</li> <li>Engine speed: Below 3,600 rpm after the following conditions are met</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0 V
			<ul> <li>[Ignition switch: ON]</li> <li>Engine: Stopped</li> <li>[Engine is running]</li> <li>Engine speed: Above 3,600 rpm</li> </ul>	BATTERY VOLTAGE (11 - 14 V)
			[Engine is running] • Selector lever: P or N position	0 - 1.0 V
29	V	VIAS control solenoid valve	<ul><li>[Engine is running]</li><li>Selector lever: D position</li><li>Engine speed: Below 5,000 rpm</li></ul>	BATTERY VOLTAGE (11 - 14 V)
			[Engine is running] • Engine speed: Above 5,000 rpm	0 - 1.0 V
32	R/G	EVAP control system pressure sensor	[Ignition switch: ON]	Approximately 1.8 - 4.8 V
34	Y/G	Intake air temperature sensor	[Engine is running]	Approximately 0 - 4.8 V Output voltage varies with intake air temperature.
36	W	Knock sensor (bank 2)	[Engine is running]  • Idle speed	Approximately 2.5 V

< SERVICE INFORMATION >

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TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	А
			[When cranking engine]	Approximately 0 V	EC
38	G/B	Fuel pump control module (FPCM) check	[Engine is running] • Warm-up condition • Idle speed	4 - 6 V	C
			[When cranking engine]	0 - 0.5 V	
39	B/R	Fuel pump control module (FPCM)	[Engine is running] • Warm-up condition • Idle speed	8 - 12 V	D
				BATTERY VOLTAGE	
				(11 - 14 V)★	Е
			<ul><li>[Engine is running]</li><li>Idle speed</li><li>Accelerator pedal: Not depressed even slightly, after engine starting</li></ul>		F
				: : : : : : : : : : : : : : : : : : :	
45	V	EVAP canister purge volume		SEC990C	G
		control solenoid valve		BATTERY VOLTAGE	
			<ul><li>[Engine is running]</li><li>Engine speed: Approx. 2,000 rpm (More than 100 seconds after starting engine)</li></ul>	(11 - 14 ∨)★	Н
				№ 10.0 V/Div 50 ms/Div r SEC991C	J
			[Engine is running] • Warm-up condition	0 - 0.2 ∨★	J
46	L/O	Ignition signal No. 7	Idle speed     NOTE:     The pulse cycle changes depending on rpm		K
60 61 62	V/W P Y/R	Ignition signal No. 5 Ignition signal No. 3 Ignition signal No. 1	at idle	>> 2.0V/Dlv 50 ms/Dlv PBIB0044E	L
65	BR/R	Ignition signal No. 8		0.1 - 0.4 V★	
79 80 81	GR/R GR/B G/R	Ignition signal No. 6 Ignition signal No. 4 Ignition signal No. 2	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>		M
			g0 0p000. 2,000 ipin	>> 2.0V/Div 50 ms/Div PBIB0045E	Ν
47	G	Sensor power supply (Throt- tle position sensor)	[Ignition switch: ON]	Approximately 5 V	0
48	BR	Sensor power supply (EVAP control system pressure sensor)	[Ignition switch: ON]	Approximately 5 V	Р
49	В/Ү	Sensor power supply (Refrigerant pressure sen- sor, Battery current sensor)	[Ignition switch: ON]	Approximately 5 V	

[VK45DE]

## < SERVICE INFORMATION >

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TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	
50	w		[Ignition switch: ON]     Engine: Stopped     Selector lever: D position     Accelerator pedal: Fully released	More than 0.36 V	
30	VV	Throttle position sensor 1	<ul> <li>[Ignition switch: ON]</li> <li>Engine: Stopped</li> <li>Selector lever: D position</li> <li>Accelerator pedal: Fully depressed</li> </ul>	Less than 4.75 V	
51	W	Mass air flow sensor	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	0.9 - 1.2 V	
31	VV	iviass all flow serisor	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,500 rpm</li></ul>	1.6 - 1.9 V	
53	LG	Intake valve timing control	[Engine is running] • Warm-up condition • Idle speed	0 - 1.0 V★	
33		position sensor (bank 2)	[Engine is running] • Engine speed: 2,000 rpm	0 - 1.0 V★	
55	L/R	Heated oxygen sensor 2 (bank 1)	<ul> <li>[Engine is running]</li> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met.</li> <li>Engine: After warming-up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - Approximately 1.0 V	
57	BR/W			Approximately 2.6 V	
58	G/O	A/E concor 1 (bank 2)	[Engine is running] • Warm-up condition	Approximately 2.3 V	
76	G/W	A/F sensor 1 (bank 2)	Idle speed	Approximately 3.1 V	
77	GR			Approximately 2.3 V	
66	В	Sensor ground (Throttle position sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V	
67	B/W	Sensor ground	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V	
68	L/Y	Sensor power supply (Power steering pressure sensor)	[Ignition switch: ON]	Approximately 5 V	

< SERVICE INFORMATION >

[VK45DE]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
69	R	Throttle position sensor 2	<ul> <li>[Ignition switch: ON]</li> <li>Engine: Stopped</li> <li>Selector lever: D position</li> <li>Accelerator pedal: Fully released</li> </ul>	Less than 4.75 V
09	K	Throttle position sensor 2	<ul> <li>[Ignition switch: ON]</li> <li>Engine: Stopped</li> <li>Selector lever: D position</li> <li>Accelerator pedal: Fully depressed</li> </ul>	More than 0.36 V
70	L/R	Refrigerant pressure sensor	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Both A/C switch and blower fan motor switch: ON (Compressor operates)</li> </ul>	1.0 - 4.0 V
71	L/R	Battery current sensor	[Engine is running]  • Battery: Fully charged*  • Idle speed	Approximately 2.6 - 3.5 V
70		Intake valve timing control	[Engine is running] • Warm-up condition • Idle speed	0 - 1.0 V★    Discription   D
72 L make valve timing control position sensor (bank 1)	[Engine is running] • Engine speed: 2,000 rpm	0 - 1.0 V★		
73	Y/B	Engine coolant temperature sensor	[Engine is running]	Approximately 0 - 4.8 V Output voltage varies with engine coolant temperature.
74	W	Heated oxygen sensor 2 (bank 2)	<ul> <li>[Engine is running]</li> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met</li> <li>Engine: After warming-up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - Approximately 1.0 V
78	В	Sensor ground (Heated oxygen sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
82	W	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
83	Р	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
85	V	Data link connector	_	_
86	Р	CAN communication line	_	_
90	L	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5 V

## < SERVICE INFORMATION >

	_	ORWATION >		
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
91	BR	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5 V
94	L	CAN communication line	_	_
98	R	Accelerator pedal position	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.20 - 0.55 V
90	K	sensor 2	<ul><li>[Ignition switch: ON]</li><li>Engine: Stopped</li><li>Accelerator pedal: Fully depressed</li></ul>	1.85 - 2.40 V
			[Ignition switch: ON] • ICC steering switch: OFF	Approximately 4.3 V
			[Ignition switch: ON] • MAIN switch: Pressed	Approximately 0 V
			[Ignition switch: ON] • CANCEL switch: Pressed	Approximately 1.9 V
99	Y	ICC steering switch (models with ICC system)	[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	Approximately 3.8 V
			[Ignition switch: ON] • SET/COAST switch: Pressed	Approximately 3.3 V
			[Ignition switch: ON] • DISTANCE switch: Pressed	Approximately 2.6 V
			[Ignition switch: ON] • LDP ON switch: Pressed	Approximately 1.1 V
		ASCD steering switch (models with ASCD system)	[Ignition switch: ON] • ASCD steering switch: OFF	Approximately 4 V
			[Ignition switch: ON] • MAIN switch: Pressed	Approximately 0 V
99	Y		[Ignition switch: ON] • CANCEL switch: Pressed	Approximately 1 V
			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	Approximately 3 V
			[Ignition switch: ON] • SET/COAST switch: Pressed	Approximately 2 V
101	V/R	Stan Jama quitab	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0 V
101	V/K	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)
400	6	Transmission vanus suitel	[Ignition switch: ON] • Selector lever: P or N position	Approximately 0 V
102	G	Transmission range switch	[Ignition switch: ON] • Selector lever: Except above position	BATTERY VOLTAGE (11 - 14 V)
104	0	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
			[Ignition switch: ON]	0 - 1.0 V
400	1.0	Accelerator pedal position	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.4 - 1.1 V
106	LG	G Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.7 - 4.8 V

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#### < SERVICE INFORMATION >

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
107	V/W	Fuel tank temperature sensor	[Engine is running]	Approximately 0 - 4.8 V Output voltage varies with fuel tank temperature.
108	BR	ICC brake switch (models witch ICC system)	[Ignition switch: ON] • Brake pedal: Slightly depressed	Approximately 0 V
108	BK	ASCD brake switch (models witch ASCD system)	[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)
-			[Ignition switch: OFF]	0 V
109	L	Ignition switch	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
111	SB	ECM relay (Self shut-off)	<ul><li>[Engine is running]</li><li>[Ignition switch: OFF]</li><li>For a few seconds after turning ignition switch OFF</li></ul>	0 - 1.5 V
		(Sell Silut-oll)	[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
440	OD.	Fuel sum select	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.5 V
113	GR	Fuel pump relay	[Ignition switch: ON]  • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)
115 116	B B	ECM ground	[Engine is running] • Idle speed	Body ground
117	GR/L	EVAP canister vent control valve	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
119 120	R R	Power supply for ECM	[Ignition switch: ON]	BATTER Y VOLTAGE (11 - 14V)
121	L	Power supply for ECM (Back up)	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)

<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

#### **CONSULT-III Function**

INFOID:0000000005353932

#### **FUNCTION**

Diagnostic test mode	Function
ECU Identification	ECM part number can be read.
Self Diagnostic Result	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data Monitor	Input/Output data in the ECM can be read.
Active Test	Diagnostic Test Mode in which CONSULT-III drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Function Test	This mode is used to inform customers when the vehicle requires periodic maintenance.
Work Support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-III unit.
DTC & SRT Confirmation	The status of system monitoring tests and the self-diagnosis status/results can be confirmed.

<sup>\*:</sup> The following emission-related diagnostic information is cleared when the ECM memory is erased.

<sup>\*:</sup> Before measuring the terminal voltage, check that the battery is fully charged. Refer to SC-4, "How to Handle Battery".

<sup>•</sup> Diagnostic trouble codes

#### < SERVICE INFORMATION >

- 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

			Direct Diagnostic Mode							
			Self Diagno			Active Test	DTC & SRT Confirmation			
	Item		DTC*1	FREEZE FRAME DATA*2	Data Monitor		SRT STA- TUS	DTC WORK SUP- PORT		
	Crankshaft position sensor (PC	OS)	×	×	×					
	Camshaft position sensor (PHA	ASE)	×	×	×					
	Mass air flow sensor		×		×					
	Engine coolant temperature se	nsor	×	×	×	×				
	Air fuel ratio (A/F) sensor 1		×		×		×	×		
	Heated oxygen sensor 2		×		×		×	×		
	Vehicle speed signal		×	×	×					
	Accelerator pedal position sens	sor	×		×					
	Throttle position sensor		×	×	×					
S	Fuel tank temperature sensor		×		×	×				
AR.	EVAP control system pressure	sensor	×		×					
Ę	Intake air temperature sensor		×	×	×					
Ä	Knock sensor		×							
MP .	Refrigerant pressure sensor				×					
ENGINE CONTROL COMPONENT PARTS	Closed throttle position switch ator pedal position sensor sign				×					
IR	Air conditioner switch				×					
Ö	Park/neutral position (PNP) sig	ınal	×		×					
Ä	Stop lamp switch		×		×					
NG IS	Power steering pressure sensor	or	×		×					
Ш	Battery voltage				×					
	Load signal				×					
	Intake valve timing control posi sor	tion sen-	×		×					
	Fuel level sensor		×		×					
	Battery current sensor		×		×					
	ICC steering switch		×		×					
	ASCD steering switch		×		×					
	ICC brake switch		×		×					
	ASCD brake switch		×		×					

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			Direct Diagnostic Mode							
	ltem			Self Diagr	nostic Result			DTC 8 Confirm		
			Work Support	DTC*1	FREEZE FRAME DATA*2	Data Monitor	Active Test	SRT STA- TUS	DTC WORK SUP- PORT	
		Fuel injector				×	×			
		Power transistor (Ignition timing)				×	×			
		Throttle control motor relay		×		×				
ပ		Throttle control motor		×						
ENGINE CONTROL COMPONENT PARTS		EVAP canister purge volume control solenoid valve		×		×	×		×	
Ë		FPCM		×		×				
PO		Air conditioner relay				×				
<b>⊠</b>	PUT	Fuel pump relay	×			×	×			
٦c	OUTPUT	Cooling fan control module		×		×	×			
IR	0	Air fuel ratio (A/F) sensor 1 heater		×		×		×* <sup>3</sup>		
SO		Heated oxygen sensor 2 heater		×		×		×* <sup>3</sup>		
빌		EVAP canister vent control valve	×	×		×	×			
ENG		Intake valve timing control solenoid valve		×		×	×			
		VIAS control solenoid valve		×		×	×			
		Alternator				×	×			
		Calculated load value			×	×				

X: Applicable

#### WORK SUPPORT MODE

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<sup>\*1:</sup> This item includes 1st trip DTCs.

<sup>\*2:</sup> 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 <a href="EC-735">EC-735</a>, "Emission-Related Diagnostic Information".

<sup>\*3:</sup> Always "CMPLT" is displayed.

WORK ITEM	CONDITION	USAGE
IDLE AIR VOL LEARN	THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
EVAP SYSTEM CLOSE	CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS.  IGN SW ON  ENGINE NOT RUNNING  AMBIENT TEMPERATURE IS ABOVE 0°C (32°F).  NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM  FUEL TANK TEMP. IS MORE THAN 0°C (32°F).  WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE"  WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITION EXCEPT ABOVE, CONSULT-III WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION.  NOTE:  WHEN STARTING ENGINE, CONSULT-III MAY DISPLAY "BATTERY", EVEN IN USING CHARGED BATTERY".	When detecting EVAP leakage in the EVAP system
FUEL PRESSURE RELEASE	FUEL PUMP WILL STOP BY TOUCHING "START" DUR- ING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
SELF-LEARNING CONT	THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEF- FICIENT.	When clearing the coefficient of self-learning control value
VIN REGISTRATION	IN THIS MODE VIN IS REGISTERED IN ECM	When registering VIN in ECM
TARGET IDLE RPM ADJ*	IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	IDLE CONDITION	When adjusting target ignition timing

<sup>\*:</sup> This function is not necessary in the usual service procedure.

## SELF DIAGNOSTIC RESULT MODE

#### Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-735, "Emission-Related Diagnostic Information".

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	The engine control component part/control system has a trouble code, that is displayed as PXXXX. (Refer to EC-735, "Emission-Related Diagnostic Information".)
CAL/LD VALUE [%]	The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	"Long-term fuel trim" at the moment a malfunction is detected is displayed.
L-FUEL TRM-B2 [%]	The "long-term fuel trim" indicates much more gradual feedback compensation to the base fuel schedule than "short-term fuel trim".
S-FUEL TRM-B1 [%]	"Short-term fuel trim" at the moment a malfunction is detected is displayed.
S-FUEL TRM-B2 [%]	The "short-term fuel trim" indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH-P/S [%]	The throttle valve opening angle at the moment a malfunction is detected is displayed.

< SERVICE INFORMATION >

Freeze frame data item*	Description
B/FUEL SCHDL [msec]	The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.
FUEL SYS-B1	"Fuel injection system status" at the moment a malfunction is detected is displayed.
FUEL SYS-B2	<ul> <li>One of the following mode is displayed.</li> <li>Mode2: Open loop due to detected system malfunction</li> <li>Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment)</li> <li>Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control</li> <li>Mode5: Open loop - has not yet satisfied condition to go to closed loop</li> </ul>
INT MANI PRES [kPa]	These items are displayed but are not applicable to this model.
COMBUST CONDITION	These items are displayed but are not applicable to this model.

<sup>\*:</sup> The items are the same as those of 1st trip freeze frame data.

## DATA MONITOR MODE

#### Monitored Item

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	<ul> <li>Accuracy becomes poor if engine speed drops below the idle rpm.</li> <li>If the signal is interrupted while the engine is running, an abnormal value may be in- dicated.</li> </ul>
MAS A/F SE-B1	V	<ul> <li>The signal voltage of the mass air flow sensor is displayed.</li> <li>When the engine is stopped, ue is indicated.</li> <li>When engine is running, sper range is indicated in "SPEC".</li> </ul>	
B/FUEL SCHDL	msec	"Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	When engine is running, specification range is indicated in "SPEC".
A/F ALPHA-B1	%		When the engine is stopped, a certain val-
A/F ALPHA-B2	%	The mean value of the air-fuel ratio feedback cor- rection factor per cycle is indicated.	<ul> <li>ue is indicated.</li> <li>This data also includes the data for the airfuel ratio learning control.</li> <li>When engine is running, specification range is indicated in "SPEC".</li> </ul>
COOLAN TEMP/S	°C or °F	The engine coolant temperature (determined by the signal voltage of the engine coolant tempera- ture sensor) is displayed.	When the engine coolant temperature sensor is open or short-circuited, ECM en- ters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
A/F SEN1 (B1)	V	The A/F signal computed from the input signal of	
A/F SEN1 (B2)	V	the air fuel ratio (A/F) sensor 1 is displayed.	
HO2S2 (B1)	×V	The signal voltage of the heated oxygen sensor 2	
HO2S2 (B2)	V	is displayed.	
HO2S2 MNTR (B1)	RICH/ LEAN	Display of heated oxygen sensor 2 signal:     RICH: means the amount of oxygen after three way	When the engine is stopped, a certain val-
HO2S2 MNTR (B2)	RICH/ LEAN	catalyst is relatively small.  LEAN: means the amount of oxygen after three way catalyst is relatively large.	ue is indicated.
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from combination meter (Unified meter and A/C amp.) is displayed.	
BATTERY VOLT	V	The power supply voltage of ECM is displayed.	
ACCEL SEN 1	V	The accelerator pedal position sensor signal volt-	ACCEL SEN 2 signal is converted be
ACCEL SEN 2	V	age is displayed.	ECM internally. Thus, it differs from ECM terminal voltage signal.

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Monitored item	Unit	Description	Remarks
TP SEN 1-B1	V	The throttle position sensor signal voltage is dis-	TP SEN 2-B1 signal is converted by ECM
TP SEN 2-B1	V	played.	internally. Thus, it differs from ECM termi- nal voltage signal.
FUEL T/TMP SE	°C or °F	<ul> <li>The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is dis- played.</li> </ul>	
EVAP SYS PRES	V	The signal voltage of EVAP control system pressure sensor is displayed.	
FUEL LEVEL SE	V	The signal voltage of the fuel level sensor is displayed.	
START SIGNAL	ON/OFF	Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	After starting the engine, [OFF] is dis- played regardless of the starter signal.
CLSD THL POS	ON/OFF	Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG	ON/OFF	Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
PW/ST SIGNAL	ON/OFF	[ON/OFF] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor signal) is indicated.	
LOAD SIGNAL	ON/OFF	Indicates [ON/OFF] condition from the electrical load signal.     ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position.     OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW	ON/OFF	Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW	ON/OFF	Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW	ON/OFF	Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1	msec	Indicates the actual fuel injection pulse width com-	When the engine is stopped, a certain
INJ PULSE-B2	msec	pensated by ECM according to the input signals.	computed value is indicated.
IGN TIMING	BTDC	Indicates the ignition timing computed by ECM according to the input signals.	When the engine is stopped, a certain value is indicated.
CAL/LD VALUE	%	"Calculated load value" indicates the value of the current air flow divided by peak air flow.	
MASS AIRFLOW	g⋅m/s	Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow 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		
INT/V TIM (B2)	°CA	Indicates [°CA] of intake camshaft advanced angle.	
INT/V SOL (B1)	%	The control value of the intake valve timing control	
INT/V SOL (B2)	%	<ul> <li>solenoid valve (determined by ECM according to the input signals) is indicated.</li> <li>The advance angle becomes larger as the value in- creases.</li> </ul>	

## < SERVICE INFORMATION >

[VK45DE]

Monitored item	Unit	Description	Remarks	
VIAS S/V-1	ON/OFF	<ul> <li>The control condition of the VIAS control solenoid valve (determined by ECM according to the input signals) is indicated.</li> <li>OFF: VIAS control solenoid valve is not operating. ON: VIAS control solenoid valve is operating.</li> </ul>		E
AIR COND RLY	ON/OFF	The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.		
FUEL PUMP RLY	ON/OFF	Indicates the fuel pump relay control condition de- termined by ECM according to the input signals.		_
FPCM	HI/LOW	The control condition of the fuel pump control mod- ule (FPCM) (determined by the ECM according to the input signal) is indicated.		
VENT CONT/V	ON/OFF	The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated.     ON: Closed OFF: Open		F
THRTL RELAY	ON/OFF	Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.		(
HO2S2 HTR (B1)	ON/OFF	Indicates [ON/OFF] condition of heated oxygen		
HO2S2 HTR (B2)	ON/OFF	sensor 2 heater determined by ECM according to the input signals.		H
ALT DUTY SIG	ON/OFF	The control condition of the power generation voltage variable control (determined by ECM according to the input signals) is indicated.     ON: Power generation voltage variable control is active.     OFF: Power generation voltage variable control is inactive.		
I/P PULLY SPD	rpm	Indicates the engine speed computed from the in- put speed signal.		
VEHICLE SPEED	km/h or MPH	The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.		k
IDL A/V LEARN	YET/CM- PLT	Display the condition of idle air volume learning YET: Idle air volume learning has not been performed yet.  CMPLT: Idle air volume learning has already been performed successfully.		L
TRVL AFTER MIL	km or mile	Distance traveled while MIL is activated.		Λ
SNOW MODE SW	ON/OFF	Indicates [ON/OFF] condition from the snow mode switch signal.		N
A/F S1 HTR (B1)	%	Air fuel ratio (A/F) sensor 1 heater control value		
A/F S1 HTR (B2)	%	<ul> <li>computed by ECM according to the input signals.</li> <li>The current flow to the heater becomes larger as the value increases.</li> </ul>		
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from combination meter (Unified meter and A/C amp.) is displayed.		F
SET VHCL SPD	km/h or mph	The preset vehicle speed is displayed.		
MAIN SW	ON/OFF	Indicates [ON/OFF] condition from MAIN switch signal.		
CANCEL SW	ON/OFF	Indicates [ON/OFF] condition from CANCEL switch signal.		

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[VK45DE]

Monitored item	Unit	Description	Remarks
RESUME/ACC SW	ON/OFF	Indicates [ON/OFF] condition from RESUME/AC- CELERATE switch signal.	
SET SW	ON/OFF	Indicates [ON/OFF] condition from SET/COAST switch signal.	
BRAKE SW1	ON/OFF	Indicates [ON/OFF] condition from ASCD brake switch signal.	
BRAKE SW2	ON/OFF	Indicates [ON/OFF] condition of stop lamp switch signal.	
DIST SW	ON/OFF	Indicates [ON/OFF] condition from DISTANCE switch signal.	
CRUISE LAMP	ON/OFF	<ul> <li>Indicates [ON/OFF] condition of CRUISE lamp de- termined by the ECM according to the input sig- nals.</li> </ul>	
SET LAMP	ON/OFF	Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
FAN DUTY	%	Indicates a command value for cooling fan. The value is calculated by ECM based on input signals.	
AC EVA TEMP	°C or °F	Indicates A/C evaporator temperature sent from "unified meter and A/C amp.".	
AC EVA TARGET	°C or °F	Indicates target A/C evaporator temperature sent from "unified meter and A/C amp.".	
ALT DUTY	%	Indicates the duty ratio of the power generation command value. The ratio is calculated by ECM based on the battery current sensor signal.	
BAT CUR SEN	mV	The signal voltage of battery current sensor is dis- played.	
A/F ADJ-B1	_	Indicates the correction factor stored in ECM. The	
A/F ADJ-B2	_	factor is calculated from the difference between the target air/fuel ratio stored in ECM and the air-fuel ratio calculated from air fuel ratio (A/F) sensor 1 signal.	
P/N POSI SW	ON/OFF	Indicates [ON/OFF] condition from the park/neutral position (PNP) signal.	
INT/A TEMP SE	°C or °F	The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
AC PRESS SEN	V	The signal voltage from the refrigerant pressure sensor is displayed.	
FPCM DR VOLT	V	The voltage between fuel pump and FPCM is dis- played.	

#### NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

#### **ACTIVE TEST MODE**

Test Item

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
VENT CON- TROL/V	<ul> <li>Ignition switch: ON (Engine stopped)</li> <li>Turn solenoid valve ON and OFF using the CONSULT-III and listen to operating sound.</li> </ul>	Solenoid valve makes an operating sound.	Harness and connectors     Solenoid valve
ENG COOLANT TEMP	<ul> <li>Engine: Return to the original trouble condition</li> <li>Change the engine coolant tem- perature 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 INJEC- TION	Engine: Return to the original trouble condition     Change the amount of fuel injection using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	Harness and connectors     Fuel injector     Air fuel ratio (A/F) sensor 1
FUEL/T TEMP SEN	Change the fuel tank temperature	using CONSULT-III.	
PURG VOL CONT/V	<ul> <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 CONSULT-III.</li> </ul>	Engine speed changes according to the opening percent.	Harness and connectors     Solenoid valve
FUEL PUMP RE- LAY	Ignition switch: ON (Engine stopped)     Turn the fuel pump relay ON and OFF using CONSULT-III and listen to operating sound.	Fuel pump relay makes the operating sound.	Harness and connectors     Fuel pump relay
V/T ASSIGN AN- GLE	Engine: Return to the original trouble condition     Change intake valve timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	Harness and connectors     Intake valve timing control solenoid valve
VIAS SOL VALVE	Ignition switch: ON     Turn solenoid valve ON and OFF using CONSULT-III and listen to operating sound.	Solenoid valve makes an operating sound.	Harness and connectors     Solenoid valve
FAN DUTY CONTROL*	Ignition switch: ON     Change duty ratio using CON-SULT-III.	Cooling fan speed changes.	Harness and connectors     Cooling fan motor     Cooling fan relay     Cooling fan control module     IPDM E/R
ALTERNATOR DUTY	Engine: Idle     Change duty ratio using CON- SULT-III.	Battery voltage changes.	Harness and connectors     IPDM E/R     Alternator
POWER BAL- ANCE	<ul> <li>Engine: After warming up, idle the engine.</li> <li>A/C switch OFF</li> <li>Selector lever: P or N position</li> <li>Cut off each fuel injector signal one at a time using CONSULT-III.</li> </ul>	Engine runs rough or dies.	Harness and connectors     Compression     Fuel injector     Power transistor     Spark plug     Ignition coil
IGNITION TIM- ING	Engine: Return to the original trouble condition     Timing light: Set     Retard the ignition timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	Perform Idle Air Volume Learning.

<sup>\*:</sup> 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 "How to Display SRT Status" in EC-735. "Emission-Related Diagnostic Information".

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SRT WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

#### DTC WORK SUPPORT Mode

Test mode	Test item	Corresponding DTC No.	Reference page
	HO2S2 (B1) P1146	P0138	EC-949
	HO2S2 (B1) P1147	P0137	EC-940
110000	HO2S2 (B1) P0139	P0139	EC-961
HO2S2	HO2S2 (B2) P1166	P0158	EC-949
	HO2S2 (B2) P1167	P0157	EC-940
	HO2S2 (B2) P0159	P0159	EC-961
	A/F SEN1 (B1) P1278/P1279	P0133	EC-931
A/F SEN1	A/F SEN1 (B1) P1276	P0130	EC-907
AVF SEINT	A/F SEN1 (B2) P1288/P1289	P0153	EC-931
	A/F SEN1 (B2) P1286	P0150	EC-907
	EVP SML LEAK P0442/P1442*	P0442	EC-1035
	EVP SIVIL LEAK PU442/P1442	P0455	EC-1083
EVAPORATIVE SYSTEM	EVP V/S LEAK P0456/P1456*	P0456	EC-1089
	PURG VOL CN/V P1444	P0443	EC-1042
	PURG FLOW P0441	P0441	EC-1030

<sup>\*:</sup> DTC P1442 and P1456 does not apply to Y50 models but appears in DTC WORK SUPPORT Mode screens.

## Generic Scan Tool (GST) Function

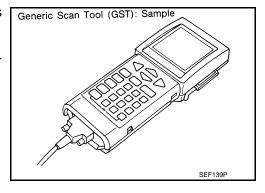
INFOID:0000000005353933

#### **DESCRIPTION**

Generic Scan Tool (OBD II scan tool) complying with SAE J1978 has several functions explained below.

ISO9141 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 analog 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-735, "Emission-Related Diagnostic Information".
Service \$03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.

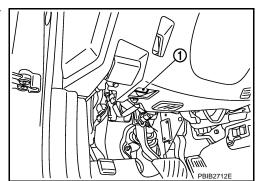
< SERVICE INFORMATION >

[VK45DE]

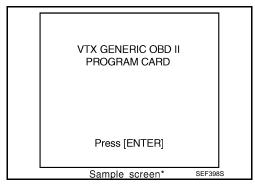
Dia	agnostic service	Function
Service \$04	CLEAR DIAG INFO	This diagnostic service can clear all emission-related diagnostic information. This includes:  Clear number of diagnostic trouble codes (Service \$01)  Clear diagnostic trouble codes (Service \$03)  Clear trouble code for freeze frame data (Service \$01)  Clear freeze frame data (Service \$02)  Reset status of system monitoring test (Service \$01)  Clear on board monitoring test results (Service \$06 and \$07)
Service \$06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
Service \$07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
Service \$08	_	This diagnostic service can close EVAP system in ignition switch ON position (Engine stopped). When this diagnostic service is performed, EVAP canister vent control valve can be closed.  In the following conditions, this diagnostic service cannot function.  Low ambient temperature  Low battery voltage  Engine running  Ignition switch OFF  Low fuel temperature  Too much pressure is applied to EVAP system
Service \$09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

#### INSPECTION PROCEDURE

- 1. Turn ignition switch OFF.
- 2. Connect GST to data link connector (1), which is located under LH dash panel near the hood opener handle.



- 3. Turn ignition switch ON.
- 4. Enter the program according to instructions on the screen or in the operation manual.
  - (\*: Regarding GST screens in this section, sample screens are shown.)



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< SERVICE INFORMATION > [VK45DE]

Perform each diagnostic service according to each service procedure.

For further information, see the GST Operation Manual of the tool maker.

**OBD II FUNCTIONS** 

F0: DATA LIST

F1: FREEZE DATA

F2: DTCs

F3: SNAPSHOT

F4: CLEAR DIAG INFO F5: O2 TEST RESULTS

#### **F6: READINESS TESTS**

F7: ON BOARD TESTS F8: EXPAND DIAG PROT

F9: UNIT CONVERSION

Sample screen\* SEF416S

#### CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005353934

#### Remarks:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
  - \* Specification data may not be directly related to their components signals/values/operations.

i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

MONITOR ITEM	CO	NDITION	SPECIFICATION
ENG SPEED	Run engine and compare CONSU	Almost the same speed as the tachometer indication.	
MAS A/F SE-B1	See EC-814, "Inspection Procedure'		
B/FUEL SCHDL	See EC-814, "Inspection Procedure'		
A/F ALPHA-B1 A/F ALPHA-B2	See EC-814, "Inspection Procedure"		
COOLAN TEMP/S	Engine: After warming up		More than 70°C (158°F)
A/F SEN1 (B1) A/F SEN1 (B2)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5 V
HO2S2 (B1) HO2S2 (B2)	are met.	rpm quickly after the following conditions	0 - 0.3 V ←→ Approx. 0.6 - 1.0 V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	<ul> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>		$LEAN \longleftrightarrow RICH$
VHCL SPEED SE	Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	Ignition switch: ON (Engine stopped)	ed)	11 - 14 V
ACCEL SEN 1	Ignition switch: ON	Accelerator pedal: Fully released	0.4 - 1.1 V
ACCEL SEN 2*1	(Engine stopped)	Accelerator pedal: Fully depressed	3.7 - 4.8 V
TP SEN 1-B1	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 2-B1*1	(Engine stopped)  • Selector lever position: D	Accelerator pedal: Fully depressed	Less than 4.75 V
EVAP SYS PRES	Ignition switch: ON		Approx. 1.8 - 4.8 V
START SIGNAL	• Ignition switch: $ON \rightarrow START \rightarrow C$	• Ignition switch: $ON \rightarrow START \rightarrow ON$	
CLSD THL POS	Ignition switch: ON	Accelerator pedal: Fully released	ON
OLOD THE FOO	(Engine stopped)	Accelerator pedal: Slightly depressed	OFF
	Engine: After warming up, idle the	Air conditioner switch: OFF	OFF
AIR COND SIG	engine	Air conditioner switch: ON (Compressor operates.)	ON

< SERVICE INFORMATION >

[VK45DE]

MONITOR ITEM	CC	NDITION	SPECIFICATION
PW/ST SIGNAL	Engine: After warming up, idle the engine.	Steering wheel: Not being turned (Forward direction)	OFF
	engine	Steering wheel: Being turned	ON
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2ND position	ON
		Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	• Ignition switch: $ON \rightarrow OFF \rightarrow ON$		$ON \to OFF \to ON$
LIEATED EAN OW	Engine: After warming up, idle the	Heater fan switch: ON	ON
HEATER FAN SW		Heater fan switch: OFF	OFF
		Brake pedal: Fully released	OFF
BRAKE SW	Ignition switch: ON	Brake pedal: Slightly depressed	ON
	Engine: After warming up	Idle	2.0 - 3.0 msec
INJ PULSE-B1 INJ PULSE-B2	<ul><li>Selector lever position: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,000 rpm	1.9 - 2.9 msec
	Engine: After warming up	Idle	7 - 17°BTDC
IGN TIMING	<ul><li>Selector lever position: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,000 rpm	25 - 45°BTDC
	Engine: After warming up	Idle	14 - 33%
CAL/LD VALUE	<ul><li>Selector lever position: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,500 rpm	12 - 25%
	Engine: After warming up	Idle	2.0 - 6.0 g·m/s
MASS AIRFLOW	<ul><li>Selector lever position: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,500 rpm	7.0 - 20.0 g·m/s
PURG VOL C/V	<ul> <li>Engine: After warming up</li> <li>Selector lever position: P or N</li> <li>Air conditioner switch: OFF</li> </ul>	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%
	No load	2,000 rpm	_
	Engine: After warming up	Idle	−5 - 5°CA
INT/V TIM (B1) INT/V TIM (B2)	<ul><li>Selector lever position: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,000 rpm	Approx. 0 - 20°CA
	Engine: After warming up	Idle	0 - 2%
NT/V SOL (B1) NT/V SOL (B2)	<ul><li>Selector lever position: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,000 rpm	Approx. 25 - 50%
	Selector lever position: P or N	•	ON
/IAS S/V-1	Engine speed: More than 5,000 rp	om	ON
	Selector lever position: Except P c     Engine speed: Less than 5,000 rp		OFF
	Engine: After warming up, idle the	Air conditioner switch: OFF	OFF
AIR COND RLY	engine	Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	For 1 seconds after turning ignition     Engine running or cranking	n switch: ON	ON
	Except above		OFF

## < SERVICE INFORMATION >

[VK45DE]

MONITOR ITEM	CC	NDITION	SPECIFICATION
	Engine: Cranking		н
FPCM	<ul> <li>Engine: Idle</li> <li>Engine coolant temperature: More than 10°C (50°F)</li> </ul>		LOW
VENT CONT/V	Ignition switch: ON		OFF
THRTL RELAY	Ignition switch: ON		ON
HO2S2 HTR (B1) HO2S2 HTR (B2)	- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
			OFF
ALT DUTY SIG	Power generation voltage variable		ON
	Power generation voltage variable	e control: Not operating	OFF
I/P PULLY SPD	Vehicle speed: More than 20 km/h	n (12 MPH)	Almost the same speed as the tachometer indication
VEHICLE SPEED	Turn drive wheels and compare C dication.	ONSULT-III value with the speedometer in-	Almost the same speed as the speedometer indication
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	0 - 65,535 km (0 - 40,723 miles)
SNOW MODE SW	• Ignition switch: ON	Snow mode switch: ON	ON
SNOW MODE 3W	Ignition switch: ON	Snow mode switch: OFF	OFF
A/F S1 HTR (B1) A/F S1 HTR (B2)	Engine: After warming up, idle the	engine	0 - 100%
VHCL SPEED SE	Turn drive wheels and compare C dication.	ONSULT-III value with the speedometer in-	Almost the same speed as the speedometer indication
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
MAIN SW	Ignition switch: ON	MAIN switch: Pressed	ON
W/ W/ OV	ignition switch. Of	MAIN switch: Released	OFF
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	ON
0, 11022 011	ignition owton. Or	CANCEL switch: Released	OFF
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
RESUME/ACC SW	• Igrillion Switch. ON	RESUME/ACCELERATE switch: Released	OFF
SET SW	Ignition switch: ON	SET/COAST switch: Pressed	ON
SET SW	Ignition switch: ON	SET/COAST switch: Released	OFF
BRAKE SW1		Brake pedal: Fully released	ON
(ICC/ASCD brake switch)	Ignition switch: ON	Brake pedal: Slightly depressed	OFF
BRAKE SW2	Ignition switch: ON	Brake pedal: Fully released	OFF
(Stop lamp switch)	ignition switch. Of	Brake pedal: Slightly depressed	ON
DIST SW	Ignition switch: ON	DISTANCE switch: Pressed	ON
	Igilidon oviton. Orv	DISTANCE switch: Released	OFF
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time $\rightarrow$ at the 2nd time	$ON \to OFF$
	MAIN switch: ON	ASCD: Operating	ON
SET LAMP	When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Not operating	OFF
FAN DUTY	Engine: Running		0 - 100%

#### < SERVICE INFORMATION >

[VK45DE]

MONITOR ITEM	CONDITION		SPECIFICATION
ALT DUTY	Engine: Idle		0 - 80%
BAT CUR SEN	<ul> <li>Engine speed: Idle</li> <li>Battery: Fully charged*<sup>2</sup></li> <li>Selector lever position: P or N</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>		Approx. 2,600 - 3,500 mV
P/N POSI SW	Ignition switch: ON	Selector lever position: P or N	ON
F/N FOSI 3W		Selector lever position: Except above	OFF
AC PRESS SEN	Engine: Idle     Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0 V

<sup>\*1:</sup> Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

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<sup>\*2:</sup> Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to SC-4, "How to Handle Battery".

< SERVICE INFORMATION >

[VK45DE]

## TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description INFOID:0000000053539935

The specification (SP) value indicates the tolerance of the value that is displayed in "SPEC" of "DATA MONITOR" 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 illuminate the MIL.

The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

## **Testing Condition**

INFOID:0000000005353936

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 104.3 kPa (1.003 1.064 kg/cm<sup>2</sup>, 14.25 15.12 psi)
- Atmospheric temperature: 20 30°C (68 86°F)
- Engine coolant temperature: 75 95°C (167 203°F)
- Engine speed: Idle
- Transmission: Warmed-up
- After the engine is warmed up to normal operating temperature, drive vehicle until "ATF TEMP SE 1" (A/T fluid temperature sensor signal) in "DATA MONITOR" mode of "TRANSMISSION" indicates more than 60°C (140°F).
- Electrical load: Not applied
- Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

## Inspection Procedure

INFOID:0000000005353937

#### NOTE:

Perform "SPEC" of "DATA MONITOR" mode in maximum scale display.

- Perform EC-760, "Basic Inspection".
- Check that the testing conditions are met. Refer to <u>EC-814, "Testing Condition"</u>.
- Select "B/FUEL SCHDL", "A/F ALPHA-B1", "A/F ALPHA-B2" and "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode with CONSULT-III.
- 4. Check that monitor items are within the SP value.
- 5. If NG, go to EC-815, "Diagnosis Procedure".

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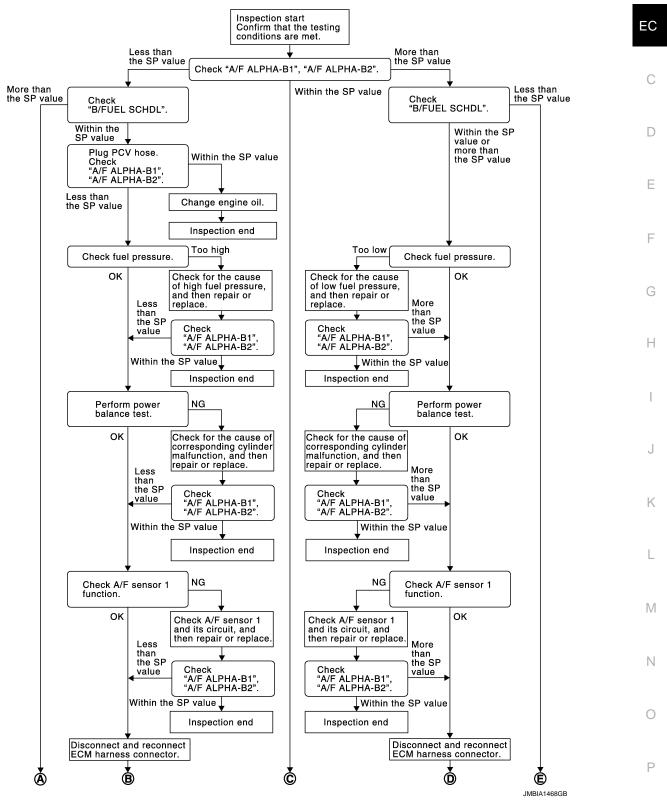
[VK45DE]

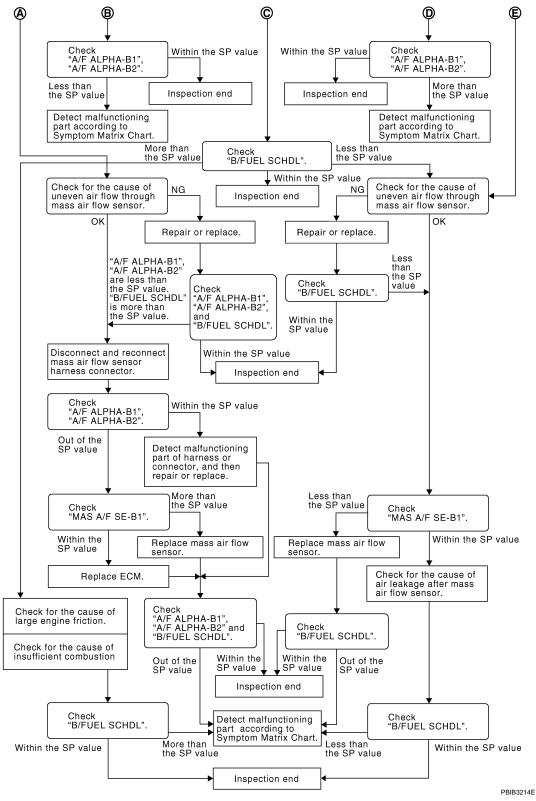
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Diagnosis Procedure

INFOID:0000000005353938

#### **OVERALL SEQUENCE**





#### **DETAILED PROCEDURE**

1.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

- Start engine.
- Check that the testing conditions are met. Refer to <u>EC-814. "Testing Condition"</u>.
- Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and check that each indication is within the SP value.

NOTE:

#### TROUBLE DIAGNOSIS - SPECIFICATION VALUE [VK45DE] < SERVICE INFORMATION > Check "A/F ALPHA-B1", "A/F ALPHA-B2" for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little. Α OK or NG OK >> GO TO 17. NG (Less than the SP value)>>GO TO 2. EC NG (More than the SP value)>>GO TO 3. 2.check "B/FUEL SCHDL" Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and check that the indication is within the SP value. OK or NG D >> GO TO 4. OK NG (More than the SP value)>>GO TO 19. 3.CHECK "B/FUEL SCHDL" Е Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and check that the indication is within the SP value. OK or NG F OK >> GO TO 6. NG (More than the SP value)>>GO TO 6. NG (Less than the SP value)>>GO TO 25. **4.**CHECK "A/F ALPHA-B1", "A/F ALPHA-B2" Stop the engine. Н Disconnect PCV hose, and then plug it. Start engine. 4. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and check that each indication is within the SP value. OK or NG OK >> GO TO 5. NG >> GO TO 6. 5.CHANGE ENGINE OIL 1. Stop the engine. K 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 L short during winter). The symptom will not be detected after changing engine oil or changing driving conditions.

>> INSPECTION END

#### **6.**CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-766, "Fuel Pressure Check".)

OK or NG

OK >> GO TO 9.

NG (Fuel pressure is too high)>>Replace "fuel level sensor unit and fuel pump (main)". GO TO 8.

NG (Fuel pressure is too low)>>GO TO 7.

#### .DETECT MALFUNCTIONING PART

- Check the following.
- Clogged and bent fuel hose and fuel tube
- Clogged fuel filter
- Fuel pump and its circuit (Refer to EC-1298, "Diagnosis Procedure".)
- If NG, repair or replace the malfunctioning part. If OK, replace "fuel level sensor unit and fuel pump (main)".

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#### < SERVICE INFORMATION >

[VK45DE]

>> GO TO 8.

# 8.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

- Start engine.
- Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and check that each indication is within the SP value.

#### OK or NG

OK >> INSPECTION END

NG >> GO TO 9.

## 9.PERFORM POWER BALANCE TEST

- Perform "POWER BALANCE" in "ACTIVE TEST" mode.
- 2. Check that each cylinder produces a momentary engine speed drop.

#### OK or NG

OK >> GO TO 12.

NG >> GO TO 10.

# 10. DETECT MALFUNCTIONING PART

- Check the following below.
- Ignition coil and its circuit (Refer to EC-1313, "Diagnosis Procedure".)
- Fuel injector and its circuit (Refer to EC-1293, "Diagnosis Procedure".)
- Intake air leakage
- Low compression pressure (Refer to "CHECKING COMPRESSION PRESSURE" in EM-227, "On-Vehicle Service".)
- If NG, repair or replace the malfunctioning part.

If OK, replace malfunctioning fuel injector. (It may be caused by leakage from fuel injector or clogging.)

>> GO TO 11.

# 11. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

- Start engine.
- Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and check that each indication is within the SP value.

#### OK or NG

OK >> INSPECTION END

NG >> GO TO 12.

## 12. CHECK A/F SENSOR 1 FUNCTION

Perform all DTC Confirmation Procedure related with A/F sensor 1.

- For DTC P0130, P0150, refer to <u>EC-907, "DTC Confirmation Procedure"</u>.
  For DTC P0131, P0151, refer to <u>EC-915, "DTC Confirmation Procedure"</u>.
- For DTC P0132, P0152, refer to EC-923, "DTC Confirmation Procedure".
- For DTC P0133, P0153, refer to EC-931, "DTC Confirmation Procedure".
- For DTC P2A00, P2A03, refer to EC-1271, "DTC Confirmation Procedure".

#### OK or NG

OK >> GO TO 15.

NG >> 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", "A/F ALPHA-B2"

- Start engine.
- Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and check that each indication is within the SP value.

#### OK or NG

< SERVICE INFORMATION >	[VK45DE]
OK >> INSPECTION END NG >> GO TO 15.	A
15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR	А
<ol> <li>Stop the engine.</li> <li>Disconnect ECM harness connector.</li> </ol>	EC
3. Check pin terminals and connector for damage, and then reconnect it.	
>> GO TO 16.	C
16.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"	
<ol> <li>Start engine.</li> <li>Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and che indication is within the SP value.</li> </ol>	eck that each
OK or NG OK >> INSPECTION END	Е
OK >> INSPECTION END  NG >> Detect malfunctioning part according to <u>EC-775</u> . "Symptom Matrix Chart".	
17. CHECK "B/FUEL SCHDL"	F
Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and check that the indication is value.	within the SP
OK or NG	G
OK >> INSPECTION END	
NG (More than the SP value)>>GO TO 18. NG (Less than the SP value)>>GO TO 25.	H
18. DETECT MALFUNCTIONING PART	
Check for the cause of large engine friction. Refer to the following.     Engine oil level is too high	
- Engine oil viscosity	
<ul> <li>Belt tension of power steering, alternator, A/C compressor, etc. is excessive</li> <li>Noise from engine</li> </ul>	J
<ul><li>Noise from transmission, etc.</li><li>Check for the cause of insufficient combustion. Refer to the following.</li></ul>	
- Valve clearance malfunction	K
<ul> <li>Intake valve timing control function malfunction</li> <li>Camshaft sprocket installation malfunction, etc.</li> </ul>	
	L
>> Repair or replace malfunctioning part, and then GO TO 30.	
19. CHECK INTAKE SYSTEM	
Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.  • Crushed air ducts	
<ul> <li>Malfunctioning seal of air cleaner element</li> <li>Uneven dirt of air cleaner element</li> </ul>	N
Improper specification of intake air system	
<u>OK or NG</u> OK >> GO TO 21.	C
NG >> Repair or replace malfunctioning part, and then GO TO 20.	
20.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2", AND "B/FUEL SCHDL"	-
Select "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR check that each indication is within the SP value.	R" mode, and
OK or NG	
OK >> INSPECTION END	00.70.07
NG ("B/FUEL SCHDL" is more, "A/F ALPHA-B1", "A/F ALPHA-B2" are less than the SP value) > 21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR	

Revision: 2009 June **EC-819** 2010 M35/M45

[VK45DE]

# < SERVICE INFORMATION >

- Stop the engine.
- Disconnect mass air flow sensor harness connector.
- Check pin terminals and connector for damage and then reconnect it again.

>> GO TO 22.

# 22.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

- Start engine.
- Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and check that each indication is within the SP value.

#### OK or NG

OK Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-877. "Diagnosis Procedure".

GO TO 29.

NG >> GO TO 23.

# 23. CHECK "MAS A/F SE-B1"

Select "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode, and check that the indication is within the SP value.

#### OK or NG

>> GO TO 24. OK

NG (More than the SP value)>>Replace mass air flow sensor, and then GO TO 29.

## 24.REPLACE ECM

- Replace ECM.
- Perform initialization of IVIS(NATS) system and registration of all IVIS(NATS) ignition key IDs. Refer to BL-224, "ECM Re-Communicating Function".
- Perform EC-764, "VIN Registration".
- 4. Perform EC-764, "Accelerator Pedal Released Position Learning".
- Perform <u>EC-764</u>, "<u>Throttle Valve Closed Position Learning</u>".
   Perform <u>EC-765</u>, "<u>Idle Air Volume Learning</u>".

>> GO TO 29.

# 25. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal in air cleaner element
- Uneven dirt in air cleaner element
- Improper specification in intake air system

#### OK or NG

OK >> GO TO 27.

NG >> Repair or replace malfunctioning part, and then GO TO 26.

## 26.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and check that the indication is within the SP value.

#### OK or NG

#### >> INSPECTION END

NG (Less than the SP value)>>GO TO 27.

## **2 1.** CHECK "MAS A/F SE-B1"

Select "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode, and check that the indication is within the SP value.

#### OK or NG

OK >> GO TO 28.

NG (Less than the SP value)>>Replace mass air flow sensor, and then GO TO 30.

**EC-820** Revision: 2009 June 2010 M35/M45

< SERVICE INFORMATION >

28. CHECK INTAKE SYSTEM

Check for the cause of air leakage after the mass air flow sensor. Refer to the following.

- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks in PCV valve
- Disconnection or cracks in EVAP purge hose, stuck open EVAP canister purge volume control solenoid valve
- Malfunctioning seal in rocker cover gasket
- Disconnection, looseness, or cracks in hoses, such as a vacuum hose, connecting to intake air system parts
- Malfunctioning seal in intake air system, etc.

>> GO TO 30.

# $29.\mathtt{CHECK}$ "A/F ALPHA-B1", "A/F ALPHA-B2", AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and check that each indication is within the SP value.

#### OK or NG

OK >> INSPECTION END

NG >> Detect malfunctioning part according to <a href="EC-775">EC-775</a>, "Symptom Matrix Chart".

## 30.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and then check that the indication is within the SP value.

#### OK or NG

OK >> INSPECTION END

NG >> Detect malfunctioning part according to EC-775, "Symptom Matrix Chart". EC

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**EC-821** Revision: 2009 June 2010 M35/M45

## TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

< SERVICE INFORMATION >

[VK45DE]

## TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

Description INFOID:0000000005353939

Intermittent incidents may occur. In many cases, the malfunction resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of intermittent incidents occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

Common Intermittent Incidents Report Situations

STEP in Work Flow	Situation		
2	The CONSULT-III is used. The SELF DIAGNOSTIC RESULT screen shows time data other than [0] or [1t]		
3 or 4	The symptom described by the customer does not recur.		
5	5 (1st trip) DTC does not appear during the DTC Confirmation Procedure.		
10	The Diagnostic Procedure for PXXXX does not indicate the malfunctioning area.		

## Diagnosis Procedure

INFOID:0000000005353940

## 1.INSPECTION START

Erase (1st trip) DTCs. Refer to "How to Erase DTC" in EC-735, "Emission-Related Diagnostic Information".

>> GO TO 2.

## 2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.

Refer to EC-828, "Ground Inspection".

#### OK or NG

OK >> GO TO 3.

NG >> Repair or replace malfunctioning part.

# 3. SEARCH FOR ELECTRICAL INCIDENT

Perform GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident", "INCIDENT SIMULATION TESTS".

#### OK or NG

OK >> GO TO 4.

NG >> Repair or replace malfunctioning part.

#### 4. CHECK CONNECTOR TERMINALS

Refer to GI-23, "How to Check Terminal", "HOW TO PROBE CONNECTORS", "How to Check Enlarged Contact Spring of Terminal".

#### OK or NG

OK >> INSPECTION END

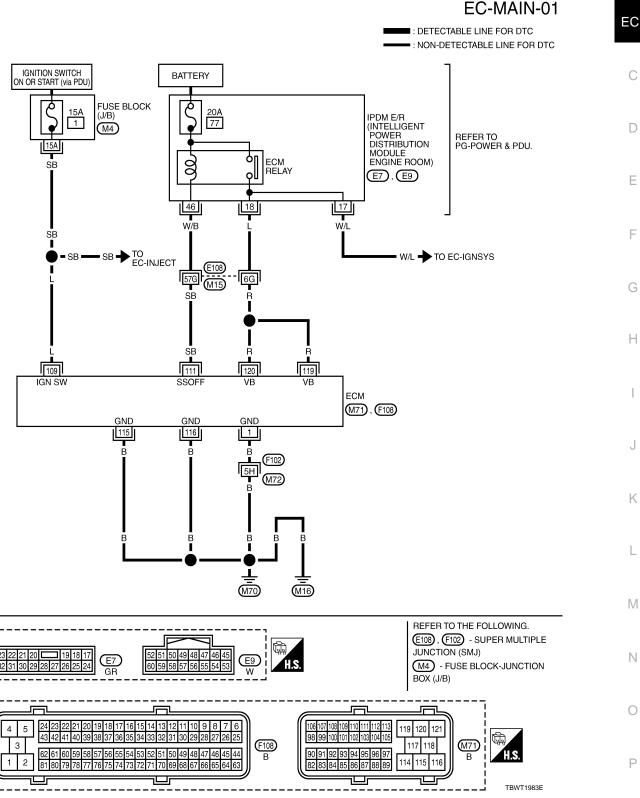
NG >> Repair or replace malfunctioning part.

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## POWER SUPPLY AND GROUND CIRCUIT





Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Never 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.

#### < SERVICE INFORMATION >

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	В	ECM ground	[Engine is running] • Idle speed	Body ground
109		Ignition switch	[Ignition switch: OFF]	0 V
	L		[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
111	SB	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5 V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
115 116	B B	ECM ground	[Engine is running] • Idle speed	Body ground
119 120	R R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

## Diagnosis Procedure

INFOID:0000000005353942

# 1. INSPECTION START

Start engine.

#### Is engine running?

#### Yes or No

Yes >> GO TO 8. No >> GO TO 2.

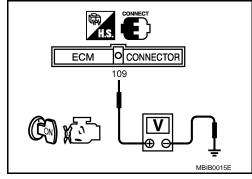
# 2.CHECK ECM POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF and then ON.
- 2. Check voltage between ECM terminal 109 and ground with CONSULT-III or tester.

#### **Voltage: Battery voltage**

#### OK or NG

OK >> GO TO 4. NG >> GO TO 3.



# 3.DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M4
- 15 A fuse
- · Harness for open or short between ECM and fuse
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

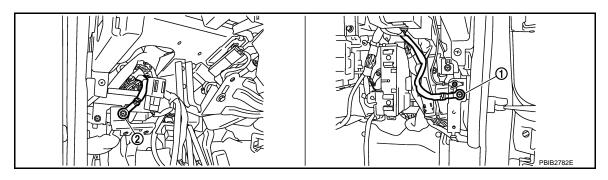
## 4. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".

#### POWER SUPPLY AND GROUND CIRCUIT

#### < SERVICE INFORMATION >





1. Body ground M70

2. Body ground M16

#### OK or NG

OK >> GO TO 5.

NG >> Repair or replace ground connections.

## ${f 5.}$ CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

- 1. Disconnect ECM harness connector.
- 2. Check harness continuity between ECM terminals 1, 115, 116 and ground. Refer to Wiring Diagram.

#### Continuity should exist.

Also check harness for short to power.

#### OK or NG

OK >> GO TO 7. NG >> GO TO 6.

## 6. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors F102, M72
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

## 7. CHECK ECM POWER SUPPLY CIRCUIT-II

- 1. Reconnect ECM harness connector.
- Turn ignition switch ON.
- 3. Check voltage between IPDM E/R terminal 17 and ground with CONSULT-III or tester.

#### **Voltage: Battery voltage**

#### OK or NG

OK >> Go to EC-1313, "Diagnosis Procedure".

NG >> GO TO 8.

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# 8. CHECK ECM POWER SUPPLY CIRCUIT-III

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON and then turn OFF.

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#### POWER SUPPLY AND GROUND CIRCUIT

#### < SERVICE INFORMATION >

[VK45DE]

Check voltage between ECM terminals 119, 120 and ground with CONSULT-III or tester.

Voltage: After turning ignition switch OFF, battery

voltage will exist for a few seconds, then drop

approximately 0V.

#### OK or NG

OK >> GO TO 15.

NG (Battery voltage does not exist.)>>GO TO 9.

NG (Battery voltage exists for more than a few seconds.)>>GO TO

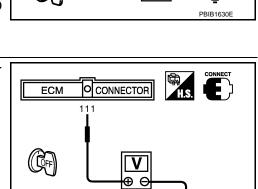


Check voltage between ECM terminal 111 and ground with CON-SULT-III or tester.

#### Voltage: Battery voltage

## OK or NG

OK >> GO TO 10. NG >> GO TO 12.



CONNECTOR

119, 120

# 10. CHECK ECM POWER SUPPLY CIRCUIT-V

- 1. Disconnect ECM harness connector.
- 2. Disconnect IPDM E/R harness connector E7.
- 3. Check harness continuity between ECM terminals 119, 120 and IPDM E/R terminal 18. Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 18. NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness or connectors E108, M15
- 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.
- Disconnect IPDM E/R harness connector E9.
- Check harness continuity between ECM terminal 111 and IPDM E/R terminal 46. Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 14. NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

#### POWER SUPPLY AND GROUND CIRCUIT [VK45DE] < SERVICE INFORMATION > Check the following. Harness or connectors E108, M15 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.

# 14. CHECK 20 A FUSE

- Disconnect 20 A fuse from IPDM E/R.
- 2. Check 20 A fuse.

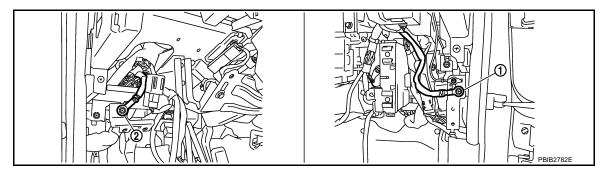
#### OK or NG

OK >> GO TO 18.

NG >> Replace 20 A fuse.

# 15. CHECK GROUND CONNECTIONS

Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

#### OK or NG

OK >> GO TO 16.

NG >> Repair or replace ground connections.

# 16.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

- 1. Disconnect ECM harness connector.
- Check harness continuity between ECM terminals 1, 115, 116 and ground. Refer to Wiring Diagram.

#### Continuity should exist.

Also check harness for short to power.

#### OK or NG

>> GO TO 18. OK NG >> GO TO 17.

17. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness or connectors F102, M72
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

**EC-827** 

# 18. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### OK or NG

OK >> Replace IPDM E/R.

NG >> Repair open circuit or short to power in harness or connectors. EC

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2010 M35/M45

#### **POWER SUPPLY AND GROUND CIRCUIT**

[VK45DE]

## **Ground Inspection**

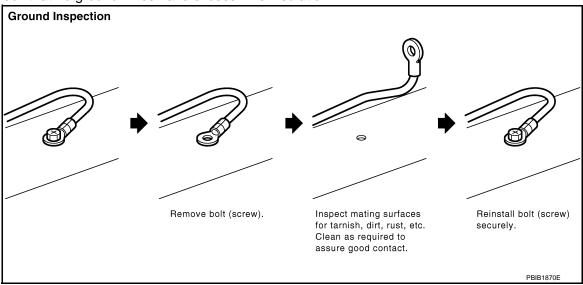
INFOID:0000000005353943

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.

Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.

When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- · Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- · Reinstall bolt or screw securely.
- Inspect for "add-on" accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Check that all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet, check that no ground wires have excess wire insulation.



#### **DTC U0101 CAN COMMUNICATION LINE**

< SERVICE INFORMATION >

[VK45DE]

## DTC U0101 CAN COMMUNICATION LINE

Description INFOID:0000000005353944

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.

### On Board Diagnosis Logic

INFOID:0000000005353945

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0101 0101	Lost communication with TCM	When ECM is not transmitting or receiving CAN communication signal of OBD (emission-related diagnosis) with TCM for 2 seconds or more.	CAN communication line between TCM and ECM (CAN communication line is open or shorted)

#### **DTC Confirmation Procedure**

INFOID:0000000005353946

- 1. Turn ignition switch ON and wait at least 3 seconds.
- 2. Check DTC.
- If DTC is detected, go to <u>EC-830, "Diagnosis Procedure"</u>.

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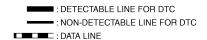
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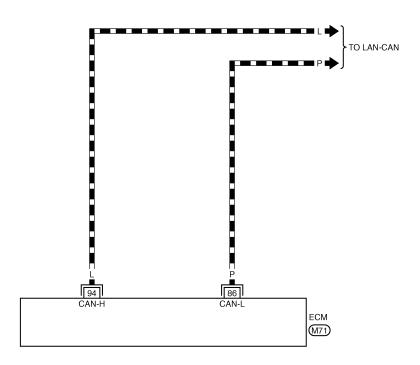
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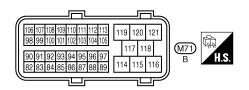
Wiring Diagram

INFOID:0000000005353947

### EC-CAN-01







TBWT1011E

## Diagnosis Procedure

INFOID:0000000005353948

Go to LAN-20, "Trouble Diagnosis Flow Chart".

#### **DTC U1001 CAN COMMUNICATION LINE**

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## **DTC U1001 CAN COMMUNICATION LINE**

Description INFOID:00000000053533949

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.

### On Board Diagnosis Logic

INFOID:0000000005353950

#### The MIL will not illuminate for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1001 1001	CAN communication line	When ECM is not transmitting or receiving CAN communication signal other than OBD (emission-related diagnosis) for 2 seconds or more.	Harness or connectors (CAN communication line is open or shorted)

#### **DTC Confirmation Procedure**

INFOID:000000000535395

- 1. Turn ignition switch ON and wait at least 3 seconds.
- 2. Check 1st trip DTC.
- If 1st trip DTC is detected, go to <u>EC-832, "Diagnosis Procedure"</u>.

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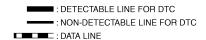
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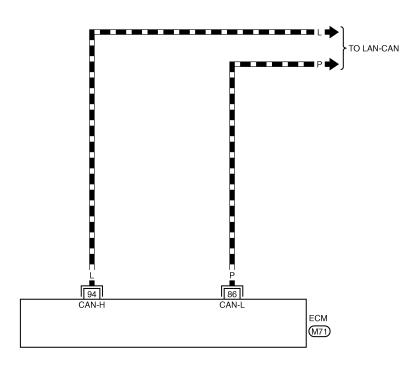
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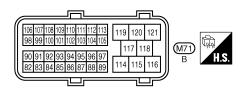
Wiring Diagram

INFOID:0000000005353952

### EC-CAN-01







TBWT1011E

## Diagnosis Procedure

INFOID:0000000005353953

Go to LAN-20, "Trouble Diagnosis Flow Chart".

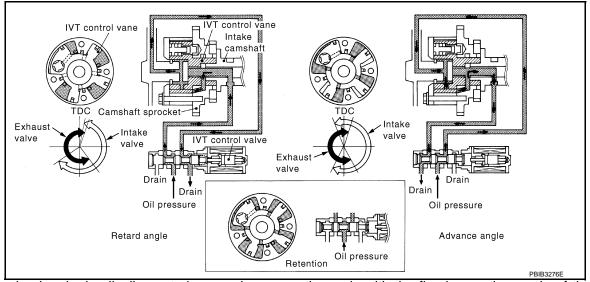
## DTC P0011, P0021 IVT CONTROL

**Description** 

#### SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed			
Intake valve timing control position sensor	Intake valve timing signal	Intake valve timing control	Intake valve timing control solenoid valve	
Engine coolant temperature sensor	Engine coolant temperature	Control	Soleriola valve	
Unified meter and A/C amp.	Vehicle speed*			

<sup>\*:</sup> This signal is sent to the ECM via the CAN communication line



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.

#### COMPONENT INSPECTION

Intake Valve Timing Control Solenoid Valve

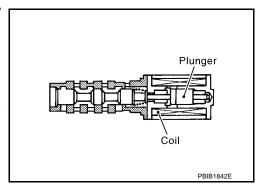
Intake Valve Timing (IVT) control solenoid valve is activated by ON/ OFF pulse duty (ratio) signals from the ECM.

The IVT 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.



Intake Valve Timing Control Position Sensor

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#### < SERVICE INFORMATION >

Intake valve timing control position sensors are located in the front of cylinder heads in both bank 1 and bank 2.

This sensor uses a Hall IC.

The cam position is determined by the intake primary cam sprocket concave (in three places). The ECM provides feedback to the intake valve timing control for appropriate target valve open-close timing according to drive conditions based on detected cam position.



#### CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005353955

[VK45DE]

Specification data are reference values.

MONITOR ITEM	Co	ONDITION	SPECIFICATION
IN IT 0 ( TIM ( D 4 )	Engine: After warming up	Idle	–5 - 5°CA
INT/V TIM (B1) INT/V TIM (B2)	<ul><li>Selector lever position: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,000 rpm	Approx. 0 - 20°CA
NT0 ( 00) (D4)	Engine: After warming up	Idle	0 - 2%
INT/V SOL (B1) INT/V SOL (B2)	<ul><li>Selector lever position: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,000 rpm	Approx. 25 - 50%

## On Board Diagnosis Logic

INFOID:0000000005353956

#### NOTE:

- If DTC P0011 or P0021 is displayed with DTC P0075 or P0081, first perform the trouble diagnosis for DTC P0075, P0081 (Refer to EC-860, "DTC Confirmation Procedure").
- If DTC P0011 or P0021 is displayed with DTC P1140 or P1145, first perform the trouble diagnosis for DTC P1140, P1145 (Refer to <u>EC-1131</u>, "<u>DTC Confirmation Procedure</u>").

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
P0011 0011 (Bank 1)		Α	The alignment of the intake valve timing control has been misresistered.	Harness or connectors     (Intake valve timing control solenoid valve circuit is open or shorted.)
P0021 0021 (Bank 2)	Intake valve timing control performance	В	There is a gap between angle of target and phase-control angle degree.	<ul> <li>Harness or connectors         (Intake valve timing control position sensor circuit is open or shorted.)</li> <li>Intake valve timing control solenoid valve</li> <li>Intake valve timing control position sensor</li> <li>Crankshaft position sensor (POS)</li> <li>Camshaft position sensor (PHASE)</li> <li>Accumulation of debris to the signal pick-up portion of the camshaft sprocket</li> <li>Timing chain installation</li> <li>Foreign matter caught in the oil groove for intake valve timing control</li> </ul>

#### **FAIL-SAFE MODE**

When the malfunction is detected, the ECM enters fail-safe mode.

Detected items	Engine operating condition in fail-safe mode	
Intake valve timing control	The signal is not energized to the solenoid valve and the valve control does not function	

#### **DTC Confirmation Procedure**

INFOID:0000000005353957

#### **CAUTION:**

Always drive at a safe speed.

Revision: 2009 June **EC-834** 2010 M35/M45

#### DTC P0011, P0021 IVT CONTROL

#### < SERVICE INFORMATION >

NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10V and 16V at idle.

#### PROCEDURE FOR MALFUNCTION A

- Start engine and warm it up to normal operating temperature.
- Maintain the following conditions for at least 10 consecutive seconds.

Engine speed	1,200 - 2,000 rpm (A constant rotation is maintained.)	
Engine coolant temperature	More than 70°C (158°F)	
Selector lever	1st or 2nd position	
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)	

3. Maintain the following conditions for at least 20 consecutive seconds.

Engine speed	Idle
Engine coolant temperature	More than 70°C (158°F)
Selector lever	P or N position

- Check 1st trip DTC.
- If 1st trip DTC is detected, go to EC-839, "Diagnosis Procedure".

#### PROCEDURE FOR MALFUNCTION B

- Start engine and warm it up to normal operating temperature.
- Maintain the following conditions for at least 10 consecutive seconds. 2.

Engine speed	1,700 - 3,175 rpm (A constant rotation is maintained.)	
Engine coolant temperature	70 - 105°C (158 - 221°F)	
Selector lever	1st or 2nd position	
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)	

- Check 1st trip DTC.
- If 1st trip DTC is detected, go to EC-839, "Diagnosis Procedure".

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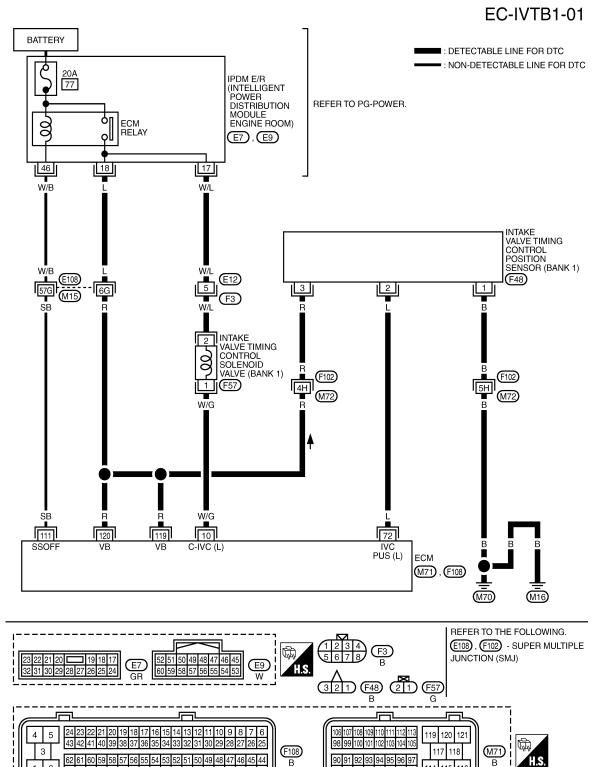
**EC-835** Revision: 2009 June 2010 M35/M45

## Wiring Diagram

INFOID:0000000005353958

TBWT1984E

#### BANK 1



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III. CAUTION:

## DTC P0011, P0021 IVT CONTROL

< SERVICE INFORMATION >

[VK45DE]

Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	EC	
		W/G Intake valve timing control solenoid valve (bank 1)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)	С	
10	W/G		[Engine is running] • Warm-up condition • Engine speed: 2,000rpm	7 - 12 V*	D E	
				2310.0 V/Div PBIB1790E	F	
			Warm-up coi     Idle speed	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	0 - 1.0 V★	G
72	L	Intake valve timing control position sensor (bank 1)	[Engine is running] • Engine speed: 2,000rpm	0 - 1.0 V★	J	
111	SB	ECM relay	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5 V	K L	
		(Self shut-off)	[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)	M	
119 120	R R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	íVI	

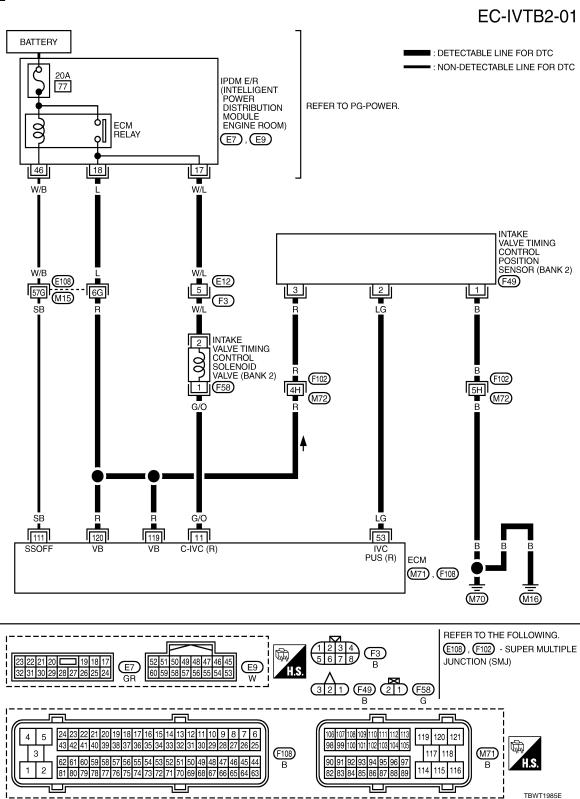
<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

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BANK 2



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

CAUTION:

Never 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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TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
			[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
11	G/O	Intake valve timing control solenoid valve (bank 2)	[Engine is running] • Warm-up condition • Engine speed: 2,000rpm	7 - 12 V★
		Intake valve timing control	[Engine is running] • Warm-up condition • Idle speed	0 - 1.0 V★
53	LG	position sensor (bank 2)	[Engine is running] • Engine speed: 2,000 rpm	0 - 1.0 V★
111	SB	SB ECM relay	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5 V
	(Self shut-off)		[Ignition switch: OFF]  • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
119 120	R R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# 1. CHECK OIL PRESSURE WARNING LAMP

1. Start engine.

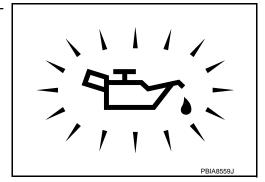
2. Check oil pressure warning lamp and confirm it is not illuminated.

#### OK or NG

OK >> GO TO 2.

Diagnosis Procedure

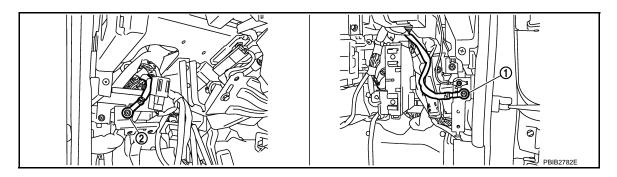
NG >> Go to <u>LU-24</u>, "Inspection".



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## 2.check ground connections

- 1. Turn ignition switch OFF.
- 2. Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

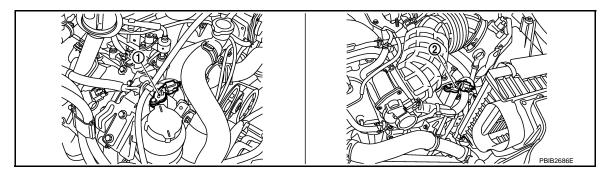
#### OK or NG

OK >> GO TO 3.

NG >> Repair or replace ground connections.

## 3.check intake valve timing control position sensor power supply circuit

1. Disconnect intake valve timing control position sensor harness connector.

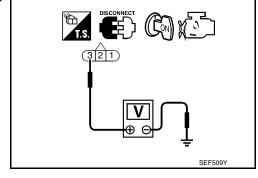


- Intake valve timing control position sensor (bank 2)
- 2. Intake valve timing control position sensor (bank 1)
- 2. Turn ignition switch ON.
- Check voltage between intake valve timing control position sensor terminal 3 and ground with CONSULT-III or tester.

#### Voltage: Battery voltage

#### OK or NG

OK >> GO TO 5. NG >> GO TO 4.



## 4. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E108, M15
- Harness connectors F102, M72
- Harness for open or short between intake valve timing control position sensor and ECM
- Harness for open or short between intake valve timing control position sensor and IPDM E/R

#### DTC P0011, P0021 IVT CONTROL

#### < SERVICE INFORMATION >

[VK45DE]

>> Repair open circuit or short to ground or short to power in harness or connectors.

# 5. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- Check harness continuity between intake valve timing control position sensor terminal 1 and ground. Refer to Wiring Diagram.

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#### Continuity should exist.

3. Also check harness for short to power.

#### OK or NG

OK >> GO TO 7. NG >> GO TO 6. D

#### 6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F102, M72
- · Harness for open or short between intake valve timing control position sensor and ground

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>> Repair open circuit or short to power in harness or connectors.

# 7.CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect ECM harness connector.
- Check harness continuity between the following;
   ECM terminal 72 and intake valve timing control position sensor (bank 1) terminal 2 or
   ECM terminal 53 and intake valve timing control position sensor (bank 2) terminal 2.
   Refer to Wiring Diagram.

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#### Continuity should exist.

3. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

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## 8.CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR

#### Refer to EC-843, "Component Inspection".

#### OK or NG

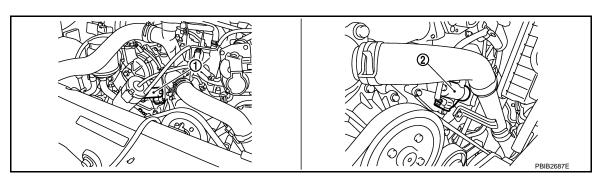
OK >> GO TO 9.

NG >> Replace intake valve timing control position sensor.

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## 9. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- 1. Reconnect ECM harness connector.
- 2. Disconnect intake valve timing control solenoid valve harness connector.



Intake valve timing control solenoid valve (bank 2)

Intake valve timing control solenoid valve (bank 1)

Revision: 2009 June **EC-841** 2010 M35/M45

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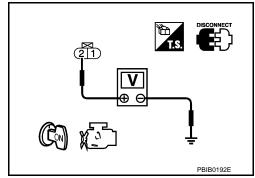
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- 3. Turn ignition switch ON.
- 4. Check voltage between intake valve timing control solenoid valve terminal 2 and ground with CONSULT-III or tester.

#### Voltage: Battery voltage

#### OK or NG

OK >> GO TO 11. NG >> GO TO 10.



## 10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R.
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

# 11. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect ECM harness connector.
- Check harness continuity between the following;
   FCM terminal 10 and intake valve timing control soleno

ECM terminal 10 and intake valve timing control solenoid valve (bank 1) terminal 1 or ECM terminal 11 and intake valve timing control solenoid valve (bank 2) terminal 1.

Refer to Wiring Diagram.

#### Continuity should exist.

3. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 12.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 12. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-843, "Component Inspection".

#### OK or NG

OK >> GO TO 13.

NG >> Replace intake valve timing control solenoid valve.

## 13. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-1018, "Component Inspection".

#### OK or NG

OK >> GO TO 14.

NG >> Replace crankshaft position sensor (POS).

## 14. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-1024, "Component Inspection".

#### OK or NG

OK >> GO TO 15.

NG >> Replace camshaft position sensor (PHASE).

## 15. CHECK CAMSHAFT SPROCKET

Check accumulation of debris to the signal pick-up portion of the camshaft sprocket. Refer to <u>EM-211</u>, <u>"Removal and Installation"</u>.

#### OK or NG

OK >> GO TO 16.

### DTC P0011, P0021 IVT CONTROL

< SERVICE INFORMATION >

[VK45DE]

NG >> Remove debris and clean the signal pick-up cutout of camshaft sprocket.

## 16. CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

#### Are there any service records that may cause timing chain misaligned?

#### Yes or No

Yes >> Check timing chain installation. Refer to EM-200, "Removal and Installation".

No >> GO TO 17.

## 17. CHECK LUBRICATION CIRCUIT

Refer to "Inspection of Camshaft Sprocket (INT) Oil Groove" in EM-211, "Component".

#### OK or NG

OK >> GO TO 18.

NG >> Clean lubrication line.

## 18. CHECK INTERMITTENT INCIDENT

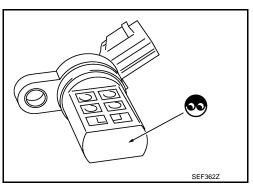
Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

### Component Inspection

#### INTAKE VALVE TIMING CONTROL POSITION SENSOR

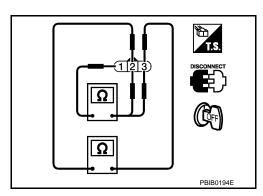
- 1. Disconnect intake valve timing control position sensor harness connector.
- 2. Loosen the fixing bolt of the sensor.
- 3. Remove the sensor.
- 4. Visually check the sensor for chipping.



Check resistance as per the following.

Terminal No. (Polarity)	Resistance [at 25°C (77°F)]
3 (+) - 1 (-)	
2 (+) - 1 (-)	Except 0 or $\infty \Omega$
3 (+) - 2 (-)	

6. If NG, replace intake valve timing control position sensor.



#### INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Disconnect intake valve timing control solenoid valve harness connector.

Revision: 2009 June **EC-843** 2010 M35/M45

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#### DTC P0011, P0021 IVT CONTROL

#### < SERVICE INFORMATION >

[VK45DE]

2. Check resistance between intake valve timing control solenoid valve terminals as per the following.

Terminals	Resistance [at 20°C (68°F)]
1 and 2	7.0 - 7.5 Ω
1 or 2 and ground	$\stackrel{\scriptstyle \sim \; \Omega}{\text{(Continuity should not exist)}}$

If NG, replace intake valve timing control solenoid valve. If OK, go to next step.

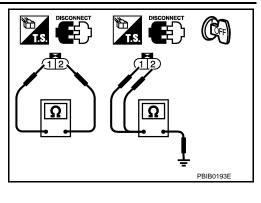
- 3. Remove intake valve timing control solenoid valve.
- 4. Provide 12V DC between intake valve timing control solenoid valve terminals and then interrupt it. Check that the plunger moves as shown in the figure.

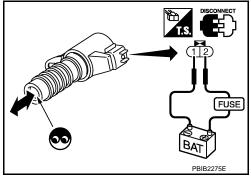
#### **CAUTION:**

Never apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

If NG, replace intake valve timing control solenoid valve. **NOTE:** 

Always replace O-ring when intake valve timing control solenoid valve is removed.





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#### Removal and Installation

INTAKE VALVE TIMING CONTROL POSITION SENSOR Refer to EM-199, "Component".

INTAKE VALVE TIMING CONTROL SOLENOID VALVE Refer to EM-199, "Component".

< SERVICE INFORMATION >

[VK45DE]

## DTC P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

Description INFOID:0000000005353962

#### SYSTEM DESCRIPTION

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Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Air fuel ratio (A/F) sensor 1 heater control	Air fuel ratio (A/F) sensor 1
Mass air flow sensor	Amount of intake air	neater control	ricater

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.

#### CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005353963

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F S1 HTR (B1) A/F S1 HTR (B2)	Engine: After warming up, idle the engine	0 - 100%

### On Board Diagnosis Logic

INFOID:0000000005353964

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031 0031 (Bank 1)	Air fuel ratio (A/F) sensor 1	The current amperage in the A/F sensor 1 heater circuit is out of the normal range.	Harness or connectors     (The A/F sensor 1 heater circuit is open or shorted.)     A/F sensor 1 heater
P0051 0051 (Bank 2)	heater control circuit low	(An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)	
P0032 0032 (Bank 1)	Air fuel ratio (A/F) sensor 1	The current amperage in the A/F sensor 1 heater circuit is out of the normal range.	Harness or connectors  (The A/E appear 1 heater giravit is aborted.)
P0052 0052 (Bank 2)	heater control circuit high	(An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)	<ul><li>(The A/F sensor 1 heater circuit is shorted.)</li><li>A/F sensor 1 heater</li></ul>

#### **DTC Confirmation Procedure**

INFOID:0000000005353965

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is between 11V and 16V at idle.

- Turn ignition switch ON and wait at least 5 seconds.
- Check 1st trip DTC.
- If 1st trip DTC is detected, go to EC-849, "Diagnosis Procedure".

**EC-845** Revision: 2009 June 2010 M35/M45

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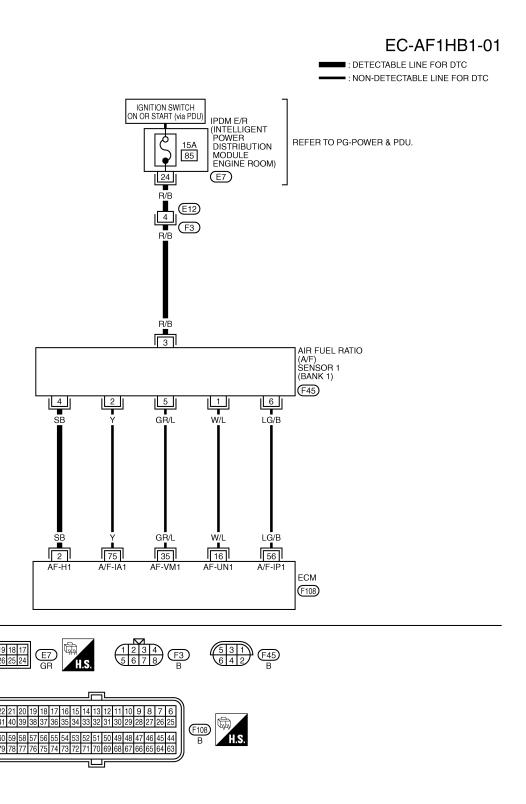
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[VK45DE]

Wiring Diagram

INFOID:0000000005353966

BANK 1



TBWT1033E

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III. CAUTION:

< SERVICE INFORMATION >

[VK45DE]

Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	SB	A/F sensor 1 heater (bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5 V★  → 10.0V/Div 10 ms/Div T  PBIB1584E
16	W/L			Approximately 3.1 V
35	GR/L	A/F sensor 1 (bank 1)	[Engine is running]  • Warm-up condition	Approximately 2.6 V
56	LG/B	All School (Dalik I)	Idle speed	Approximately 2.3 V
75	Υ			Approximately 2.3 V

 $<sup>\</sup>bigstar$ : Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

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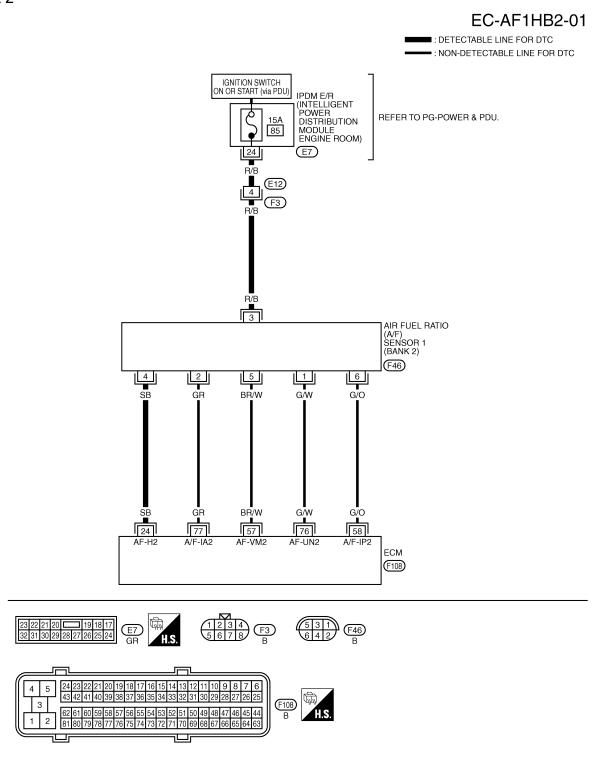
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BANK 2



TBWT1034E

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

#### **CAUTION:**

Never 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.

< SERVICE INFORMATION >

[VK45DE]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	SB	A/F sensor 1 heater (bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5 V★  → 10.0V/Div 10 ms/Div T  PBIB1584E
57	BR/W			Approximately 2.6V
58	G/O	A/E concer 1 (book 2)	[Engine is running]  • Warm-up condition	Approximately 2.3 V
76	G/W	A/F sensor 1 (bank 2)	Warm-up condition     Idle speed	Approximately 3.1 V
77	GR			Approximately 2.3 V

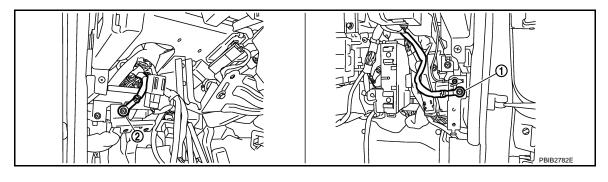
<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

## 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

2. Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".



1. Body ground M70

2. Body ground M16

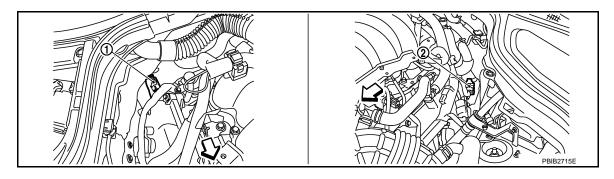
#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

## 2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



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< SERVICE INFORMATION >

1. A/F sensor 1 (bank 2) harness connector

2. A/F sensor 1 (bank 1) harness connector

Turn ignition switch ON.

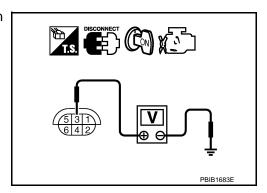
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Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-III or tester.

#### Voltage: Battery voltage

#### OK or NG

>> GO TO 4. OK NG >> GO TO 3.



[VK45DE]

## 3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- IPDM E/R harness connector E7
- 15 A fuse
- Harness for open or short between A/F sensor 1 and fuse

#### >> Repair or replace harness or connectors.

## 4. CHECK A/F SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check harness continuity between the following; ECM terminal 2 and A/F sensor 1 (bank 1) terminal 4 or ECM terminal 24 and A/F sensor 1 (bank 2) terminal 4. Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 5.

NG >> 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-851, "Component Inspection".

#### OK or NG

OK >> GO TO 6. NG >> GO TO 7.

### 6.CHECK INTERMITTENT INCIDENT

Perform EC-822, "Diagnosis Procedure".

#### OK or NG

OK >> GO TO 7.

NG >> Repair or replace malfunctioning part.

7.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

### Replace air fuel ratio (A/F) sensor 1.

#### CAUTION:

 Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

< SERVICE INFORMATION >

[VK45DE]

• Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

#### >> INSPECTION END

### Component Inspection

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AIR FUEL RATIO (A/F) SENSOR 1 HEATER Check resistance between terminals 3 and 4.

#### Resistance: 2.3 - $4.3\Omega$ [at 25°C (77°F)]

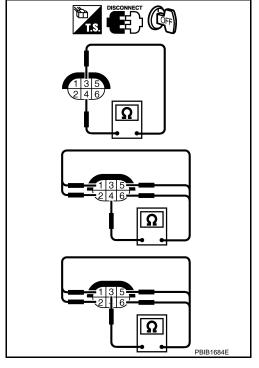
Check continuity between terminals 3 and 1, 2, 5, 6, terminals 4 and 1, 2, 5, 6.

#### Continuity should not exist.

If NG, replace the A/F sensor 1.

#### **CAUTION:**

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).



Removal and Installation

AIR FUEL RATIO (A/F) SENSOR 1 Refer to EM-178, "Component".

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Revision: 2009 June **EC-851** 2010 M35/M45

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### DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >

[VK45DE]

## DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

Description INFOID:00000000053533970

#### SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator	
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	' '   Endine speed			
Engine coolant temperature sensor	Engine coolant temperature	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater	
Mass air flow sensor	Amount of intake air			

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

#### **OPERATION**

Engine speed	Heated oxygen sensor 2 heater
Above 3,600 rpm	OFF
Below 3,600 rpm after the following conditions are met.  Engine: After warming up  Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

#### CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005353971

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	<ul> <li>Engine speed: Below 3,600 rpm after the following conditions are met.</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	ON
	Engine speed: Above 3,600 rpm	OFF

## On Board Diagnosis Logic

INFOID:0000000005353972

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037 0037 (Bank 1)	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range.	Harness or connectors     (The heated oxygen sensor 2 heater circuit)
P0057 0057 (Bank 2)		er control circuit low (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	<ul><li>is open or shorted.)</li><li>Heated oxygen sensor 2 heater</li></ul>
P0038 0038 (Bank 1)	Heated oxygen sensor 2 heater control circuit high	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range.	Harness or connectors     (The heated oxygen sensor 2 heater circuit)
P0058 0058 (Bank 2)		(An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	is shorted.)  • Heated oxygen sensor 2 heater

### **DTC Confirmation Procedure**

INFOID:0000000005353973

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.

### DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >

[VK45DE]

3. Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is between 11 V and 16 V at idle.

- 1. Turn ignition switch ON and wait at least 5 seconds.
- 2. Check 1st trip DTC.
- 3. If 1st trip DTC is detected, go to EC-857, "Diagnosis Procedure".

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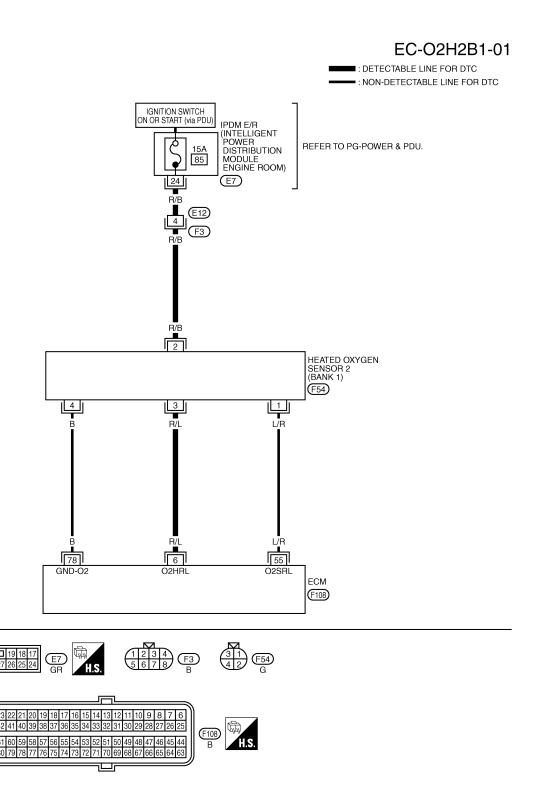
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Wiring Diagram

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BANK 1



TBWT1014E

Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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 P0037, P0038, P0057, P0058 HO2S2 HEATER

< SERVICE INFORMATION >

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TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	R/L	Heated oxygen sensor 2 heater (bank 1)	<ul> <li>[Engine is running]</li> <li>Engine speed: Below 3,600 rpm after the following conditions are met</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0 V
			[Ignition switch: ON] • Engine: Stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
55	L/R	Heated oxygen sensor 2 (bank 1)	<ul> <li>[Engine is running]</li> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - Approximately 1.0 V
78	В	Sensor ground (Heated oxygen sensor 2)	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Approximately 0 V

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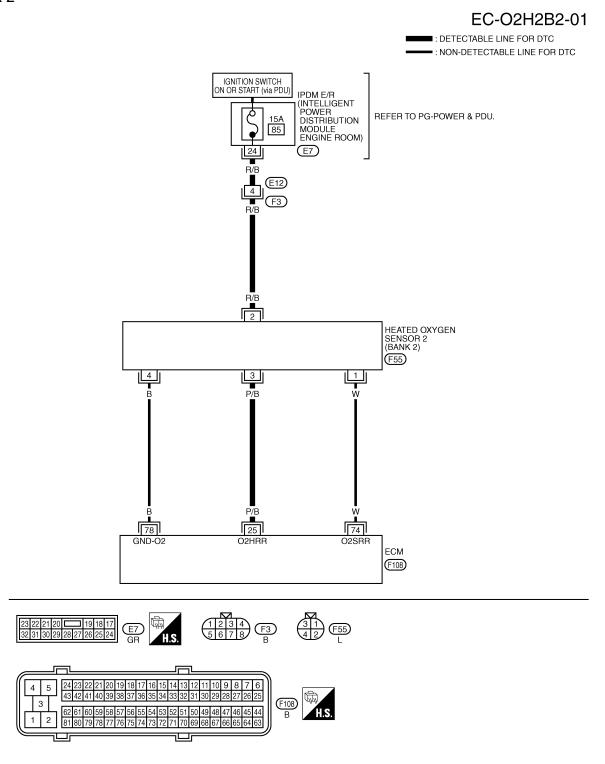
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BANK 2



TBWT1015E

Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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 P0037, P0038, P0057, P0058 HO2S2 HEATER

#### < SERVICE INFORMATION >

[VK45DE]

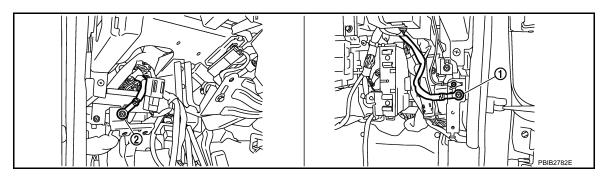
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	P/B	Heated oxygen sensor 2 heater (bank 2)	<ul> <li>[Engine is running]</li> <li>Engine speed: Below 3,600 rpm after the following conditions are met</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0 V
			[Ignition switch: ON] • Engine: Stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
74	W	Heated oxygen sensor 2 (bank 2)	<ul> <li>[Engine is running]</li> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - Approximately 1.0 V
78	В	Sensor ground (Heated oxygen sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V

## Diagnosis Procedure

## 1. CHECK GROUND CONNECTIONS

Turn ignition switch OFF.

Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

## 2.CHECK HEATED OXYGEN SENSOR 2 HEATER POWER SUPPLY CIRCUIT

Disconnect heated oxygen sensor 2 (HO2S2) harness connector.

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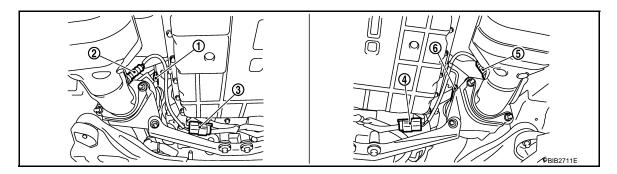
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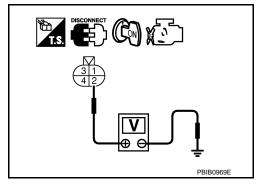
- 1. Air fuel ratio (A/F) sensor 1 (bank 1) 2. Heated oxygen sensor 2 (bank 1)
- 4. Heated oxygen sensor 2 (bank 2) harness connector
- 5. Heated oxygen sensor 2 (bank 2)
- Heated oxygen sensor 2 (bank 1) harness connector
- 6. Air fuel ratio (A/F) sensor 1 (bank 2)

- Turn ignition switch ON.
- Check voltage between HO2S2 terminal 2 and ground with CONSULT-III or tester.

#### **Voltage: Battery voltage**

#### OK or NG

OK >> GO TO 4. NG >> GO TO 3.



## 3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- IPDM E/R connector E7
- 15 A fuse
- · 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 HEATER OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
ыс	ECM	Sensor	Dank
P0037, P0038	6	3	1
P0057, P0058	25	3	2

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

### 5. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-859, "Component Inspection".

### DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

**EC-859** 

< SERVICE INFORMATION >

OK or NG

OK >> GO TO 6.

NG >> Replace malfunctioning heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

### >> INSPECTION END

### Component Inspection

#### **HEATED OXYGEN SENSOR 2 HEATER**

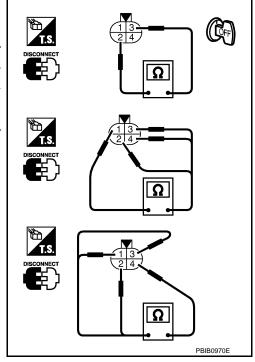
 Check resistance between HO2S2 terminals as per the following.

Terminal No.	Resistance	
2 and 3	5.0 - 7.0 Ω [at 25°C (77°F)]	
1 and 2, 3, 4	∞ Ω	
4 and 1, 2, 3	(Continuity should not exist)	

2. If NG, replace heated oxygen sensor 2.

#### **CAUTION:**

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new heated oxygen sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).



#### Removal and Installation

**HEATED OXYGEN SENSOR 2** 

Refer to EM-178, "Component".

Revision: 2009 June

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#### DTC P0075, P0081 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VK45DE]

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## DTC P0075, P0081 IVT CONTROL SOLENOID VALVE

## **Component Description**

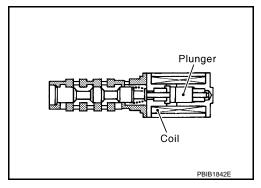
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

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.



#### INFOID:0000000005353979

#### CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL (B1) INT/V SOL (B2)	Engine: After warming up	Idle	0 - 2%
	<ul><li>Selector lever position: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,000 rpm	Approx. 25 - 50%

## On Board Diagnosis Logic

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DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0075 0075 (Bank 1) P0081 0081 (Bank 2)	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	Harness or connectors     (Intake valve timing control solenoid valve circuit is open or shorted.)     Intake valve timing control solenoid valve

#### **DTC Confirmation Procedure**

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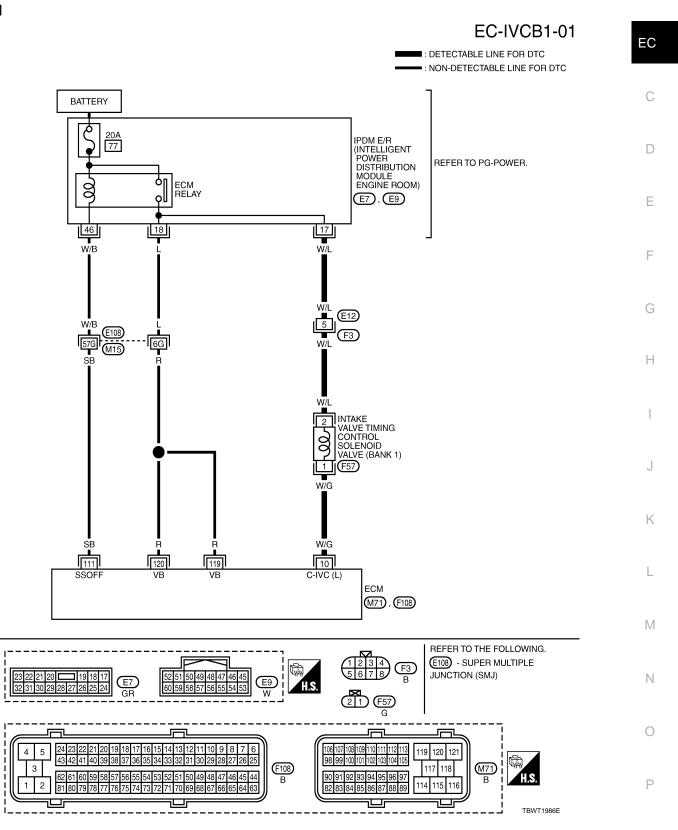
- If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
- a. Turn ignition switch OFF and wait at least 10 seconds.
- b. Turn ignition switch ON.
- c. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start engine and let it idle for 5 seconds.
- 3. Check 1st rip DTC.
- If 1st trip DTC is detected, go to <u>EC-864</u>, "<u>Diagnosis Procedure</u>".

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Wiring Diagram

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BANK 1



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III. CAUTION:

## DTC P0075, P0081 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

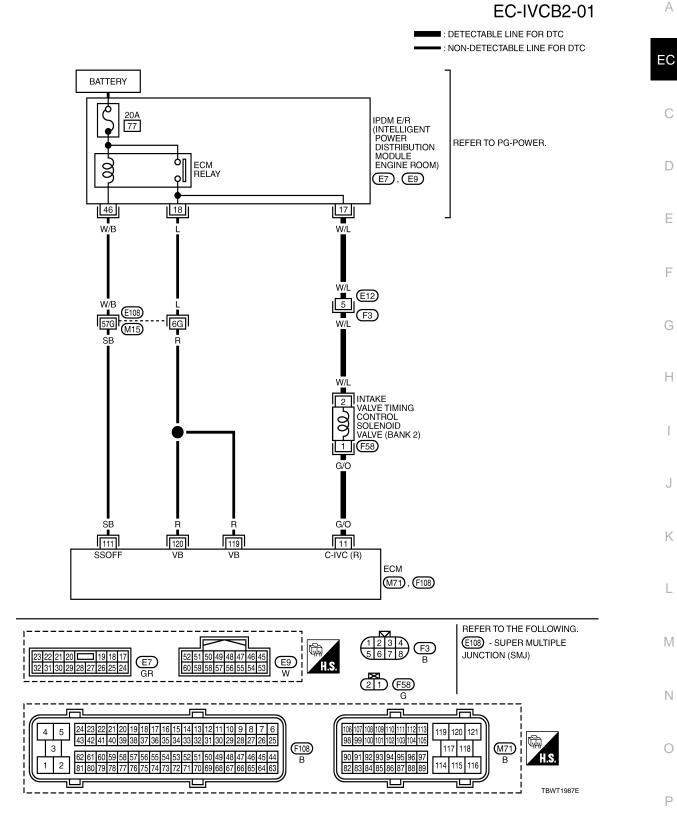
[VK45DE]

Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
10 W/G		Intake valve timing control solenoid valve (bank 1)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
	W/G		<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000rpm</li></ul>	7 - 12 V*  2010.0 V/Div  PBIB1790E
111	SB	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5 V
			<ul> <li>[Ignition switch: OFF]</li> <li>More than a few seconds after turning ignition switch OFF</li> </ul>	BATTERY VOLTAGE (11 - 14 V)
119 120	R R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

BANK 2



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11 G/O		Intake valve timing control solenoid valve (bank 2)	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
	G/O		<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000rpm</li></ul>	7 - 12 V★  → 10.0 V/Div  PBIB1790E
111	SB	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5 V
			[Ignition switch: OFF]  • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
119 120	R R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

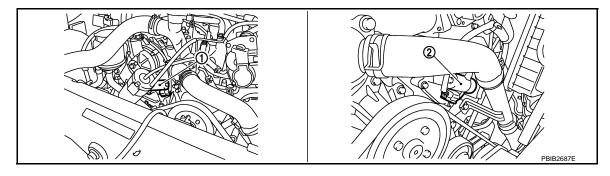
<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:0000000005353983

## 1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect intake valve timing control solenoid valve harness connector.

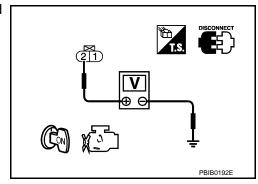


- 1. Intake valve timing control solenoid valve (bank 2)
- Intake valve timing control solenoid valve (bank 1)
- 3. Turn ignition switch ON.
- 4. Check voltage between intake valve timing control solenoid valve terminal 2 and ground with CONSULT-III or tester.

#### **Voltage: Battery voltage**

#### OK or NG

OK >> GO TO 3. NG >> GO TO 2.



#### DTC P0075, P0081 IVT CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VK45DE]

# 2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- IPDM E/R harness connector E7
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R

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>> Repair open circuit or short to ground or short to power in harness or connectors.

3.check intake valve timing control solenoid valve output signal circuit for open AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check harness continuity between the following; ECM terminal 10 and intake valve timing control solenoid valve (bank 1) terminal 1 or ECM terminal 11 and intake valve timing control solenoid valve (bank 2) terminal 1. Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## f 4.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-865, "Component Inspection".

#### OK or NG

OK >> GO TO 5.

NG >> Replace intake valve timing control solenoid valve.

## 5.CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

## Component Inspection

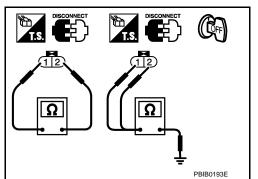
#### INTAKE VALVE TIMING CONTROL SOLENOID VALVE

- 1. Disconnect intake valve timing control solenoid valve harness connector.
- Check resistance between intake valve timing control solenoid valve terminals as per the following.

Terminals	Resistance [at 20°C (68°F)]
1 and 2	7.0 - 7.5 Ω
1 or 2 and ground	$\stackrel{\sim}{\sim} \Omega$ (Continuity should not exist)

If NG, replace intake valve timing control solenoid valve. If OK, go to next step.

3. Remove intake valve timing control solenoid valve.



**EC-865** Revision: 2009 June 2010 M35/M45

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## DTC P0075, P0081 IVT CONTROL SOLENOID VALVE

#### < SERVICE INFORMATION >

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4. Provide 12 V DC between intake valve timing control solenoid valve terminals and then interrupt it. Check that the plunger moves as shown in the figure.

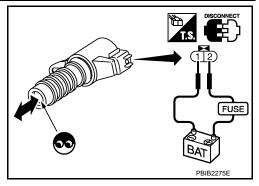
#### **CAUTION:**

Never apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

If NG, replace intake valve timing control solenoid valve.

NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.



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#### Removal and Installation

INTAKE VALVE TIMING CONTROL SOLENOID VALVE Refer to EM-199, "Component".

[VK45DE]

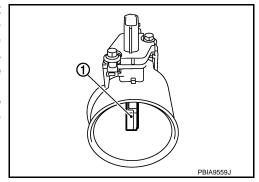
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#### DTC P0101 MAF SENSOR

## Component Description

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The greater air flow, the greater the heat loss.

Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



#### CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION	_
MAS A/F SE-B1	See EC-814, "Inspection Procedure	See EC-814, "Inspection Procedure".		
	Engine: After warming up	Idle	14 - 33%	_
CAL/LD VALUE	<ul><li>Selector lever position: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,500 rpm	12 - 25%	
	Engine: After warming up	Idle	2.0 - 6.0 g·m/s	_
MASS AIRFLOW	<ul><li>Selector lever position: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,500 rpm	7.0 - 20.0 g·m/s	_

## On Board Diagnosis Logic

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause	
P0101	Mass air flow sensor circuit	Α	A high voltage from the sensor is sent to ECM under light load driving condition.	Harness or connectors     (The sensor circuit is open or shorted.)     Mass air flow sensor     EVAP control system pressure sensor     Intake air temperature sensor	
0101	range/performance	В	A low voltage from the sensor is sent to ECM under heavy load driving condition.	<ul> <li>Harness or connectors         (The sensor circuit is open or shorted.)</li> <li>Intake air leakage</li> <li>Mass air flow sensor</li> <li>EVAP control system pressure sensor</li> <li>Intake air temperature sensor</li> </ul>	

## **DTC Confirmation Procedure**

#### Perform PROCEDURE FOR MALFUNCTION A first. If DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B. NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

## PROCEDURE FOR MALFUNCTION A

NOTE:

**EC-867** Revision: 2009 June 2010 M35/M45

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#### < SERVICE INFORMATION >

If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch ON) instead of running engine at idle speed.

- 1. Start engine and warm it up to normal operating temperature.
- Run engine for at least 10 seconds at idle speed.
- 3. Check 1st trip DTC.
- 4. If 1st trip DTC is detected, go to <a href="EC-870"><u>EC-870</a>, "Diagnosis Procedure".</u></a>

#### PROCEDURE FOR MALFUNCTION B

#### **CAUTION:**

Always drive vehicle at a safe speed.

#### (P) With CONSULT-III

1. Start engine and warm it up to normal operating temperature.

If engine cannot be started, go to EC-870, "Diagnosis Procedure".

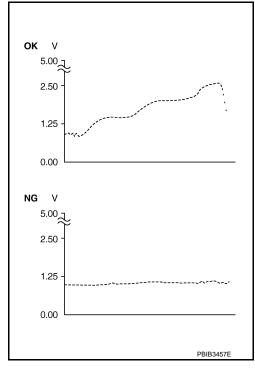
- 2. Check the voltage of "MAS A/F SE-B1" in "DATA MONITOR" mode with CONSULT-III.
- 3. Increases engine speed to approximately 4,000 rpm.
- Monitor the linear voltage rise in response to engine speed increases.

If NG, go to EC-870. "Diagnosis Procedure". If OK, go to the following step.

Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
TP SEN 1-B1	More than 1.5V
TP SEN 2-B1	More than 1.5V
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

- Check 1st trip DTC.
- If 1st trip DTC is detected, go to <u>EC-870, "Diagnosis Procedure"</u>.



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#### **Overall Function Check**

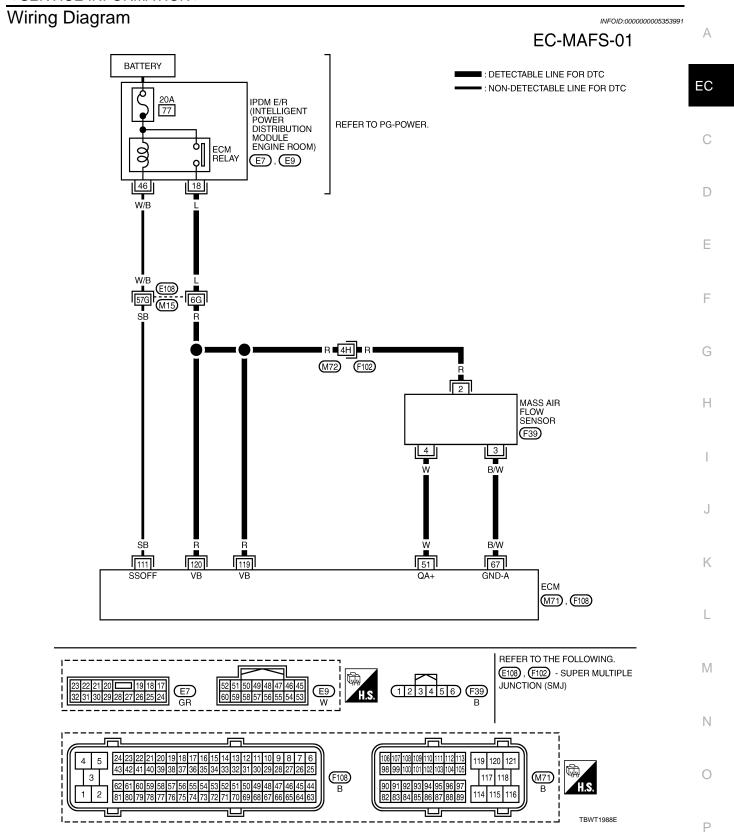
#### PROCEDURE FOR MALFUNCTION B

Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a 1st trip DTC might not be confirmed.

#### With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select Service \$01 with GST.
- 3. Check the mass air flow sensor signal with Service \$01.
- 4. Check for linear mass air flow sensor signal value rise in response to increases to approximately 4,000 rpm in engine speed.
- 5. If NG, go to EC-870, "Diagnosis Procedure".

CALC LOAD COOLANT TEMP SHORT FT #1 LONG FT #1 SHORT FT #2 LONG FT #2 ENGINE SPD VEHICLE SPD IGN ADVANCE INTAKE AIR MAF THROTTLE POS	20% 95°C 2% 0% 4% 0% 2637RPM 0MPH 41.0° 41°C 14.1gm/sec 3%
	SEF534P



Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
<u></u>	51 W Mass air flow sensor		<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	1.0 - 1.3 V
51		IVIASS AII IIUW SEIISUI	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,500 rpm</li></ul>	1.6 - 2.0 V
67	B/W	Sensor ground (MAF sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
111	SB	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5 V
		(och shut on)	[Ignition switch: OFF]  • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
119 120	R R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

## Diagnosis Procedure

INFOID:0000000005353992

## 1. INSPECTION START

Which malfunction (A or B) is duplicated?

#### A or B

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

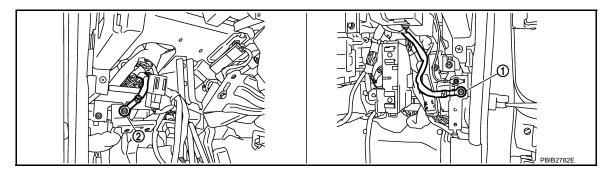
#### OK or NG

OK >> GO TO 3.

NG >> Reconnect the parts.

## 3. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

[VK45DE] < SERVICE INFORMATION >

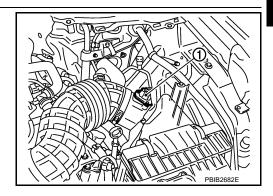
#### OK or NG

OK >> GO TO 4.

NG >> Repair or replace ground connections.

## 4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

- Disconnect mass air flow (MAF) sensor (1) harness connector.
- 2. Turn ignition switch ON.

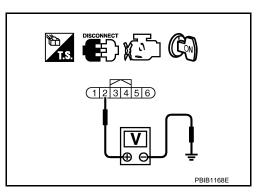


3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-III or tester.

#### Voltage: Battery voltage

#### OK or NG

OK >> GO TO 6. NG >> GO TO 5.



## $5.\mathsf{DETECT}$ MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness connectors M72, F102
- 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

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- Check harness continuity between MAF sensor terminal 3 and ECM terminal 67. Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 7.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 1. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check harness continuity between MAF sensor terminal 4 and ECM terminal 51. Refer to Wiring Diagram.

#### Continuity should exist.

2. Also check harness for short to ground and short to power.

#### OK or NG

**EC-871** Revision: 2009 June 2010 M35/M45

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#### **DTC P0101 MAF SENSOR**

[VK45DE] < SERVICE INFORMATION >

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 8.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-884, "Component Inspection".

#### OK or NG

OK >> GO TO 9.

NG >> Replace intake air temperature sensor.

## 9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

#### Refer to EC-1068, "Component Inspection".

#### OK or NG

OK >> GO TO 10.

NG >> Replace EVAP control system pressure sensor.

## 10.CHECK MASS AIR FLOW SENSOR

Refer to EC-872, "Component Inspection".

#### OK or NG

OK >> GO TO 11.

NG >> Replace mass air flow sensor.

## 11. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

## Component Inspection

INFOID:0000000005353993

#### MASS AIR FLOW SENSOR

#### (II) With CONSULT-III

- Reconnect all harness connectors disconnected.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Connect CONSULT-III and select "DATA MONITOR" mode.
- Select "MAS A/F SE-B1" and check indication under the following conditions.

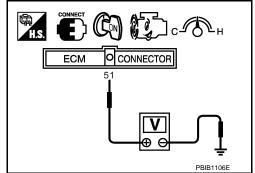
Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.0
Idle to about 4,000 rpm	1.0 - 1.3 to Approx. 2.4*

<sup>\*:</sup> Check for linear voltage rise in response to engine being increased to approximately 4,000 rpm.

- 5. If the voltage is out of specification, proceed the following.
- a. Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
  - Crushed air ducts
  - Malfunctioning seal of air cleaner element
  - · Uneven dirt of air cleaner element
  - · Improper specification of intake air system parts
- b. If NG, repair or replace malfunctioning part and perform steps 2 to 4 again. If OK, go to next step.
- Turn ignition switch OFF. 6.
- 7. Disconnect mass air flow sensor harness connector and reconnect it again.
- Perform steps 2 to 4 again.

- 9. If NG, clean or replace mass air flow sensor.
- (R) Without CONSULT-III
- Reconnect all harness connectors disconnected.
- 2. Start engine and warm it up to normal operating temperature.
- Check voltage between ECM terminal 51 (Mass air flow sensor signal) and ground.

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.0
Idle to about 4,000 rpm	1.0 - 1.3 to Approx. 2.4*



- \*: Check for linear voltage rise in response to engine being increased to approximately 4,000 rpm.
- 4. If the voltage is out of specification, proceed the following.
- a. Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
  - · Crushed air ducts
  - Malfunctioning seal of air cleaner element
  - Uneven dirt of air cleaner element
  - Improper specification of intake air system parts
- b. If NG, repair or replace malfunctioning part and perform steps 2 and 3 again. If OK, go to next step.
- 5. Turn ignition switch OFF.
- 6. Disconnect mass air flow sensor harness connector and reconnect it again.
- 7. Perform steps 2 and 3 again.
- 8. If NG, clean or replace mass air flow sensor.

#### Removal and Installation

#### MASS AIR FLOW SENSOR

Refer to EM-172, "Component".

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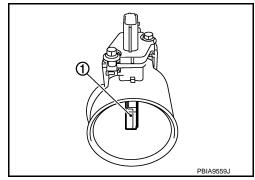
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## DTC P0102, P0103 MAF SENSOR

## Component Description

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The greater air flow, the greater the heat loss.

Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



#### CONSULT-III Reference Value in Data Monitor Mode

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Specification data are reference values.

MONITOR ITEM	Co	SPECIFICATION	
MAS A/F SE-B1	See EC-814, "Inspection Procedure".		
CAL/LD VALUE	Engine: After warming up	Idle	14 - 33%
	<ul><li>Selector lever position: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,500 rpm	12 - 25%
	Engine: After warming up	Idle	2.0 - 6.0 g·m/s
MASS AIRFLOW	<ul><li>Selector lever position: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,500 rpm	7.0 - 20.0 g·m/s

## On Board Diagnosis Logic

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#### These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors     (The sensor circuit is open or shorted.)     Intake air leakage     Mass air flow sensor
P0103 0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Harness or connectors     (The sensor circuit is open or shorted.)     Mass air flow sensor

#### **FAIL-SAFE MODE**

When the malfunction is detected, the ECM enters fail-safe mode and the MIL illuminates.

Detected items	Engine operating condition in fail-safe mode	
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	

#### **DTC Confirmation Procedure**

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#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### PROCEDURE FOR DTC P0102

## DTC P0102, P0103 MAF SENSOR

< SERVICE INFORMATION > [VK45DE]

- 1. Start engine and wait at least 5 seconds.
- 2. Check DTC.
- 3. If DTC is detected, go to EC-877, "Diagnosis Procedure".

#### PROCEDURE FOR DTC P0103

- 1. Turn ignition switch ON and wait at least 5 seconds.
- 2. Check DTC.
- 3. If DTC is detected, go to <u>EC-877, "Diagnosis Procedure"</u>. If DTC is not detected, go to next step.
- 4. Start engine and wait at least 5 seconds.
- 5. Check DTC.
- 6. If DTC is detected, go to <a href="EC-877"><u>EC-877</a>, "Diagnosis Procedure"</u>.

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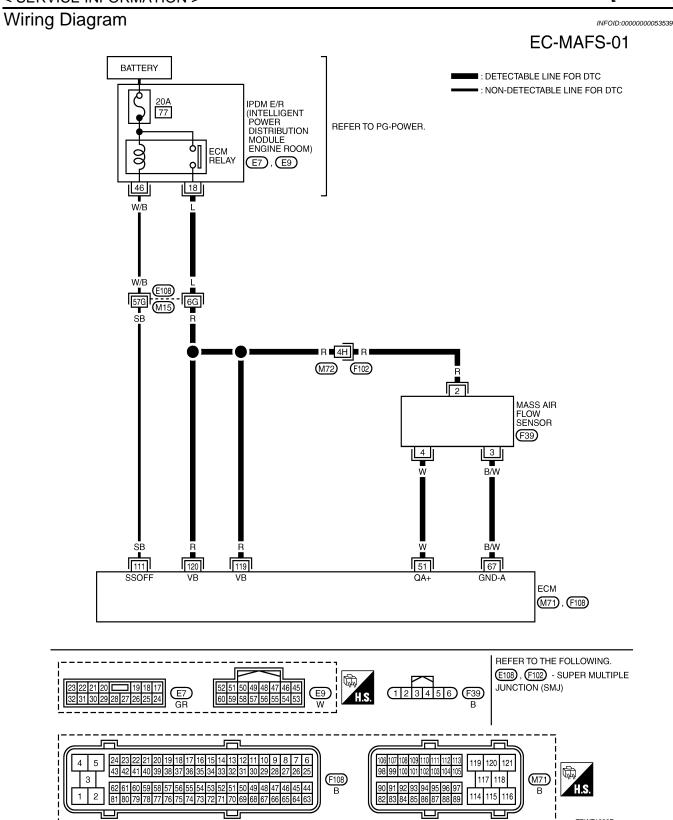
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Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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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TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
		[Engine is running] • Warm-up condition • Idle speed	1.0 - 1.3 V	
31	51 W Mass air flow sensor	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,500 rpm</li></ul>	1.6 - 2.0 V	
67	B/W	Sensor ground (MAF sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
111 SB	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5 V	
		(Jeli Shut-on)	[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
119 120	R R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

## Diagnosis Procedure

## 1. INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

#### P0102 or P0103

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 and intake manifold

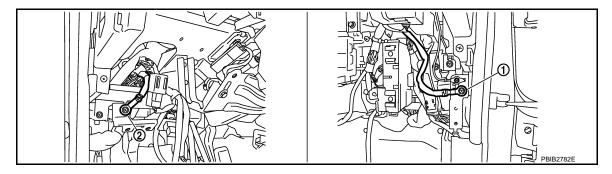
#### OK or NG

OK >> GO TO 3.

NG >> Reconnect the parts.

## 3. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".



1. Body ground M70

2. Body ground M16

#### < SERVICE INFORMATION >

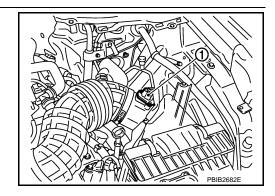
#### OK or NG

OK >> GO TO 4.

NG >> Repair or replace ground connections.

## 4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect mass air flow (MAF) sensor (1) harness connector.
- Turn ignition switch ON.

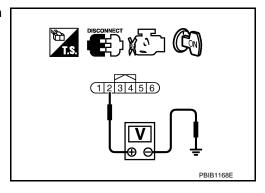


3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-III or tester.

#### Voltage: Battery voltage

#### OK or NG

OK >> GO TO 6. NG >> GO TO 5.



## 5. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E108, M15
- Harness connectors M72, F102
- · 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 harness continuity between MAF sensor terminal 3 and ECM terminal 67. Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 7.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## .CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check harness continuity between MAF sensor terminal 4 and ECM terminal 51. Refer to Wiring Diagram.

#### Continuity should exist.

2. Also check harness for short to ground and short to power.

#### OK or NG

#### DTC P0102, P0103 MAF SENSOR

[VK45DE] < SERVICE INFORMATION > OK >> GO TO 8. NG >> Repair open circuit or short to ground or short to power in harness or connectors. Α f 8.CHECK MASS AIR FLOW SENSOR Refer to EC-879, "Component Inspection". EC OK or NG OK >> GO TO 9. NG >> Replace mass air flow sensor. 9. CHECK INTERMITTENT INCIDENT Refer to EC-822, "Diagnosis Procedure". D >> INSPECTION END Component Inspection Е INFOID:0000000005354001 MASS AIR FLOW SENSOR F (P) With CONSULT-III Reconnect all harness connectors disconnected. Start engine and warm it up to normal operating temperature. Connect CONSULT-III and select "DATA MONITOR" mode. Select "MAS A/F SE-B1" and check indication under the following conditions. Н MAS A/F SE-B1 (V) Condition Ignition switch ON (Engine stopped.) Approx. 0.4 Idle (Engine is warmed-up to normal 1.0 - 1.3operating temperature.) 2,500 rpm (Engine is warmed-up to 1.6 - 2.0normal operating temperature.) Idle to about 4,000 rpm 1.0 - 1.3 to Approx. 2.4\* \*: Check for linear voltage rise in response to engine being increased to approximately 4,000 rpm. If the voltage is out of specification, proceed the following. Check for the cause of uneven air flow through mass air flow sensor. Refer to the following. Crushed air ducts Malfunctioning seal of air cleaner element Uneven dirt of air cleaner element Improper specification of intake air system parts If NG, repair or replace malfunctioning part and perform steps 2 to 4 again. If OK, go to next step. Turn ignition switch OFF. N 7. Disconnect mass air flow sensor harness connector and reconnect it again. Perform steps 2 to 4 again. If NG, clean or replace mass air flow sensor. Without CONSULT-III 1. Reconnect all harness connectors disconnected. Р Start engine and warm it up to normal operating temperature.

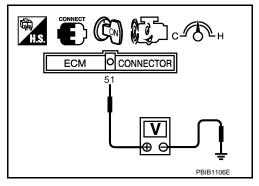
## DTC P0102, P0103 MAF SENSOR

#### < SERVICE INFORMATION >

[VK45DE]

Check voltage between ECM terminal 51 (Mass air flow sensor signal) and ground.

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 2.0
Idle to about 4,000 rpm	1.0 - 1.3 to Approx. 2.4*



- \*: Check for linear voltage rise in response to engine being increased to approximately 4,000 rpm.
- 4. If the voltage is out of specification, proceed the following.
- a. Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
  - · Crushed air ducts
  - Malfunctioning seal of air cleaner element
  - Uneven dirt of air cleaner element
  - · Improper specification of intake air system parts
- If NG, repair or replace malfunctioning part and perform steps 2 and 3 again.
   If OK, go to next step.
- 5. Turn ignition switch OFF.
- 6. Disconnect mass air flow sensor harness connector and reconnect it again.
- 7. Perform steps 2 and 3 again.
- 8. If NG, clean or replace mass air flow sensor.

#### Removal and Installation

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MASS AIR FLOW SENSOR

Refer to EM-172, "Component".

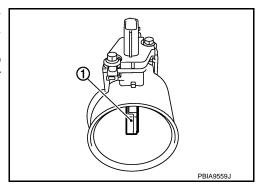
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## DTC P0112, P0113 IAT SENSOR

## Component Description

The intake air temperature sensor is built-into the mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the rise in temperature.



#### <Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

<sup>\*:</sup> This data is reference value and is measured between ECM terminal 34 (Intake air temperature sensor) and ground.

#### **CAUTION:**

Never 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.

## On Board Diagnosis Logic

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112 0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors  (The sensor circuit is open or shorted.)
P0113 0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	<ul><li>(The sensor circuit is open or shorted</li><li>Intake air temperature sensor</li></ul>

## **DTC Confirmation Procedure**

- 1. If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
- Turn ignition switch OFF and wait at least 10 seconds.
- b. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON and wait at least 5 seconds.
- Check 1st trip DTC. 3.
- If 1st trip DTC is detected, go to EC-882, "Diagnosis Procedure".

Acceptable Resistance kΩ 0.4 0.2 0 20 40 60 80 100 (32) (68) (104) (140) (176) (212) Temperature °C (°F) SEF012P

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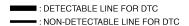
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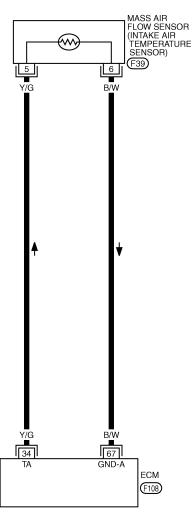
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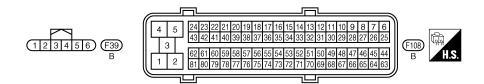
Wiring Diagram

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#### EC-IATS-01







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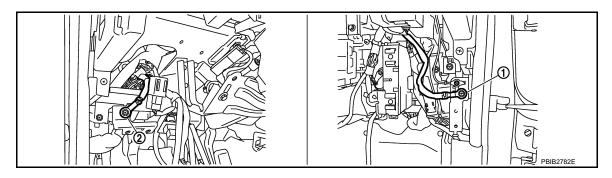
## Diagnosis Procedure

INFOID:0000000005354007

# 1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".

Revision: 2009 June **EC-882** 2010 M35/M45



1. Body ground M70

2. Body ground M16

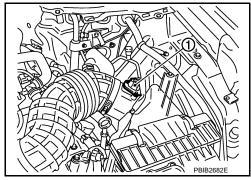
#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

## 2.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- Disconnect mass air flow sensor (intake air temperature sensor is built-into) (1) harness connector.
- Turn ignition switch ON.



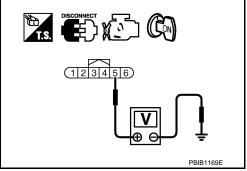
Check voltage between mass air flow sensor terminal 5 and ground with CONSULT-III or tester.

#### Voltage: Approximately 5 V

#### OK or NG

OK >> GO TO 3.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.



## 3.check intake air temperature sensor ground circuit for open and short

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- Check harness continuity between mass air flow sensor terminal 6 and ECM terminal 67. Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 4.

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-884, "Component Inspection".

#### OK or NG

**EC-883** Revision: 2009 June 2010 M35/M45

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#### < SERVICE INFORMATION >

OK >> GO TO 5.

NG >> Replace mass air flow sensor (with intake air temperature sensor).

## 5. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

## Component Inspection

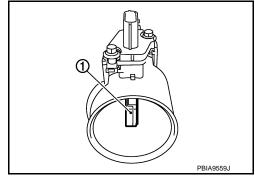
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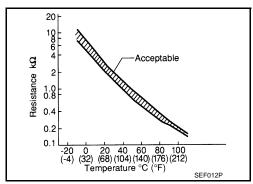
#### INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor (1) terminals 5 and 6 under the following conditions.

Intake air temperature [°C (°F)]	Resistance ( $k\Omega$ )
25 (77)	1.800 - 2.200

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





#### Removal and Installation

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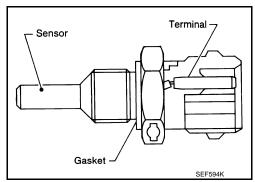
MASS AIR FLOW SENSOR Refer to EM-172, "Component".

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#### DTC P0116 ECT SENSOR

## Component Description

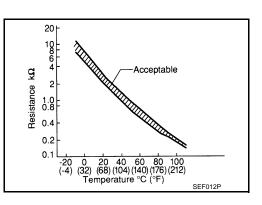
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



#### <Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

<sup>\*:</sup> This data is reference value and is measured between ECM terminal 73 (Engine coolant temperature sensor) and ground.



Never 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.

## On Board Diagnosis Logic

#### NOTE:

If DTC P0116 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117, P0118. Refer to EC-889, "DTC Confirmation Procedure".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0116 0116	Engine coolant tempera- ture sensor circuit range/ performance	Engine coolant temperature signal from engine coolant temperature sensor does not fluctuate, even when some time has passed after starting the engine with pre-warming up condition.	Harness or connectors  (High or low resistance in the circuit)

#### **DTC Confirmation Procedure**

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next step.

- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

#### Before performing the following procedure, do not add fuel.

- 1. Start engine and warm it up to normal operating temperature.
- 2. Rev engine up to 2,000 rpm for more than 10 minutes.
- Move the vehicle to a cool place, then stop engine.
- Check resistance between "fuel level sensor and fuel pump" terminals 4 and 5.

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**EC-885** Revision: 2009 June 2010 M35/M45

#### < SERVICE INFORMATION >

5. Soak the vehicle until the resistance between "fuel level sensor and fuel pump" terminals 4 and 5 becomes  $0.5 \text{ k}\Omega$  higher than the value measured before soaking.

#### CAUTION:

Never turn ignition switch ON during soaking.

NOTE:

Soak time changes depending on ambient air temperature. It may take several hours.

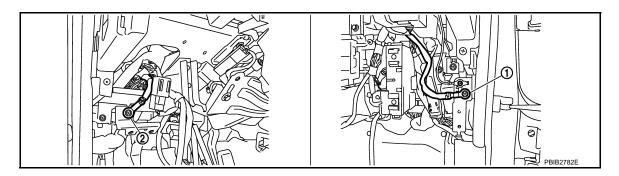
- 6. Start engine and let it idle for 20 minutes.
- 7. Check 1st trip DTC.
- 8. If 1st trip DTC is detected, go to EC-886, "Diagnosis Procedure".

## Diagnosis Procedure

INFOID:0000000005354013

## 1. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".



1. Body ground M70

2. Body ground M16

#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

## 2.check engine coolant temperature sensor

Refer to EC-886, "Component Inspection".

#### OK or NG

OK >> GO TO 3.

NG >> Replace engine coolant temperature sensor.

## 3. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

## Component Inspection

INFOID:0000000005354014

ENGINE COOLANT TEMPERATURE SENSOR

## **DTC P0116 ECT SENSOR**

#### < SERVICE INFORMATION >

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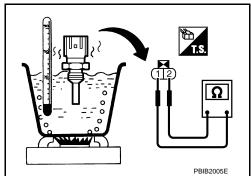
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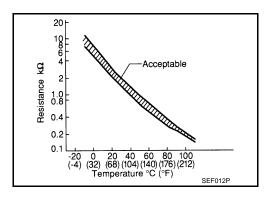
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



#### <Reference data>

Temperature [°C (°F)]	Resistance (kΩ)
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

2. If NG, replace engine coolant temperature sensor.



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## Removal and Installation

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-228, "Component".

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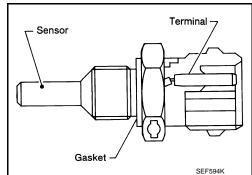
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## DTC P0117, P0118 ECT SENSOR

## **Component Description**

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



#### <Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

<sup>\*:</sup> This data is reference value and is measured between ECM terminal 73 (Engine coolant temperature sensor) and ground.

# 

#### CAUTION:

Never 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.

## On Board Diagnosis Logic

INFOID:0000000005354017

#### These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0117 0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors     (The sensor circuit is open or shorted.)
P0118 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Engine coolant temperature sensor

#### **FAIL-SAFE MODE**

When the malfunction is detected, the ECM enters fail-safe mode and the MIL illuminates.

Detected items	Engine operating condition in fail-safe mode		
	Engine coolant temperature will be determined by ECM based on the following conditions. CONSULT-III displays the engine coolant temperature decided by ECM.		
	Condition	Engine coolant temperature decided (CONSULT-III display)	
Engine coolant temperature	Just as ignition switch is turned ON or START	40°C (104°F)	
sensor circuit	Approx. 4 minutes or more after engine starting	80°C (176°F)	
	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)	
	When the fail-safe system for engine coolant temperatus while engine is running.	ire sensor is activated, the cooling fan operates	

## **DTC P0117, P0118 ECT SENSOR**

#### < SERVICE INFORMATION >

[VK45DE]

## **DTC Confirmation Procedure**

INFOID:0000000005354018

- 1. If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
- before conducting the next test.

  a. Turn ignition switch OFF and wait at least 10 seconds.
- b. Turn ignition switch ON.
- c. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON and wait at least 5 seconds.
- 3. Check DTC.
- 4. If DTC is detected, go to EC-890, "Diagnosis Procedure".

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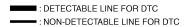
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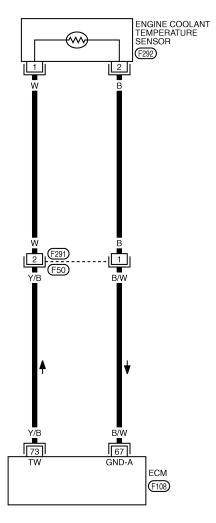
[VK45DE]

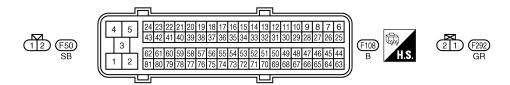
Wiring Diagram

INFOID:0000000005354019

#### EC-ECTS-01







TBWT1018E

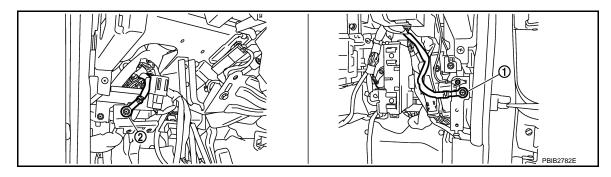
## Diagnosis Procedure

#### INFOID:0000000005354020

# 1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".

Revision: 2009 June **EC-890** 2010 M35/M45



1. Body ground M70

2. Body ground M16

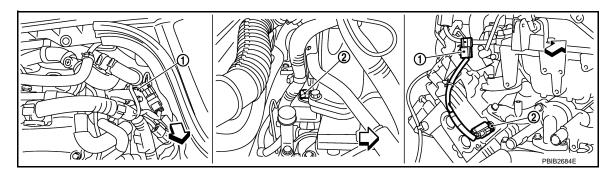
#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

## 2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor harness connector.



⟨□ : Vehicle front

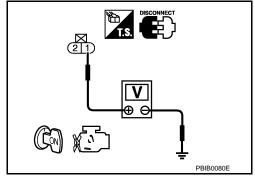
- Engine coolant temperature sensor sub-harness connector
- 2. Engine coolant temperature sensor

- Turn ignition switch ON.
- 3. Check voltage between ECT sensor terminal 1 and ground with CONSULT-III or tester.

#### **Voltage: Approximately 5V**

#### OK or NG

OK >> GO TO 4. NG >> GO TO 3.



## 3.DETECT MALFUNCTIONING RART

#### Check the following.

- Harness connector F291, F50
- Harness for open or short between ECM and engine coolant temperature sensor
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

## 4. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between ECT sensor terminal 2 and ECM terminal 67. Refer to Wiring Diagram.

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#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 6. NG >> GO TO 5.

## 5. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connector F291, F50
- Harness for open and short between ECT sensor and ECM
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

## 6. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-892, "Component Inspection".

#### OK or NG

OK >> GO TO 7.

NG >> Replace engine coolant temperature sensor.

## 7. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

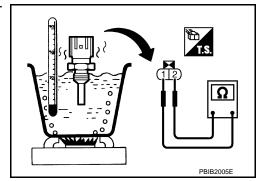
#### >> INSPECTION END

#### Component Inspection

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#### ENGINE COOLANT TEMPERATURE SENSOR

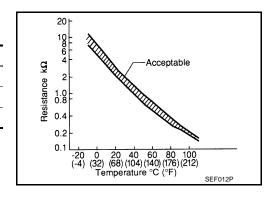
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



#### <Reference data>

Temperature [°C (°F)]	Resistance (kΩ)
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

If NG, replace engine coolant temperature sensor.



#### Removal and Installation

INFOID:0000000005354022

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-228, "Component".

[VK45DE]

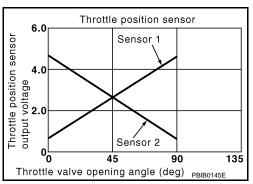
INFOID:0000000005354023

## DTC P0122, P0123 TP SENSOR

## Component 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 the two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving condition via the throttle control motor.



#### CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
TP SEN 1-B1	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36V
TP SEN 2-B1*	<ul><li>(Engine stopped)</li><li>Selector lever position: D</li></ul>	Accelerator pedal: Fully depressed	Less than 4.75V

<sup>\*:</sup> Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

## On Board Diagnosis Logic

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122 0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	<ul> <li>Harness or connectors (TP sensor 2 circuit is open or shorted.) (APP sensor 2 circuit is shorted.)</li> <li>Electric throttle control actuator (TP sensor 2)</li> <li>Accelerator pedal position sensor (APP sensor 2)</li> </ul>
P0123 0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

#### FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL illuminates.

#### Engine operation condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

#### DTC Confirmation Procedure

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

Start engine and let it idle for 1 second.

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**EC-893** Revision: 2009 June 2010 M35/M45

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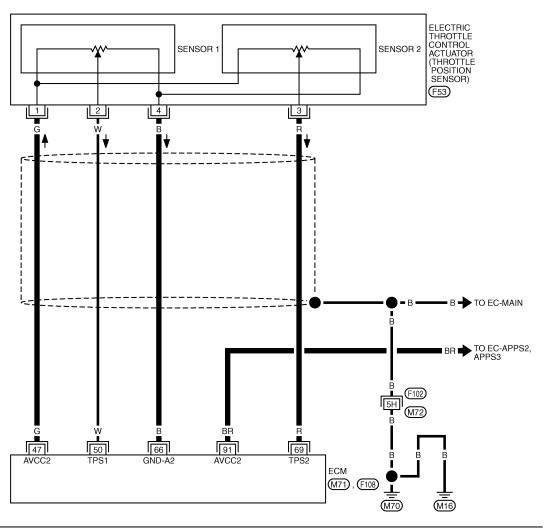
- 2. Check DTC.
- If DTC is detected, go to <u>EC-895, "Diagnosis Procedure"</u>.

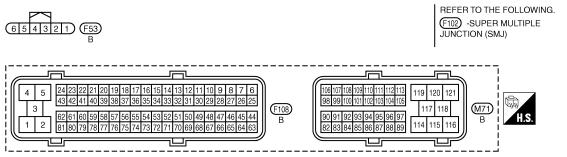
## Wiring Diagram

INFOID:0000000005354027

#### EC-TPS2-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





TBWT1491E

Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

[VK45DE]

Never 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.

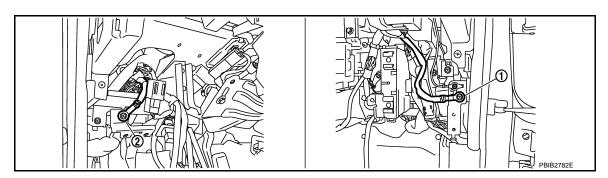
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	EC
47	G	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5 V	С
50			[Ignition switch: ON]  • Engine: Stopped  • Selector lever position: D  • Accelerator pedal: Fully released	More than 0.36 V	D
50 W Thr	Throttle position sensor 1	[Ignition switch: ON]  • Engine: Stopped  • Selector lever position: D  • Accelerator pedal: Fully depressed	Less than 4.75V	E	
66	В	Sensor ground (Throttle position sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V	F
69 R		[Ignition switch: ON]  • Engine: Stopped  • Selector lever position: D  • Accelerator pedal: Fully released  [Ignition switch: ON]  • Engine: Stopped  • Selector lever position: D  • Accelerator pedal: Fully depressed	<ul><li> Engine: Stopped</li><li> Selector lever position: D</li></ul>	Less than 4.75 V	G
	K		<ul><li> Engine: Stopped</li><li> Selector lever position: D</li></ul>	More than 0.36 V	Н
91	BR	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5 V	_

## Diagnosis Procedure

## 1. CHECK GROUND CONNECTIONS

Turn ignition switch OFF.
 Loosen and retighten ground screws on the body.

Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-I

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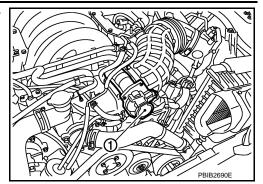
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Revision: 2009 June **EC-895** 2010 M35/M45

#### < SERVICE INFORMATION >

- Disconnect electric throttle control actuator (1) harness connector.
- Illustration shows the view with intake air duct removed.
- 2. Turn ignition switch ON.



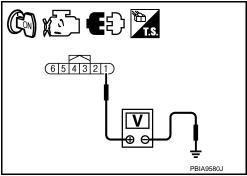
[VK45DE]

3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-III or tester.

#### **Voltage: Approximately 5 V**

#### OK or NG

OK >> GO TO 7. NG >> GO TO 3.



## 3. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.

#### Continuity should exist.

#### OK or NG

OK >> GO TO 4.

NG >> Repair open circuit.

## 4. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 1	EC-894, "Wiring Diagram"
91	APP sensor terminal 5	EC-1254, "Wiring Diagram"

#### OK or NG

OK >> GO TO 5

NG >> Repair short to ground or short to power in harness or connectors.

## 5. CHECK APP SENSOR

Refer to EC-1258, "Component Inspection".

#### OK or NG

OK >> GO TO 11. NG >> GO TO 6.

## 6. REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly.
- Perform <u>EC-764</u>, "Accelerator Pedal Released Position Learning".
- 3. Perform EC-764, "Throttle Valve Closed Position Learning".
- 4. Perform EC-765, "Idle Air Volume Learning".

## **DTC P0122, P0123 TP SENSOR**

< SERVICE INFORMATION > [VK45DE]

>> INSPECTION END  7. CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT	Α
7 T 1 W 11 OFF	EC
Refer to Wiring Diagram.  Continuity should exist.	С
<ol> <li>Also check harness for short to ground and short to power.</li> <li>OK or NG</li> <li>OK &gt;&gt; GO TO 8.</li> </ol>	D
NG >> Repair open circuit or short to ground or short to power in harness or connectors.  8.CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	Е
<ol> <li>Check harness continuity between ECM terminal 69 and electric throttle control actuator terminal 3. Refer to Wiring Diagram.</li> </ol>	F
Continuity should exist.  2. Also check harness for short to ground and short to power.  OK or NG	G
OK >> GO TO 9.  NG >> Repair open circuit or short to ground or short to power in harness or connectors.  9.CHECK THROTTLE POSITION SENSOR	Н
Refer to EC-897, "Component Inspection".  OK or NG	I
OK >> GO TO 11. NG >> GO TO 10.  10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR	J
1. Replace the electric throttle control actuator. 2. Perform <u>EC-764</u> , "Throttle Valve Closed Position Learning". 3. Perform <u>EC-765</u> , "Idle Air Volume Learning".	K
>> INSPECTION END 11.CHECK INTERMITTENT INCIDENT	L
Refer to EC-822, "Diagnosis Procedure".	M
>> INSPECTION END  Component Inspection	Ν
THROTTLE POSITION SENSOR	0
<ol> <li>Reconnect all harness connectors disconnected.</li> <li>Perform <u>EC-764</u>, "<u>Throttle Valve Closed Position Learning</u>".</li> </ol>	
<ol> <li>Turn ignition switch ON.</li> <li>Set selector lever to the D position.</li> </ol>	Ρ

Revision: 2009 June **EC-897** 2010 M35/M45

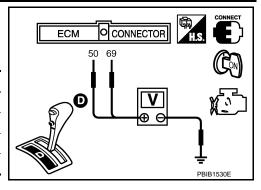
## **DTC P0122, P0123 TP SENSOR**

#### < SERVICE INFORMATION >

[VK45DE]

 Check voltage between ECM terminal 50 (TP sensor 1 signal) and ground, ECM terminal 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50	Fully released	More than 0.36 V
(Throttle position sensor 1)	Fully depressed	Less than 4.75 V
69	Fully released	Less than 4.75 V
(Throttle position sensor 2)	Fully depressed	More than 0.36 V



- If NG, replace electric throttle control actuator and go to the next step.
- 7. Perform EC-764, "Throttle Valve Closed Position Learning".
- 8. Perform EC-765, "Idle Air Volume Learning".

#### Removal and Installation

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ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-174, "Component".

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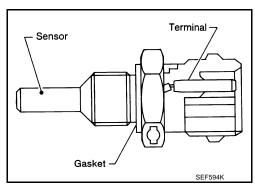
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## DTC P0125 ECT SENSOR

## Component Description

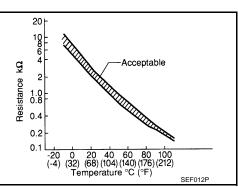
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



#### <Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

<sup>\*:</sup> This data is reference value and is measured between ECM terminal 73 (Engine coolant temperature sensor) and ground.



Never 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.

## On Board Diagnosis Logic

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0125 0125	Insufficient engine coolant temperature for closed loop fuel control	<ul> <li>Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine.</li> <li>Engine coolant temperature is insufficient for closed loop fuel control.</li> </ul>	Harness or connectors     (High resistance in the circuit)     Engine coolant temperature sensor     Thermostat

#### **DTC Confirmation Procedure**

#### **CAUTION:**

Be careful not to overheat engine.

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds. 1.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### (P) WITH CONSULT-III

- 1. Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-III.
- Check that "COOLAN TEMP/S" indication is above 10°C (50°F). If it is above 10°C (50°F), the test result will be OK. If it is below 10°C (50°F), go to the following step.

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INFOID:0000000005354033

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**EC-899** Revision: 2009 June 2010 M35/M45

- 4. Start engine and run it for 65 minutes at idle speed.
  - If "COOLAN TEMP/S" indication increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.
- 5. Check 1st trip DTC.
- 6. If 1st trip DTC is detected, go to EC-900, "Diagnosis Procedure".
- WITH GST

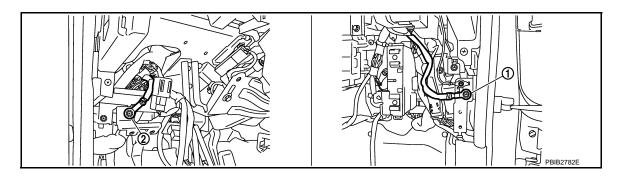
Follow the procedure "WITH CONSULT-III" above.

## Diagnosis Procedure

INFOID:0000000005354034

## 1. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

#### 2.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-900, "Component Inspection".

#### OK or NG

OK >> GO TO 3.

NG >> Replace engine coolant temperature sensor.

## 3. CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

#### OK or NG

OK >> GO TO 4.

NG >> Repair or replace thermostat. Refer to <a href="CO-51">CO-51</a>, "Component".

## 4. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

Refer to EC-890, "Wiring Diagram".

#### >> INSPECTION END

## Component Inspection

INFOID:0000000005354035

#### ENGINE COOLANT TEMPERATURE SENSOR

## **DTC P0125 ECT SENSOR**

### < SERVICE INFORMATION >

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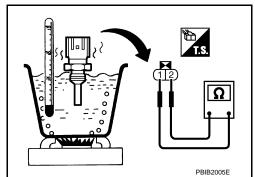
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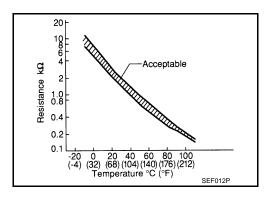
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



### <Reference data>

Temperature [°C (°F)]	Resistance (kΩ)
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

2. If NG, replace engine coolant temperature sensor.



INFOID:0000000005354036

# Removal and Installation

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-228, "Component".

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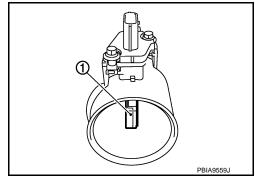
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### DTC P0127 IAT SENSOR

## Component Description

The intake air temperature sensor is built-into the mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the rise in temperature.



#### <Reference data>

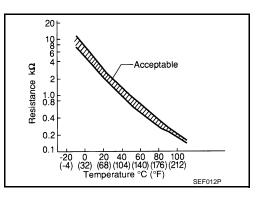
Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

<sup>\*:</sup> This data is reference value and is measured between ECM terminal 34 (Intake air temperature sensor) and ground.

#### **CAUTION:**

Never 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.

# On Board Diagnosis Logic



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0127 0127	Intake air temperature too high	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	Harness or connectors     (The sensor circuit is open or shorted)     Intake air temperature sensor

### **DTC Confirmation Procedure**

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INFOID:000000005354038

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

### **CAUTION:**

Always drive vehicle at a safe speed.

#### **TESTING CONDITION:**

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

### (P) WITH CONSULT-III

- 1. Wait until engine coolant temperature is less than 90°C (194°F)
- a. Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-III.
- c. Check the engine coolant temperature.

### **DTC P0127 IAT SENSOR**

#### [VK45DE] < SERVICE INFORMATION >

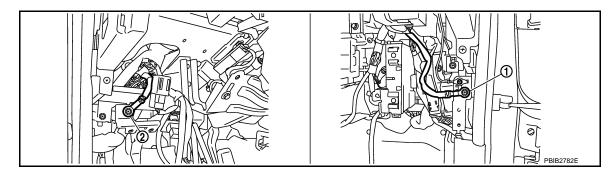
- If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch OFF and cool down engine.
  - Perform the following steps before engine coolant temperature is above 90°C (194°F).
- 2. Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-III.
- Start engine.
- 5. Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.
- Check 1st trip DTC.
- If 1st trip DTC is detected, go to EC-903, "Diagnosis Procedure". 7.

Follow the procedure "WITH CONSULT-III" above.

## **Diagnosis Procedure**

# 1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

# 2.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-903, "Component Inspection".

## OK or NG

OK >> GO TO 3.

NG >> Replace mass air flow sensor (with intake air temperature sensor).

# 3. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

Refer to EC-882, "Wiring Diagram".

### >> INSPECTION END

### Component Inspection

INTAKE AIR TEMPERATURE SENSOR

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## **DTC P0127 IAT SENSOR**

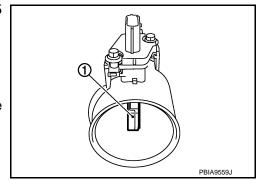
### < SERVICE INFORMATION >

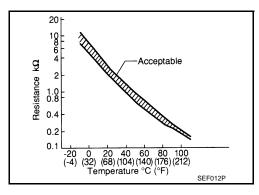
[VK45DE]

1. Check resistance between mass air flow sensor (1) terminals 5 and 6 under the following conditions.

Intake air temperature [°C (°F)]	Resistance ( $k\Omega$ )
25 (77)	1.800 - 2.200

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

INFOID:0000000005354042

MASS AIR FLOW SENSOR Refer to EM-172, "Component".

### **DTC P0128 THERMOSTAT FUNCTION**

< SERVICE INFORMATION >

[VK45DE]

### DTC P0128 THERMOSTAT FUNCTION

# On Board Diagnosis Logic

INFOID:0000000005354043

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long

This is due to a leakage in the seal or the thermostat being stuck open.

DTC No. Trouble diagnosis name DTC detecting cond		DTC detecting condition	Possible cause
P0128 0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	<ul><li>Thermostat</li><li>Leakage from sealing portion of thermostat</li><li>Engine coolant temperature sensor</li></ul>

## **DTC Confirmation Procedure**

INFOID:0000000005354044

### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

- For best results, perform at ambient temperature of -10°C (14°F) or higher.
- For best results, perform at engine coolant temperature of -10°C (14°F) to 56°C (133°F).
- Before performing the following procedure, do not add fuel.

## WITH CONSULT-III

- 1. Turn A/C switch OFF.
- 2. Turn blower fan switch OFF.
- Turn ignition switch ON.
- Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III.
- Check that the "COOLAN TEMP/S" is above 56°C (133°F). If it is below 56°C (133°F), go to next step. If it is above 56°C (133°F), cool down the engine to less than 56°C (133°F). Then go to next steps.
- Start engine and drive vehicle for 10 consecutive minutes under the following conditions.

VHCL SPEED SE More than 56 km/h (35 MP)

If "COOLAN TEMP/S" increases to more than 75°C (167°F) within 10 minutes, turn ignition switch OFF because the test result will be OK.

- Check 1st trip DTC.
- If 1st trip DTC is detected, go to EC-905, "Diagnosis Procedure".
- WITH GST

1. Follow the procedure "WITH CONSULT-III" above.

# Diagnosis Procedure

INFOID:0000000005354045

# 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-906, "Component Inspection".

### OK or NG

OK >> GO TO 2.

NG >> Replace engine coolant temperature sensor.

## 2.CHECK THERMOSTAT

Refer to CO-51, "Component".

OK or NG

**EC-905** Revision: 2009 June 2010 M35/M45

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## **DTC P0128 THERMOSTAT FUNCTION**

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[VK45DE]

OK >> INSPECTION END NG >> Replace thermostat.

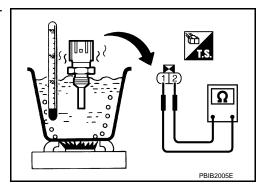
< SERVICE INFORMATION >

# Component Inspection

INFOID:0000000005354046

### ENGINE COOLANT TEMPERATURE SENSOR

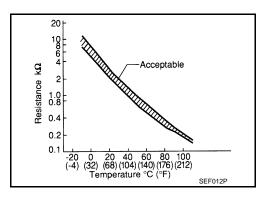
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



### <Reference data>

Temperature [°C (°F)]	Resistance (kΩ)
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

If NG, replace engine coolant temperature sensor.



### Removal and Installation

INFOID:0000000005354047

ENGINE COOLANT TEMPERATURE SENSOR Refer to <u>EM-228</u>, "Component".

[VK45DE]

INFOID:0000000005354048

# DTC P0130, P0150 A/F SENSOR 1

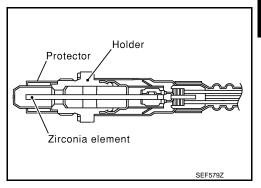
# Component Description

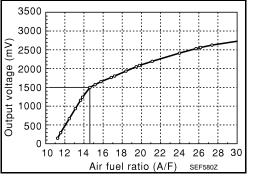
The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

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 (0.7 <  $\lambda$  < air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.

An electronic circuit controls the pump current through the oxygen pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at  $\lambda = 1$ . Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).





## CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5 V

# On Board Diagnosis Logic

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1

DTC No. DTC detecting condition Trouble diagnosis name Possible cause P0130 The A/F signal computed by ECM from the A/F 0130 sensor 1 signal is constantly in the range other · Harness or connectors (Bank 1) than approx. 1.5 V. Air fuel ratio (A/F) sensor (A/F sensor 1 circuit is open or 1 circuit shorted.) P0150 The A/F signal computed by ECM from the A/F A/F sensor 1 0150 В sensor 1 signal is constantly approx. 1.5 V. (Bank 2)

### **DTC Confirmation Procedure**

#### Perform PROCEDURE FOR MALFUNCTION A first.

signal fluctuates according to fuel feedback control.

### If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B. NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

**EC-907** Revision: 2009 June 2010 M35/M45

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#### < SERVICE INFORMATION >

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

### PROCEDURE FOR MALFUNCTION A

- 1. Start engine and warm it up to normal operating temperature.
- 2. Let engine idle for 2 minutes.
- Check 1st trip DTC.
- 4. If 1st trip DTC is detected, go to EC-912, "Diagnosis Procedure".

#### PROCEDURE FOR MALFUNCTION B

#### **CAUTION:**

### Always drive vehicle at a safe speed.

# (I) WITH CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT-III.
- Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.
   If the indication is constantly approx. 1.5 V and does not fluctuate, go to <u>EC-912</u>, "<u>Diagnosis Procedure</u>".
   If the indication fluctuates around 1.5 V, go to next step.
- Select "A/F SEN1 (B1) P1276" (for DTC P0130) or "A/F SEN1 (B2) P1286" (for DTC P0150) of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 5. Touch "START".
- 6. When the following conditions are met, "TESTING" will be displayed on the CONSULT-III screen.

ENG SPEED	1,300 - 3,200 rpm
VHCL SPEED SE	More than 64 km/h (40 MPH)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	D position

### If "TESTING" is not displayed after 20 seconds, retry from step 2.

7. Release accelerator pedal fully.

### NOTE:

Never apply brake during releasing the accelerator pedal.

8. Check that "TESTING" changes to "COMPLETED".

If "TESTING" changed to "OUT OF CONDITION", retry from step 6.

 Check that "OK" is displayed after touching "SELF-DIAG RESULT". If "NG" is displayed, go to <u>EC-912</u>, "<u>Diagnosis Procedure</u>".

### Overall Function Check

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

### WITH GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
- Shift selector lever to the D position, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (31 MPH).

#### NOTE:

Never apply brake during releasing the accelerator pedal.

- 4. Repeat steps 2 to 3 for five times.
- 5. Stop the vehicle and turn ignition switch OFF.
- 6. Wait at least 10 seconds and then turn ignition switch ON.
- 7. Turn ignition switch OFF and wait at least 10 seconds.
- 8. Restart engine.
- 9. Repeat steps 2 to 3 for five times.

# DTC P0130, P0150 A/F SENSOR 1

# < SERVICE INFORMATION >

[VK45DE]

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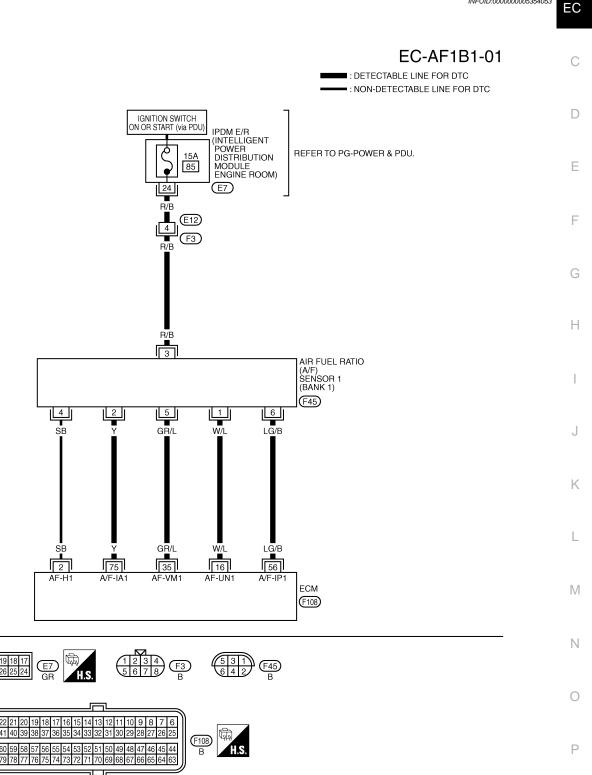
- 10. Stop the vehicle and connect GST to the vehicle.
- Check that no 1st trip DTC is displayed.
   If the 1st trip DTC is displayed, go to <u>EC-912</u>, "<u>Diagnosis Procedure</u>".

Wiring Diagram

BANK 1

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TBWT1046E

# **DTC P0130, P0150 A/F SENSOR 1**

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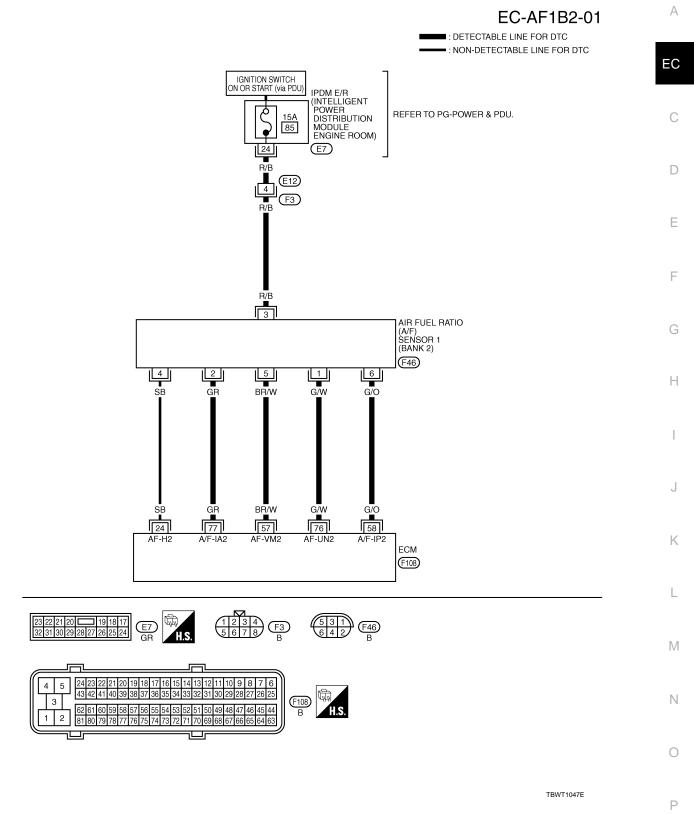
Pulse signal is measured by CONSULT-III.

### **CAUTION:**

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	SB	A/F sensor 1 heater (bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5 V★  → 10.0V/Div 10 ms/Div T  PBIB1584E
16	W/L			Approximately 3.1 V
35	GR/L	A/F sensor 1 (bank 1)	[Engine is running] • Warm-up condition	Approximately 2.6 V
56	LG/B	AVE SELISOL I (DALIK I)	Idle speed	Approximately 2.3 V
75	Υ			Approximately 2.3 V

<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)





Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

#### CAUTION:

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	SB	A/F sensor 1 heater (bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5 V★  → 10.0V/Div 10 ms/Div T  PBIB1584E
57	BR/W			Approximately 2.6 V
58	G/O	A/F sensor 1 (bank 2)	[Engine is running]  • Warm-up condition	Approximately 2.3 V
76	G/W	AVI SCIISOI I (DAIIK 2)	Warm-up condition     Idle speed	Approximately 3.1 V
77	GR			Approximately 2.3 V

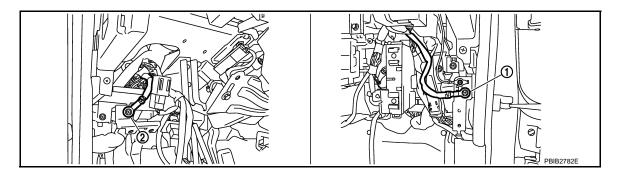
<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# Diagnosis Procedure

INFOID:0000000005354054

# 1. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".



1. Body ground M70

2. Body ground M16

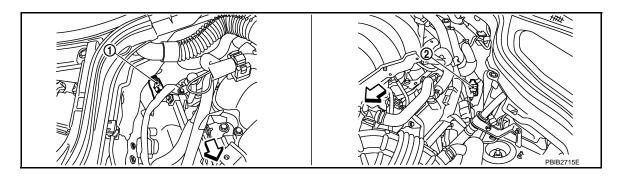
### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

# 2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



: Vehicle front

- 1. A/F sensor 1 (bank 2) harness con-
- A/F sensor 1 (bank 1) harness con-

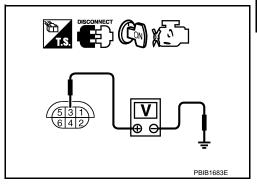
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- Turn ignition switch ON.
- Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-III or tester.

### Voltage: Battery voltage

### OK or NG

>> GO TO 4. OK NG >> GO TO 3.



# 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- IPDM E/R harness connector E7
- 15 A fuse
- Harness for open or short between A/F sensor 1 and fuse

### >> Repair or replace harness or connectors.

# 4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check harness continuity between A/F sensor 1 terminal and ECM terminal as per the following. Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
	1	16
Bank1	2	75
Danki	5	35
	6	56
	1	76
Bank 2	2	77
Dalik 2	5	57
	6	58

### Continuity should exist.

4. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal ECM terminal		A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

### Continuity should not exist.

**EC-913** Revision: 2009 June 2010 M35/M45

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## DTC P0130, P0150 A/F SENSOR 1

### < SERVICE INFORMATION >

[VK45DE]

5. Also check harness for short to power.

### OK or NG

OK >> GO TO 5.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

# 5. CHECK INTERMITTENT INCIDENT

Perform EC-822, "Diagnosis Procedure".

### OK or NG

OK >> GO TO 6.

NG >> Repair or replace malfunctioning part.

6.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1.

#### **CAUTION:**

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

#### >> INSPECTION END

Removal and Installation

INFOID:0000000005354055

AIR FUEL RATIO (A/F) SENSOR 1 Refer to EM-178, "Component".

[VK45DE]

INFOID:0000000005354056

# DTC P0131, P0151 A/F SENSOR 1

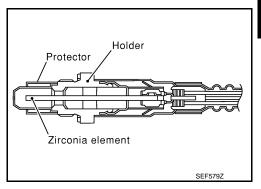
# Component Description

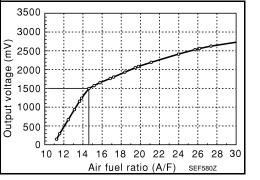
The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

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 (0.7 <  $\lambda$  < air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.

An electronic circuit controls the pump current through the oxygen pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at  $\lambda = 1$ . Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).





## CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5 V

# On Board Diagnosis Logic

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately low.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0131 0131 (Bank 1)	Air fuel ratio (A/F) sensor	The A/F signal computed by ECM from the A/F	Harness or connectors     (The A/F sensor 1 circuit is open or
P0151 0151 (Bank 2)	1 circuit low voltage	sensor 1 signal is constantly approx. 0 V.	shorted.) • A/F sensor 1

## **DTC Confirmation Procedure**

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds. 1.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

**EC-915** Revision: 2009 June 2010 M35/M45

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### DTC P0131, P0151 A/F SENSOR 1

< SERVICE INFORMATION >

[VK45DE]

### (II) WITH CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT-III.
- Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.
   If the indication is constantly approx. 0 V, go to <u>EC-920, "Diagnosis Procedure"</u>.
   If the indication is not constantly approx. 0V, go to next step.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Turn ignition switch OFF and wait at least 10 seconds.
- 7. Restart engine.
- 8. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
- 9. Maintain the following conditions for approximately 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 MPH)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever position	Suitable position

#### NOTE:

- Keep the accelerator pedal as steady as possible during cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 7, return to step 4.
- 10. Check 1st trip DTC.
- 11. If 1st trip DTC is displayed, go to EC-920, "Diagnosis Procedure".

### WITH GST

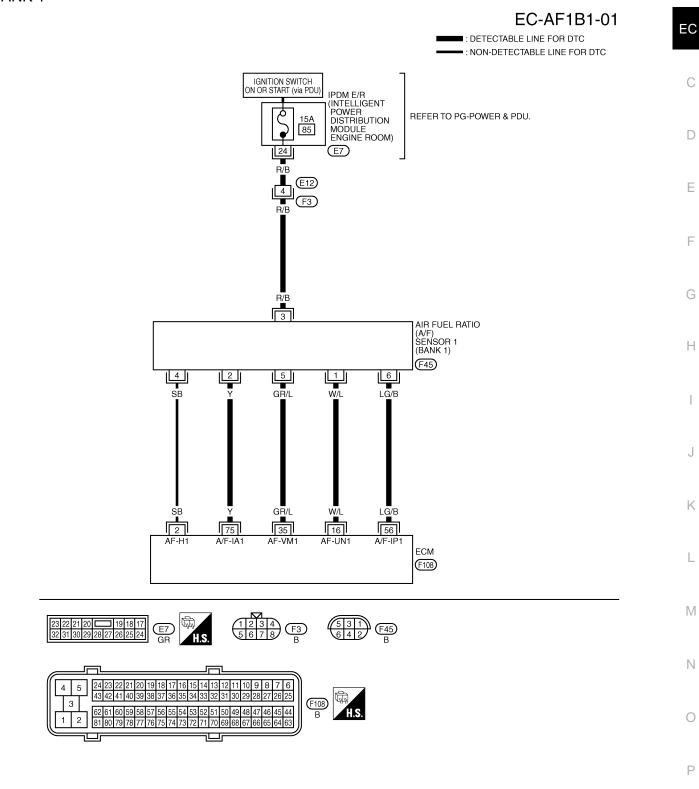
Follow the procedure "WITH CONSULT-III" above.

[VK45DE]

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Wiring Diagram

BANK 1



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Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III. CAUTION:

# **DTC P0131, P0151 A/F SENSOR 1**

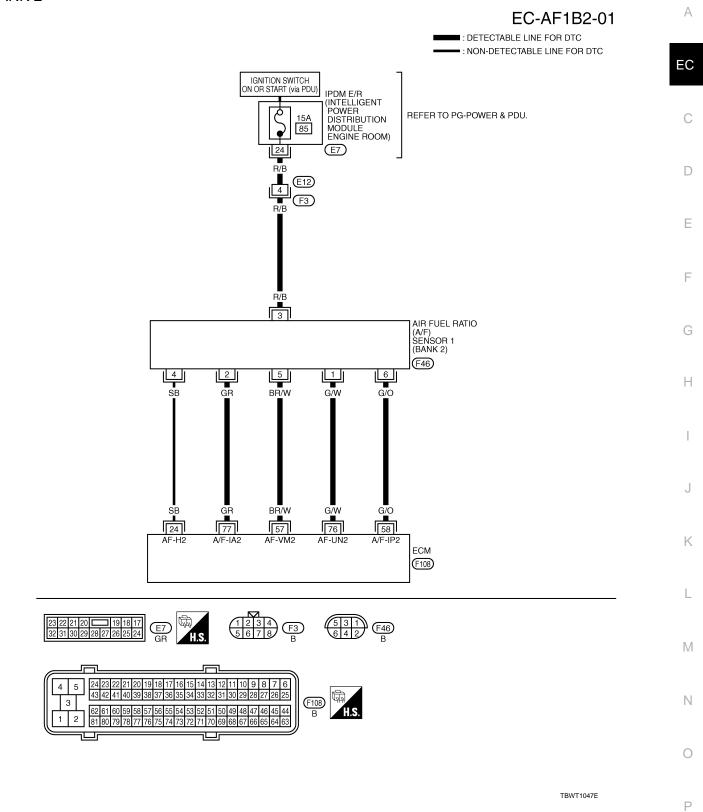
< SERVICE INFORMATION >

[VK45DE]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	SB	A/F sensor 1 heater (bank 1)	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Approximately 5 V★  → 10.0V/Div 10 ms/Div T  PBIB1584E
16	W/L		[Engine is running] • Warm-up condition • Idle speed	Approximately 3.1 V
35	GR/L	A/E consor 1 (bank 1)		Approximately 2.6 V
56	LG/B	A/F sensor i (bank i)		Approximately 2.3 V
75	Υ			Approximately 2.3 V

<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)





Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

CAUTION:

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	SB	A/F sensor 1 heater (bank 2)	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Approximately 5 V*  Description of the second of the secon
57	BR/W			Approximately 2.6 V
58	G/O	A/F sensor 1 (bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.3 V
76	G/W			Approximately 3.1 V
77	GR			Approximately 2.3 V

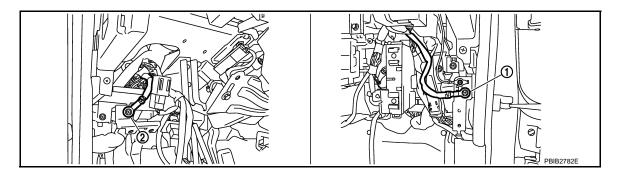
<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# Diagnosis Procedure

INFOID:0000000005354061

# 1. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".



1. Body ground M70

2. Body ground M16

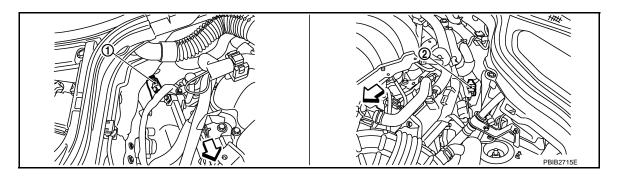
### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

# 2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



: Vehicle front

- A/F sensor 1 (bank 2) harness connector
- A/F sensor 1 (bank 1) harness connector

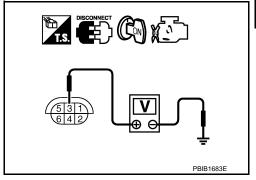
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- 2. Turn ignition switch ON.
- 3. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-III or tester.

Voltage: Battery voltage

### OK or NG

OK >> GO TO 4. NG >> GO TO 3.



# 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- IPDM E/R harness connector E7
- 15 A fuse
- 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.
- Disconnect ECM harness connector.
- Check harness continuity between A/F sensor 1 terminal and ECM terminal as per the following. Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
	1	16
Bank1	2	75
Danki	5	35
	6	56
	1	76
Bank 2	2	77
Dalik 2	5	57
	6	58

### Continuity should exist.

4. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

Bar	nk 1	Bar	nk 2
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

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### **DTC P0131, P0151 A/F SENSOR 1**

### < SERVICE INFORMATION >

[VK45DE]

5. Also check harness for short to power.

### OK or NG

OK >> GO TO 5.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

# 5. CHECK INTERMITTENT INCIDENT

Perform EC-822, "Diagnosis Procedure".

#### OK or NG

OK >> GO TO 6.

NG >> Repair or replace malfunctioning part.

6.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1.

#### **CAUTION:**

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

#### >> INSPECTION END

Removal and Installation

INFOID:0000000005354062

AIR FUEL RATIO (A/F) SENSOR 1 Refer to EM-178, "Component".

[VK45DE]

INFOID:0000000005354063

# DTC P0132, P0152 A/F SENSOR 1

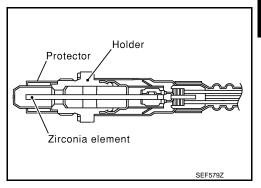
## Component Description

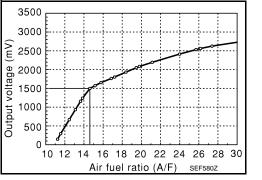
The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

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 (0.7 <  $\lambda$  < air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.

An electronic circuit controls the pump current through the oxygen pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at  $\lambda = 1$ . Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).





## CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5 V

# On Board Diagnosis 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 0132 (Bank 1)	Air fuel ratio (A/F) sensor 1	The A/F signal computed by ECM from the A/F	Harness or connectors     (The A/F sensor 1 circuit is open or
P0152 0152 (Bank 2)	circuit high voltage	sensor 1 signal is constantly approx. 5 V.	shorted.) • A/F sensor 1

## **DTC Confirmation Procedure**

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds. 1.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

**EC-923** Revision: 2009 June 2010 M35/M45

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### **DTC P0132, P0152 A/F SENSOR 1**

[VK45DE]

## (II) WITH CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication. If the indication is constantly approx. 5 V, go to <a href="EC-928">EC-928</a>, "Diagnosis Procedure". If the indication is not constantly approx. 5 V, go to next step.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Turn ignition switch OFF and wait at least 10 seconds.
- 7. Restart engine.
- 8. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
- 9. Maintain the following conditions for approximately 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 MPH)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever position	Suitable position

#### NOTE:

- Keep the accelerator pedal as steady as possible during cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 7, return to step 4.
- 10. Check 1st trip DTC.
- 11. If 1st trip DTC is displayed, go to EC-928, "Diagnosis Procedure".

### WITH GST

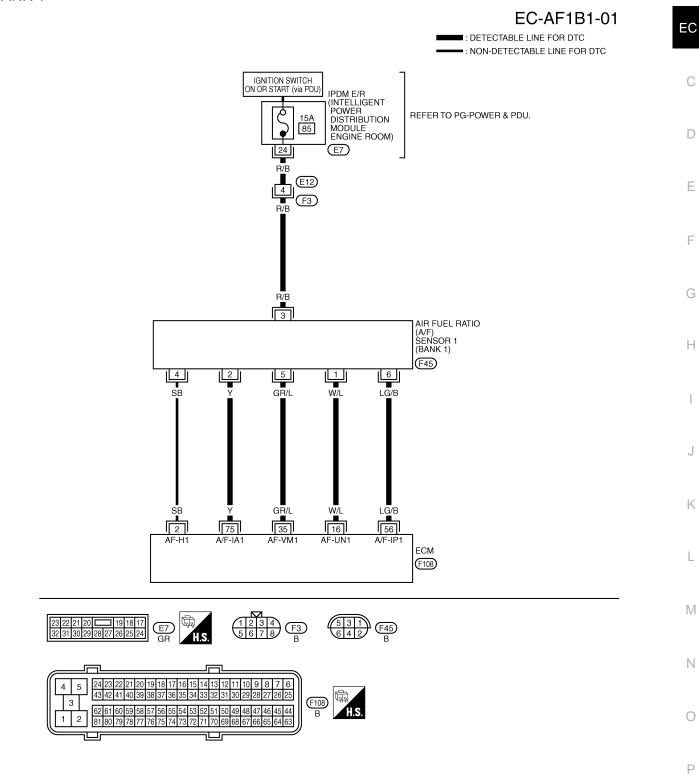
Follow the procedure "WITH CONSULT-III" above.

[VK45DE]

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Wiring Diagram

BANK 1



TBWT1046E

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III. CAUTION:

# **DTC P0132, P0152 A/F SENSOR 1**

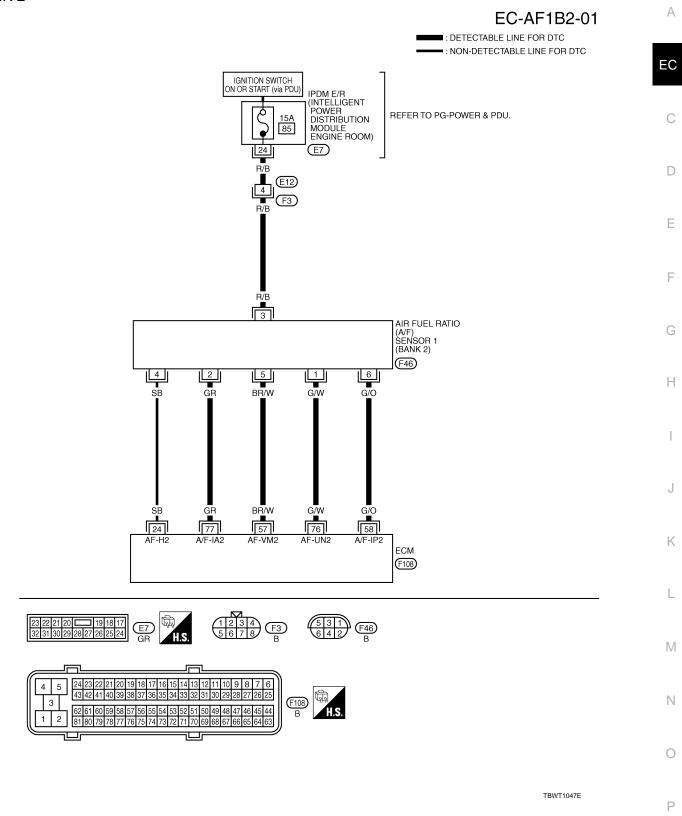
< SERVICE INFORMATION >

[VK45DE]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	SB	A/F sensor 1 heater (bank 1)	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Approximately 5 V★  → 10.0V/Div 10 ms/Div T  PBIB1584E
16	W/L		[Engine is running] • Warm-up condition • Idle speed	Approximately 3.1 V
35	GR/L	A/E consor 1 (bank 1)		Approximately 2.6 V
56	LG/B	A/F sensor i (bank i)		Approximately 2.3 V
75	Υ			Approximately 2.3 V

<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)





Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	SB	A/F sensor 1 heater (bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5 V★  → 10.0V/Div 10 ms/Div T  PBIB1584E
57	BR/W			Approximately 2.6 V
58	G/O	A/E concer 4 (bonk 2)	[Engine is running]  • Warm-up condition	Approximately 2.3 V
76	G/W	A/F sensor 1 (bank 2)	Warm-up condition     Idle speed	Approximately 3.1 V
77	GR			Approximately 2.3 V

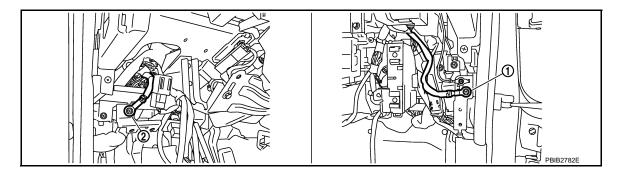
<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# Diagnosis Procedure

INFOID:0000000005354068

# 1. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

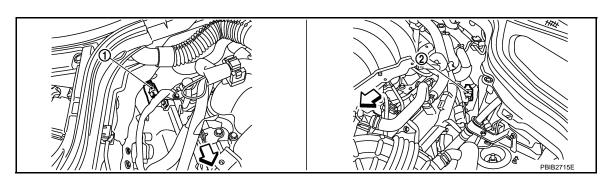
### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

# 2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



⟨
⇒ : Vehicle front

- A/F sensor 1 (bank 2) harness connector
- A/F sensor 1 (bank 1) harness connector

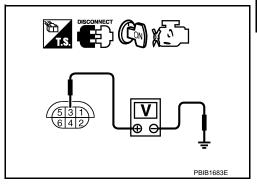
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- 2. Turn ignition switch ON.
- 3. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-III or tester.

Voltage: Battery voltage

### OK or NG

OK >> GO TO 4. NG >> GO TO 3.



# 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- IPDM E/R harness connector E7
- 15 A fuse
- 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 harness continuity between A/F sensor 1 terminal and ECM terminal as per the following. Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
	1	16
Bank1	2	75
Daliki	5	35
	6	56
	1	76
Bank 2	2	77
Dalik 2	5	57
	6	58

### Continuity should exist.

4. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

Ba	nk 1	Bank 2	
A/F sensor 1 terminal ECM terminal		A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

Continuity should not exist.

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### **DTC P0132, P0152 A/F SENSOR 1**

### < SERVICE INFORMATION >

[VK45DE]

5. Also check harness for short to power.

### OK or NG

OK >> GO TO 5.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

# 5. CHECK INTERMITTENT INCIDENT

Perform EC-822, "Diagnosis Procedure".

#### OK or NG

OK >> GO TO 6.

NG >> Repair or replace malfunctioning part.

 $\mathbf{6}.$ REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1.

#### **CAUTION:**

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

#### >> INSPECTION END

Removal and Installation

INFOID:0000000005354069

AIR FUEL RATIO (A/F) SENSOR 1 Refer to EM-178, "Component".

INFOID:0000000005354070

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# DTC P0133, P0153 A/F SENSOR 1

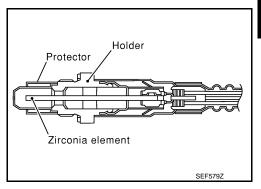
# Component Description

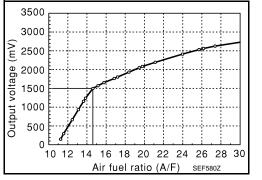
The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

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 (0.7 <  $\lambda$  < air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.

An electronic circuit controls the pump current through the oxygen pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at  $\lambda$  = 1. Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).





## CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5 V

# On Board Diagnosis Logic

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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 0133 (Bank 1)	Air fuel ratio (A/F) sensor 1	The response of the A/F signal computed by	Harness or connectors     (The A/F sensor 1 circuit is open or shorted.)     A/F sensor 1     A/F sensor 1 heater	_
P0153 circuit slow response 0153 (Bank 2)	than the specified time.	<ul> <li>Fuel pressure</li> <li>Fuel injector</li> <li>Intake air leakage</li> <li>Exhaust gas leakage</li> <li>PCV</li> <li>Mass air flow sensor</li> </ul>		

### **DTC Confirmation Procedure**

INFOID:0000000005354073

#### NOTE

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

Revision: 2009 June **EC-931** 2010 M35/M45

### DTC P0133, P0153 A/F SENSOR 1

### < SERVICE INFORMATION >

[VK45DE]

- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

### (II) WITH CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
- Let engine idle for 1 minute.
- 7. Select "A/F SEN1(B1) P1278/P1279" (for DTC P0133) or "A/F SEN1(B2) P1288/P1289" (for DTC P0153) of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 8. Touch "START".
  - If "COMPLETED" appears on CONSULT-III screen, go to step 12. If "COMPLETED" does not appear on CONSULT-III screen, go to the following step.
- 9. After perform the following procedure, "TESTING" will be displayed on the CONSULT-III screen.
- a. Increase the engine speed to between 4,000 and 5,000 rpm and maintain that speed for 10 seconds.
- Fully release accelerator pedal and then let engine idle for approximately 10 seconds.
   If "TESTING" is not displayed after 10 seconds, go to <u>EC-814</u>, "Inspection Procedure".
- Wait for approximately 20 seconds at idle at under the condition that "TESTING" is displayed on the CON-SULT-III screen.
- 11. Check that "TESTING" changes to "COMPLETED".
  - If "TESTING" changed to "OUT OF CONDITION", go to EC-814, "Inspection Procedure".
- 12. Check that "OK" is displayed after touching "SELF-DIAG RESULT". If "NG" is displayed, go to <a href="EC-936">EC-936</a>. "Diagnosis Procedure".

### WITH GST

- 1. Start engine and warm it up to normal operating temperature.
- Select Service \$01 with GST.
- 3. Calculate the total value of "Short term fuel trim" and "Long term fuel trim" indications.

Make sure that the total percentage should be within  $\pm$  15%.

If OK, go to the following step.

If NG, check the following.

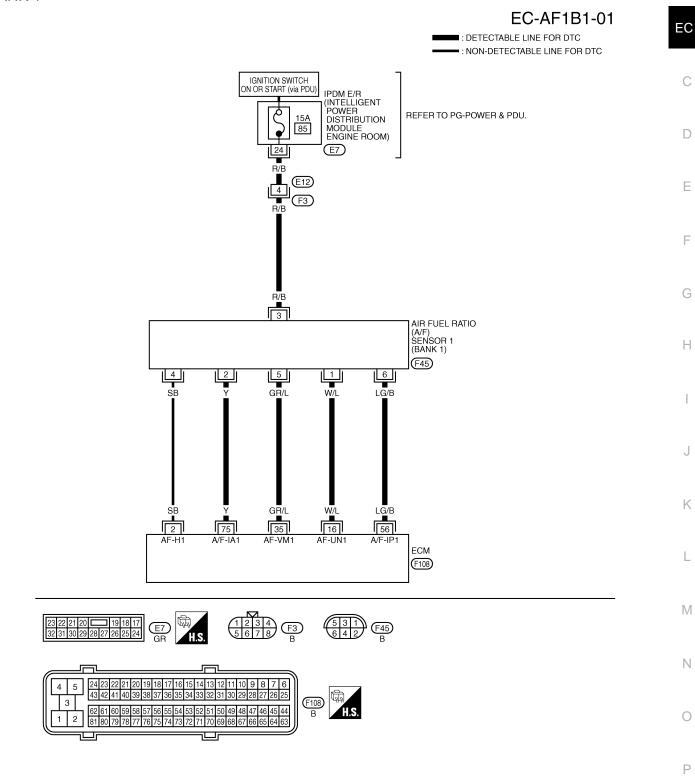
- Intake air leakage
- Exhaust gas leakage
- Incorrect fuel pressure
- Lack of fuel
- Fuel injector
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- 7. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 8. Let engine idle for 1 minute.
- 9. Increase the engine speed to between 4,000 and 5,000 rpm and maintain that speed for 10 seconds.
- 10. Fully release accelerator pedal and then let engine idle for approximately 1 minute.
- 11. Check 1st trip DTC.
- 12. If 1st trip DTC is displayed, go to EC-936, "Diagnosis Procedure".

[VK45DE]

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Wiring Diagram

BANK 1



TBWT1046E

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III. CAUTION:

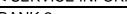
# **DTC P0133, P0153 A/F SENSOR 1**

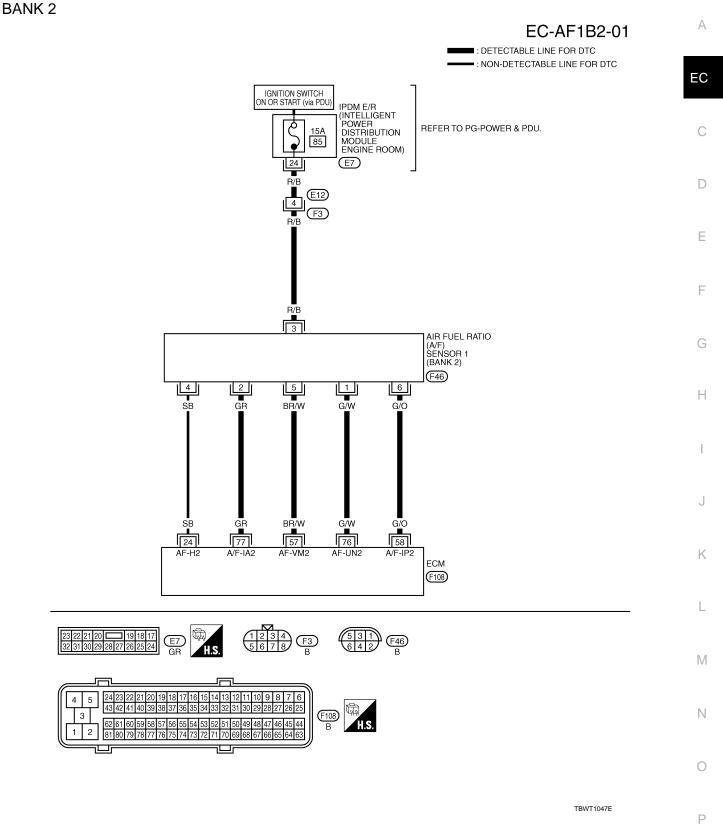
< SERVICE INFORMATION >

[VK45DE]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	SB	A/F sensor 1 heater (bank 1)	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Approximately 5 V★  → 10.0V/Div 10 ms/Div T  PBIB1584E
16	W/L	- A/F sensor 1 (bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 3.1 V
35	GR/L			Approximately 2.6 V
56	LG/B			Approximately 2.3 V
75	Υ			Approximately 2.3 V

<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)





Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	SB	A/F sensor 1 heater (bank 2)	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Approximately 5 V★  → 10.0V/Div 10 ms/Div T  PBIB1584E
57	BR/W	A/F sensor 1 (bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 2.6 V
58	G/O			Approximately 2.3 V
76	G/W			Approximately 3.1 V
77	GR			Approximately 2.3 V

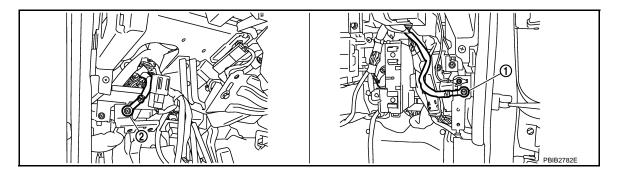
<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# Diagnosis Procedure

INFOID:0000000005354075

# 1. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".



1. Body ground M70

2. Body ground M16

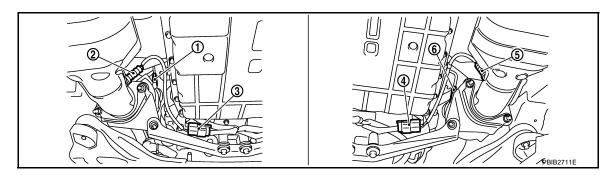
### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

# $2.\mathtt{RETIGHTEN}$ AIR FUEL RATIO (A/F) SENSOR 1

1. Loosen and retighten the air fuel ratio (A/F) sensor 1.



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- 1. A/F sensor 1 (bank 1)
- 2. Heated oxygen sensor 2 (bank 1)
- Heated oxygen sensor 2 (bank 1) harness connector

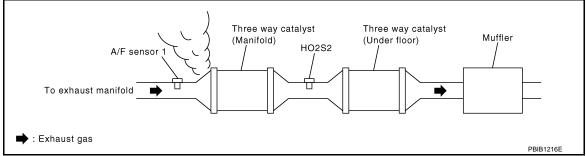
- Heated oxygen sensor 2 (bank 2) harness connector
- 5. Heated oxygen sensor 2 (bank 2)
- A/F sensor 1 (bank 2)

Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

## 3.CHECK EXHAUST GAS LEAKAGE

- 1. Start engine and run it at idle.
- Listen for an exhaust gas leakage before three way catalyst (manifold).



### OK or NG

OK >> GO TO 4.

NG >> Repair or replace malfunctioning part.

## 4. CHECK FOR INTAKE AIR LEAKAGE

Listen for an intake air leakage after the mass air flow sensor.

## OK or NG

OK >> GO TO 5.

NG >> Repair or replace malfunctioning part.

## 5.CLEAR THE SELF-LEARNING DATA

#### With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
- 3. Clear the self-learning control coefficient by touching "CLEAR".
- 4. Run engine for at least 10 minutes at idle speed.
  Is the 1st trip DTC P0171, P172, P0174 or P0175 detected? Is it difficult to start engine?

## **Without CONSULT-III**

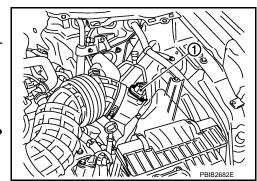
- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF.
- Disconnect mass air flow sensor (1) harness connector.
- Restart engine and let it idle for at least 5 seconds.
- Stop engine and reconnect mass air flow sensor harness connector.
- Check that DTC P0102 is displayed.
- Erase the DTC.
- 8. Check trhat DTC P0000 is displayed.
- Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?

Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?

#### Yes or No

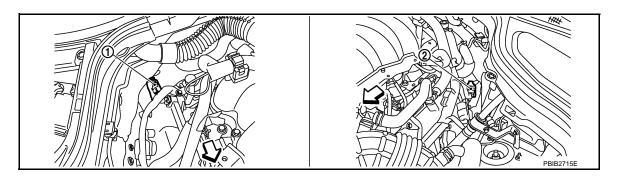
Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to <u>EC-975</u>, "<u>Diagnosis Procedure</u>" or <u>EC-984</u>, "<u>Diagnosis Procedure</u>".

No >> GO TO 6.



## 6. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector.



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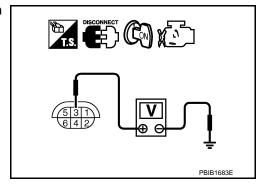
- A/F sensor 1 (bank 2) harness connector
- A/F sensor 1 (bank 1) harness connector

- 2. Turn ignition switch ON.
- 3. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-III or tester.

**Voltage: Battery voltage** 

### OK or NG

OK >> GO TO 8. NG >> GO TO 7.



## 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- IPDM E/R harness connector E7
- 15 A fuse
- · Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

## $8.\mathsf{CHECK}$ A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check harness continuity between A/F sensor 1 terminal and ECM terminal as per the following. Refer to Wiring Diagram.

	1	40
		16
Bank1	2	75
Daliki	5	35
	6	56
	1	76
Bank 2	2	77
Dalik 2	5	57
	6	58

### Continuity should exist.

#### [VK45DE] < SERVICE INFORMATION >

Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

Ba	nk 1	Bank 2		
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal	
1	16	1	76	
2	75	2	77	
5	35	5	57	
6	56	6	58	

## Continuity should not exist.

Also check harness for short to power.

### OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 9.CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-851, "Component Inspection".

#### OK or NG

OK >> GO TO 10.

NG >> GO TO 13.

## 10.CHECK MASS AIR FLOW SENSOR

Refer to EC-879. "Component Inspection".

#### OK or NG

OK >> GO TO 11.

NG >> Replace mass air flow sensor.

## 11. CHECK PCV VALVE

Refer to EC-731, "Component Inspection".

#### OK or NG

OK >> GO TO 12.

NG >> Repair or replace PCV valve.

## 12. CHECK INTERMITTENT INCIDENT

Perform EC-822, "Diagnosis Procedure".

### OK or NG

OK >> GO TO 13.

NG >> Repair or replace malfunctioning part.

## 13.replace air fuel ratio (a/f) sensor 1

Replace malfunctioning air fuel ratio (A/F) sensor 1.

#### **CAUTION:**

 Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

 Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

#### >> INSPECTION END

Removal and Installation

AIR FUEL RATIO (A/F) SENSOR 1 Refer to EM-178, "Component".

Revision: 2009 June 2010 M35/M45

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**EC-939** 

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## DTC P0137, P0157 HO2S2

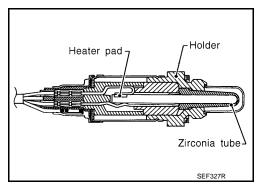
## Component Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



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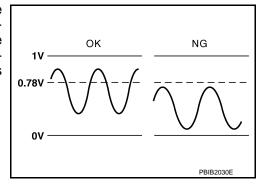
### CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	Revving engine from idle to 3,000 rpm quickly after the following conditions are met.	0 - 0.3 V ←→ Approx. 0.6 - 1.0 V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	<ul> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	$LEAN \longleftrightarrow RICH$

## On Board Diagnosis 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 malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during various driving conditions such as fuel cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0137 0137 (Bank 1)	Heated oxygen sensor 2	The maximum voltage from the sensor does not	Harness or connectors     (The sensor circuit is open or shorted)     Heated oxygen sensor 2
P0157 0157 (Bank 2)	circuit low voltage	reach the specified voltage.	<ul><li>Fuel pressure</li><li>Fuel injector</li><li>Intake air leakage</li></ul>

### **DTC Confirmation Procedure**

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#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### WITH CONSULT-III

Revision: 2009 June **EC-940** 2010 M35/M45

< SERVICE INFORMATION > [VK45DE]

#### **TESTING CONDITION:**

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

- 1. Start engine and warm it up to 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.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 6. Let engine idle for 1 minute.
- 7. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III.
- 8. Check that "COOLAN TEMP/S" indication is more than 70°C (158°F).

  If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
- 9. Open engine hood.
- 10. Select "HO2S2 (B1) P1147" (for DTC P0137) or "HO2S2 (B2) P1167" (for DTC P0157) of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 11. Follow the instructions displayed.

#### NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

- 12. Check that "OK" is displayed after touching "SELF-DIAG RESULTS".
  - If "NG" is displayed, go to EC-945, "Diagnosis Procedure".
  - If "CAN NOT BE DIAGNOSED" is displayed, perform the following procedure.
- a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- b. Return to step 1.

#### Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

#### WITH GST

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- 5. Set voltmeter probes between ECM terminal 55 [HO2S2 (B1) signal] and ground, or 74 [HO2S2 (B2) signal] and ground.
- 6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
  - (Depress and release accelerator pedal as soon as possible.)
  - The voltage should be above 0.78 V at least once during this procedure.
  - If the voltage can be confirmed in step 6, step 7 is not necessary.
- Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in the D position.
  - The voltage should be above 0.78 V at least once during this procedure.
- 8. If NG, go to EC-945, "Diagnosis Procedure".

ECM OCONNECTOR 2...3.4.55

55: Bank 1
74: Bank 2

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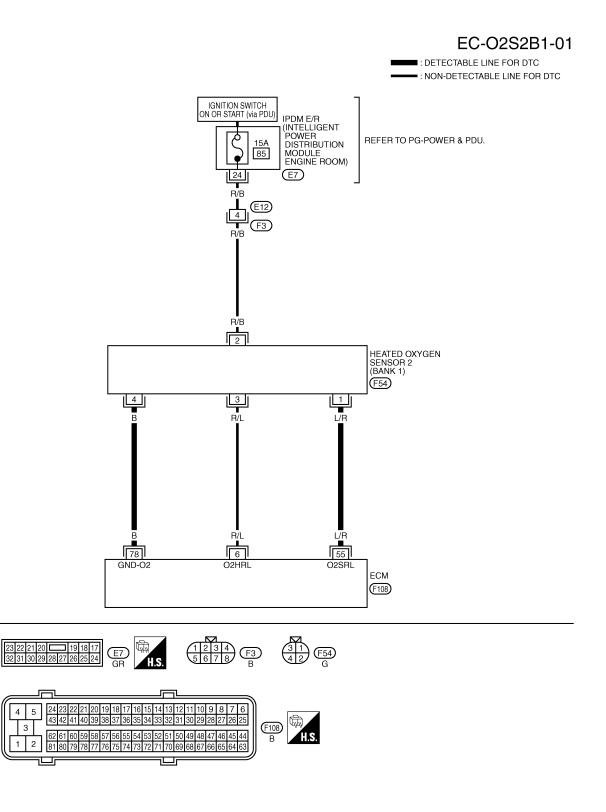
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Revision: 2009 June **EC-941** 2010 M35/M45

Wiring Diagram

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### BANK 1



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Specification data are reference values and are measured between each terminal and ground.

### **CAUTION:**

Never 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 P0137, P0157 HO2S2

< SERVICE INFORMATION >

[VK45DE]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	А
6	R/L	Heated oxygen sensor 2 heater (bank 1)	<ul> <li>[Engine is running]</li> <li>Engine speed: Below 3,600 rpm after the following conditions are met</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0 V	EC C
			[Ignition switch: ON] • Engine: Stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)	D E
55	L/R	Heated oxygen sensor 2 (bank 1)	<ul> <li>[Engine is running]</li> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - Approximately 1.0 V	F
78	В	Sensor ground (Heated oxygen sensor 2)	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Approximately 0 V	Н

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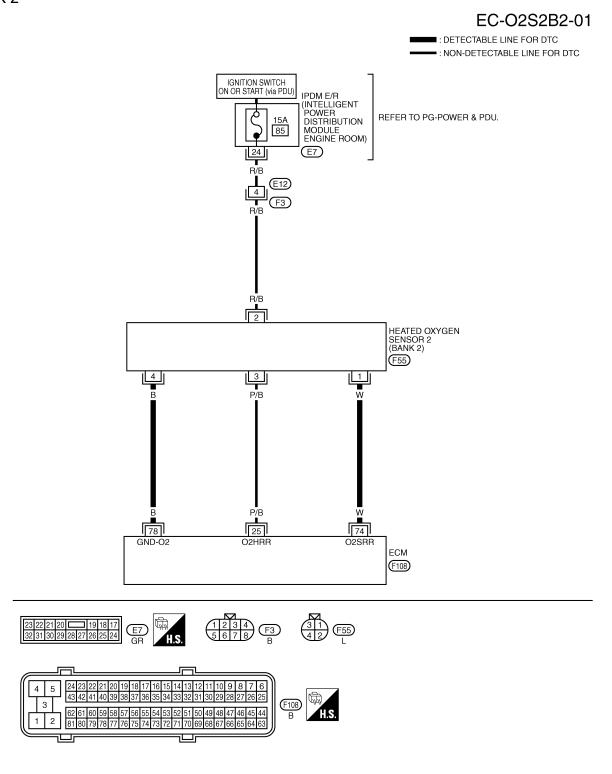
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BANK 2



TBWT1021E

Specification data are reference values and are measured between each terminal and ground.

#### **CAUTION:**

Never 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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### < SERVICE INFORMATION >

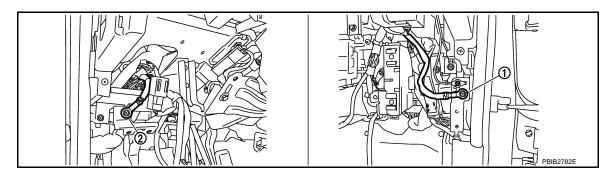
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	P/B	Heated oxygen sensor 2 heater (bank 2)	<ul> <li>[Engine is running]</li> <li>Engine speed: Below 3,600 rpm after the following conditions are met</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0 V
			[Ignition switch: ON] • Engine: Stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
74	W	Heated oxygen sensor 2 (bank 2)	<ul> <li>[Engine is running]</li> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - Approximately 1.0 V
78	В	Sensor ground (Heated oxygen sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V

## Diagnosis Procedure

## 1. CHECK GROUND CONNECTIONS

Turn ignition switch OFF.

Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

## 2.CLEAR THE SELF-LEARNING DATA

### (P) With CONSULT-III

Start engine and warm it up to normal operating temperature.

- Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
- Clear the self-learning control coefficient by touching "CLEAR".
- Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine?

#### Without CONSULT-Ⅲ

Start engine and warm it up to normal operating temperature.

**EC-945** Revision: 2009 June 2010 M35/M45

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#### < SERVICE INFORMATION >

- Turn ignition switch OFF.
- Disconnect mass air flow sensor (1) harness connector, and restart and run engine for at least 5 seconds at idle speed.
- Stop engine and reconnect mass air flow sensor harness connector.
- 5. Check that DTC P0102 is displayed.
- Erase DTC.
- 7. Check that DTC P0000 is displayed.
- 8. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine?

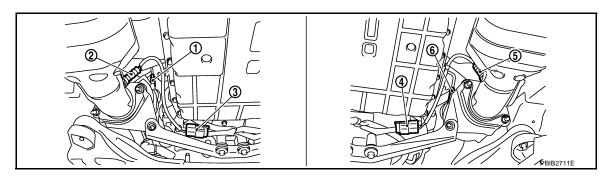
#### Yes or No

Yes >> Perform trouble diagnosis for DTC P0171 or P0174. Refer to EC-975, "Diagnosis Procedure".

No >> GO TO 3.

## 3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect heated oxygen sensor 2 (HO2S2) harness connector.



- 1. Air fuel ratio (A/F) sensor 1 (bank 1) 2. Heated oxygen sensor 2 (bank 1)
- 3. Heated oxygen sensor 2 (bank 1) harness connector

- 4. Heated oxygen sensor 2 (bank 2) harness connector
- 5. Heated oxygen sensor 2 (bank 2)
- 6. Air fuel ratio (A/F) sensor 1 (bank 2)

- Disconnect ECM harness connector.
- Check harness continuity between ECM terminal 78 and HO2S2 terminal 4. Refer to Wiring Diagram.

#### Continuity should exist.

5. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 4.

NG >> 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

Check harness continuity between ECM terminal and HO2S2 terminal as per the following. Refer to Wiring Diagram.

DTC	Term	Bank	
ыс	ECM	Sensor	Balik
P0137	55	1	1
P0157	74	1	2

#### Continuity should exist.

Check harness continuity between the following terminals and ground.

#### [VK45DE]

#### < SERVICE INFORMATION >

Refer to Wiring Diagram.

DTC	Tern	Bank	
ыс	ECM	Sensor	Dalik
P0137	55	1	1
P0157	74	1	2

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### Continuity should not exist.

3. Also check harness for short to power.

#### OK or NG

OK >> GO TO 5.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-947, "Component Inspection".

#### OK or NG

OK >> GO TO 6.

NG >> Replace malfunctioning heated oxygen sensor 2.

## 6.CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

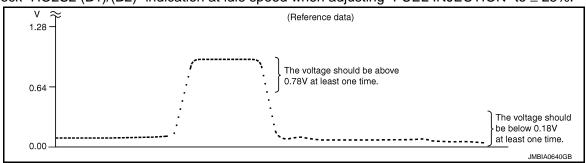
## Component Inspection

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#### **HEATED OXYGEN SENSOR 2**

#### (P) With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-III.
- Check "HO2S2 (B1)/(B2)" indication at idle speed when adjusting "FUEL INJECTION" to ± 25%.



"HO2S2 (B1)/(B2)" should be above 0.78 V at least once when the "FUEL INJECTION" is + 25%. "HO2S2 (B1)/(B2)" should be below 0.18 V at least once when the "FUEL INJECTION" is – 25%.

#### **CAUTION:**

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

CONNECTOR

**ECM** 

55: Bank 1

74: Bank 2

#### < SERVICE INFORMATION >

- Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Set voltmeter probes between ECM terminal 55 [HO2S2 (B1) signal] and ground, or 74 [HO2S2 (B2) signal] and ground.
- 6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.

(Depress and release accelerator pedal as soon as possible.)

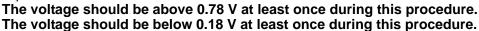
The voltage should be above 0.78 V at least once during

The voltage should be above 0.78 V at least once during this procedure.

The voltage should be below 0.18 V at least once during this procedure.

If the voltage can be confirmed at step 6, step 7 is not necessary.

7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in the D position.



8. If NG, replace heated oxygen sensor 2.

#### **CAUTION:**

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

Removal and Installation

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**HEATED OXYGEN SENSOR 2** 

Refer to EM-178, "Component".

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## DTC P0138, P0158 HO2S2

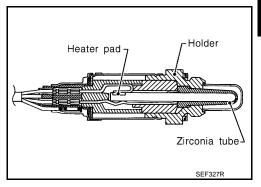
## Component Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



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## CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

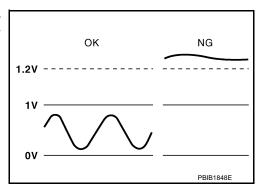
MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	Revving engine from idle to 3,000 rpm quickly after the following conditions are met.	0 - 0.3 V ←→ Approx. 0.6 - 1.0 V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	<ul> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	$LEAN \longleftrightarrow RICH$

## On Board Diagnosis 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.

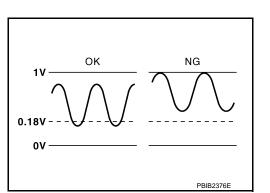
### **MALFUNCTION A**

To judge malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during various driving conditions such as fuel cut.



#### **MALFUNCTION B**

To judge malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during various driving conditions such as fuel cut.



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**EC-949** Revision: 2009 June 2010 M35/M45

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0138 0138 (Bank 1)		A)	An excessively high voltage from the sensor is sent to ECM.	Harness or connectors     (The sensor circuit is open or shorted)     Heated oxygen sensor 2
P0158 0158 (Bank 2)	Heated oxygen sensor 2 circuit high voltage	B)	The minimum voltage from the sensor is not reached to the specified voltage.	Harness or connectors     (The sensor circuit is open or shorted)     Heated oxygen sensor 2     Fuel pressure     Fuel injector

#### **DTC Confirmation Procedure**

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#### Perform PROCEDURE FOR MALFUNCTION A first.

# If 1st trip DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B. NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

#### PROCEDURE FOR MALFUNCTION A

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 2 minutes.
- 7. Check 1st trip DTC.
- 8. If 1st trip DTC is detected, go to <a href="EC-955">EC-955</a>. "Diagnosis Procedure".

#### PROCEDURE FOR MALFUNCTION B

#### (P) With CONSULT-III

### **TESTING CONDITION:**

#### For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30 °C (32 to 86 °F).

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III.
- 6. Check that "COOLAN TEMP/S" indication is more than 70°C (158°F). If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
- 7. Open engine hood.
- Select "HO2S2 (B1) P1146" (for DTC P0138) or "HO2S2 (B2) P1166" (for DTC P0158) of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 9. Follow the instructions displayed.

#### NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

- 10. Check that "OK" is displayed after touching "SELF-DIAG RESULTS".
  - If "NG" is displayed, go to EC-955, "Diagnosis Procedure".
  - If "CAN NOT BE DIAGNOSED" is displayed, perform the following procedure.
- a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- b. Return to step 1.

## **Overall Function Check**

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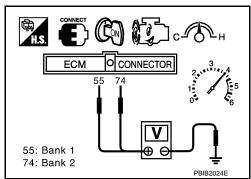
### PROCEDURE FOR MALFUNCTION B

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

#### With GST

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Set voltmeter probes between ECM terminal 55 [HO2S2 (B1) signal] and ground, or 74 [HO2S2 (B2) signal] and ground.
- 6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
  - (Depress and release accelerator pedal as soon as possible.)

    The voltage should be below 0.18 V at least once during this
  - If the voltage can be confirmed in step 6, step 7 is not necessary.
- Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in the D position.
  - The voltage should be below 0.18 V at least once during this procedure.
- 8. If NG, go to EC-955, "Diagnosis Procedure".



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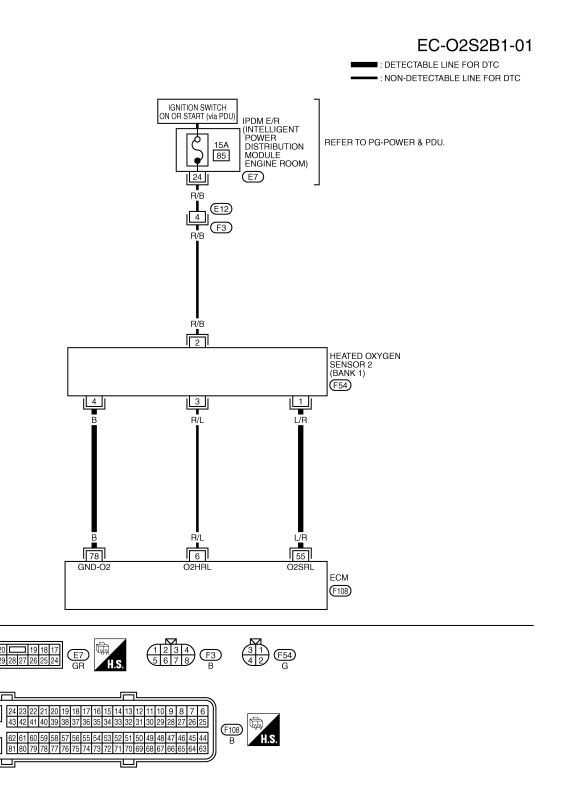
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Wiring Diagram

INFOID:0000000005354091

### BANK 1



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Specification data are reference values and are measured between each terminal and ground.

### **CAUTION:**

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Never 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 P0138, P0158 HO2S2

< SERVICE INFORMATION >

[VK45DE]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	А
6	R/L	Heated oxygen sensor 2 heater (bank 1)	<ul> <li>[Engine is running]</li> <li>Engine speed: Below 3,600 rpm after the following conditions are met</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0 V	EC C
			[Ignition switch: ON] • Engine: Stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)	D E
55	L/R	Heated oxygen sensor 2 (bank 1)	<ul> <li>[Engine is running]</li> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - Approximately 1.0 V	F
78	В	Sensor ground (Heated oxygen sensor 2)	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Approximately 0 V	Н

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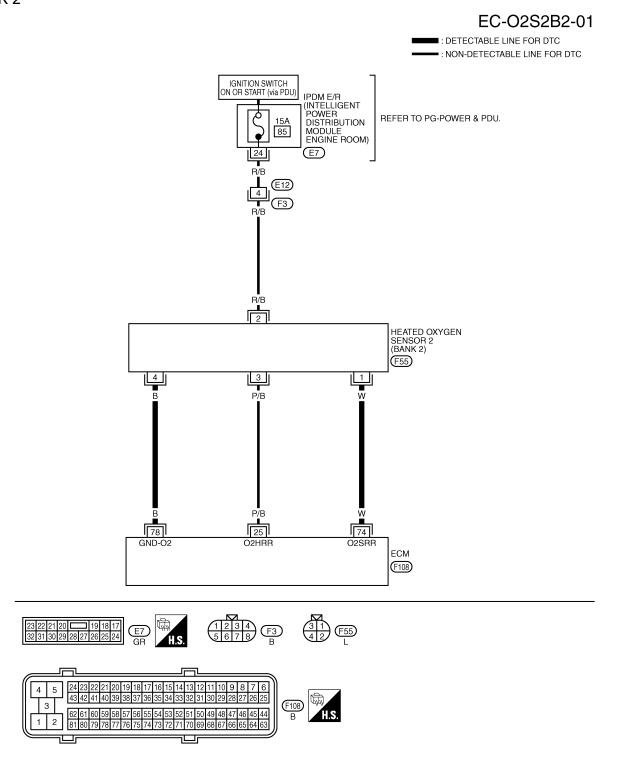
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BANK 2



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Specification data are reference values and are measured between each terminal and ground.

#### **CAUTION:**

Never 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.

#### < SERVICE INFORMATION >

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	P/B	Heated oxygen sensor 2 heater (bank 2)	<ul> <li>[Engine is running]</li> <li>Engine speed: Below 3,600 rpm after the following conditions are met</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0 V
			[Ignition switch: ON] • Engine: Stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
74	w	Heated oxygen sensor 2 (bank 2)	<ul> <li>[Engine is running]</li> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - Approximately 1.0 V
78	В	Sensor ground (Heated oxygen sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V

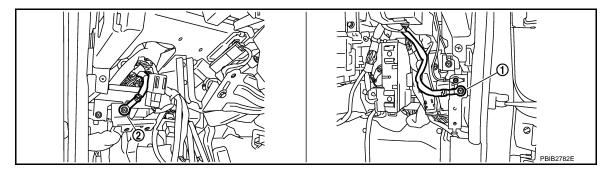
## Diagnosis Procedure

INFOID:0000000005354092

## PROCEDURE FOR MALFUNCTION A

## 1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

## 2.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect heated oxygen sensor 2 (HO2S2) harness connector.

**EC-955** Revision: 2009 June 2010 M35/M45

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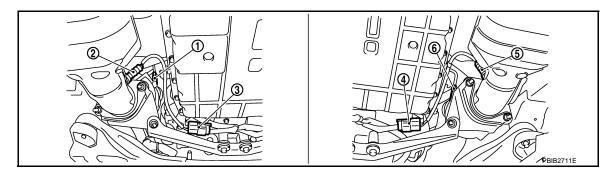
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- 1. Air fuel ratio (A/F) sensor 1 (bank 1) 2. Heated oxygen sensor 2 (bank 1)
- 3. Heated oxygen sensor 2 (bank 1) harness connector

- 4. Heated oxygen sensor 2 (bank 2) harness connector
- 5. Heated oxygen sensor 2 (bank 2)
- 6. Air fuel ratio (A/F) sensor 1 (bank 2)

- Disconnect ECM harness connector.
- Check harness continuity between ECM terminal 78 and HO2S2 terminal 4. Refer to Wiring Diagram.

### Continuity should exist.

5. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 3.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 3.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check harness continuity between ECM terminal and HO2S2 terminal as per the following. Refer to Wiring Diagram.

DTC	Tern	Bank	
ыс	ECM	Sensor	Dank
P0138	55	1	1
P0158	74	1	2

#### Continuity should exist.

Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
ыс	ECM	Sensor	Balik
P0138	55	1	1
P0158	74	1	2

### Continuity should not exist.

3. Also check harness for short to power.

#### OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

## Water should not exist.

### DTC P0138, P0158 HO2S2

## [VK45DE] < SERVICE INFORMATION > OK or NG Α OK >> GO TO 5. NG >> Repair or replace harness or connectors. 5. CHECK HEATED OXYGEN SENSOR 2 EC Refer to EC-959, "Component Inspection". OK or NG OK >> GO TO 6. NG >> Replace malfunctioning heated oxygen sensor 2. 6.CHECK INTERMITTENT INCIDENT D Refer to EC-822, "Diagnosis Procedure". >> INSPECTION END Е PROCEDURE FOR MALFUNCTION B 1. CHECK GROUND CONNECTIONS Turn ignition switch OFF. Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection". Н **(1)** 1. Body ground M70 2. Body ground M16 OK or NG OK >> GO TO 2. NG >> Repair or replace ground connections. 2.CLEAR THE SELF-LEARNING DATA L (P) With CONSULT-III Start engine and warm it up to normal operating temperature. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III. 3. Clear the self-learning control coefficient by touching "CLEAR". 4. Run engine for at least 10 minutes at idle speed. Ν Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine? (R) Without CONSULT-III Start engine and warm it up to normal operating temperature. Turn ignition switch OFF.

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#### [VK45DE]

#### < SERVICE INFORMATION >

- Disconnect mass air flow sensor (1) harness connector, and restart and run engine for at least 5 seconds at idle speed.
- Stop engine and reconnect mass air flow sensor harness connector.
- 5. Check that DTC P0102 is displayed.
- Erase the DTC.
- 7. Check that DTC P0000 is displayed.
- 8. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine?

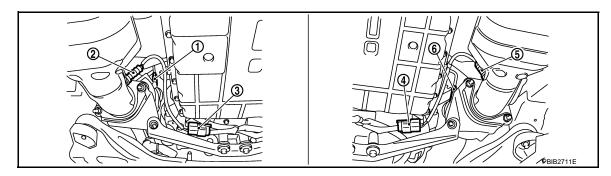
### Yes or No

Yes >> Perform trouble diagnosis for DTC P0172, P0175. Refer to <u>EC-984</u>, "<u>Diagnosis Procedure"</u>.

No >> GO TO 3.

## 3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 harness connector.



- 1. Air fuel ratio (A/F) sensor 1 (bank 1) 2. I
- Heated oxygen sensor 2 (bank 1)
- 4. Heated oxygen sensor 2 (bank 2) harness connector
- 5. Heated oxygen sensor 2 (bank 2)
- Heated oxygen sensor 2 (bank 1) harness connector
- 6. Air fuel ratio (A/F) sensor 1 (bank 2)

- 3. Disconnect ECM harness connector.
- 4. Check harness continuity between ECM terminal 78 and HO2S2 terminal 4. Refer to Wiring Diagram.

### Continuity should exist.

5. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 4.

NG >> 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

 Check harness continuity between ECM terminal and HO2S2 terminal as per the following. Refer to Wiring Diagram.

DTC	Tern	Bank	
ыс	ECM	Sensor	Balik
P0138	55	1	1
P0158	74	1	2

#### Continuity should exist.

Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

#### < SERVICE INFORMATION >

DTC	Terminals		Bank	
DIC	ECM	Sensor	Dalik	
P0138	55	1	1	
P0158	74	1	2	

## EC

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#### Continuity should not exist.

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Also check harness for short to power.

### OK or NG

OK >> GO TO 5.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-959, "Component Inspection".

#### OK or NG

OK >> GO TO 6.

NG >> Replace malfunctioning heated oxygen sensor 2.

## 6.CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

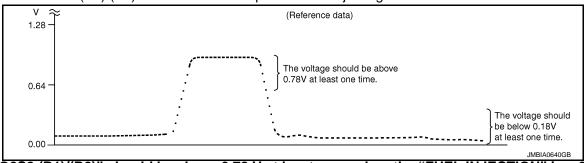
## Component Inspection

INFOID:0000000005354093

### **HEATED OXYGEN SENSOR 2**

#### (P) With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- 5. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-III.
- 6. Check "HO2S2 (B1)/(B2)" indication at idle speed when adjusting "FUEL INJECTION" to  $\pm$  25%.



"HO2S2 (B1)/(B2)" should be above 0.78 V at least once when the "FUEL INJECTION" is + 25%. "HO2S2 (B1)/(B2)" should be below 0.18 V at least once when the "FUEL INJECTION" is – 25%.

#### CALITION

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

#### Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.

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CONNECTOR

ECM

55: Bank 1 74: Bank 2

- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Set voltmeter probes between ECM terminal 55 [HO2S2 (B1) signal] and ground, or 74 [HO2S2 (B2) signal] and ground.
- 6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.

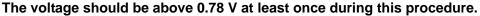
(Depress and release accelerator pedal as soon as possible.)

The voltage should be above 0.78 V at least once during this procedure.

The voltage should be below 0.18 V at least once during this procedure.

If the voltage can be confirmed at step 6, step 7 is not necessary.

7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in the D position.



The voltage should be below 0.18 V at least once during this procedure.

8. If NG, replace heated oxygen sensor 2.

#### **CAUTION:**

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

Removal and Installation

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#### **HEATED OXYGEN SENSOR 2**

Refer to EM-178, "Component".

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## DTC P0139, P0159 HO2S2

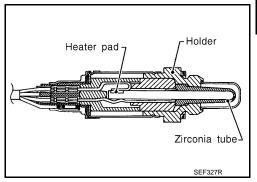
## Component Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



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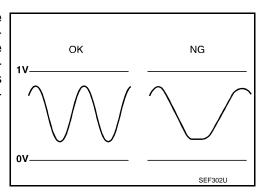
### CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	Revving engine from idle to 3,000 rpm quickly after the following conditions are met.	0 - 0.3 V ←→ Approx. 0.6 - 1.0 V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	<ul> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	$LEAN \longleftrightarrow RICH$

## On Board Diagnosis 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 malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than the specified value during various driving conditions such as fuel cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139 0139 (Bank 1)	Heated oxygen sensor 2	It takes more time for the sensor to respond be-	<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> </ul>
P0159 0159 (Bank 2)	circuit slow response	tween rich and lean than the specified time.	<ul><li>Fuel pressure</li><li>Fuel injector</li><li>Intake air leakage</li></ul>

### **DTC Confirmation Procedure**

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

#### WITH CONSULT-III

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#### **TESTING CONDITION:**

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

- Start engine and warm it up to the normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 6. Let engine idle for 1 minute.
- Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III.
- 8. Check that "COOLAN TEMP/S" indication is more than 70°C (158°F). If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
- 9. Open engine hood.
- 10. Select "HO2S2 (B1) P0139" or "HO2S2 (B2) P0159" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 11. Follow the instructions displayed.

#### NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

- 12. Check that "OK" is displayed after touching "SELF-DIAG RESULTS".
  - If "NG" is displayed, go to EC-966. "Diagnosis Procedure".
  - If "CAN NOT BE DIAGNOSED" is displayed, perform the following procedure.
- a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- b. Return to step 1.

### **Overall Function Check**

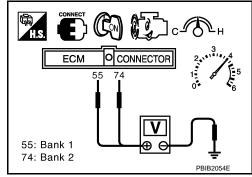
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Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

#### **® WITH GST**

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- Set voltmeter probes between ECM terminal 55 [HO2S2 (B1) signal] and ground, or 74 [HO2S2 (B2) signal] and ground.
- 6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
  - (Depress and release accelerator pedal as soon as possible.)

    A change of voltage should be more than 0.12 V for 1 second during this procedure.
  - If the voltage can be confirmed in step 6, step 7 is not necessary.
- Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in the D position.
  - A change of voltage should be more than 0.12V for 1 second during this procedure.
- 8. If NG, go to EC-966, "Diagnosis Procedure".

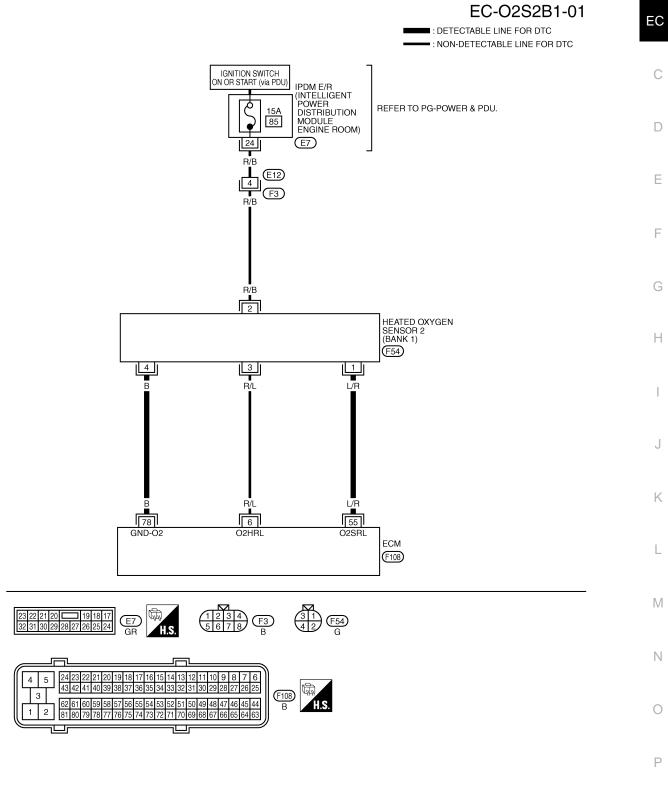


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Wiring Diagram

BANK 1



TBWT1020E

Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

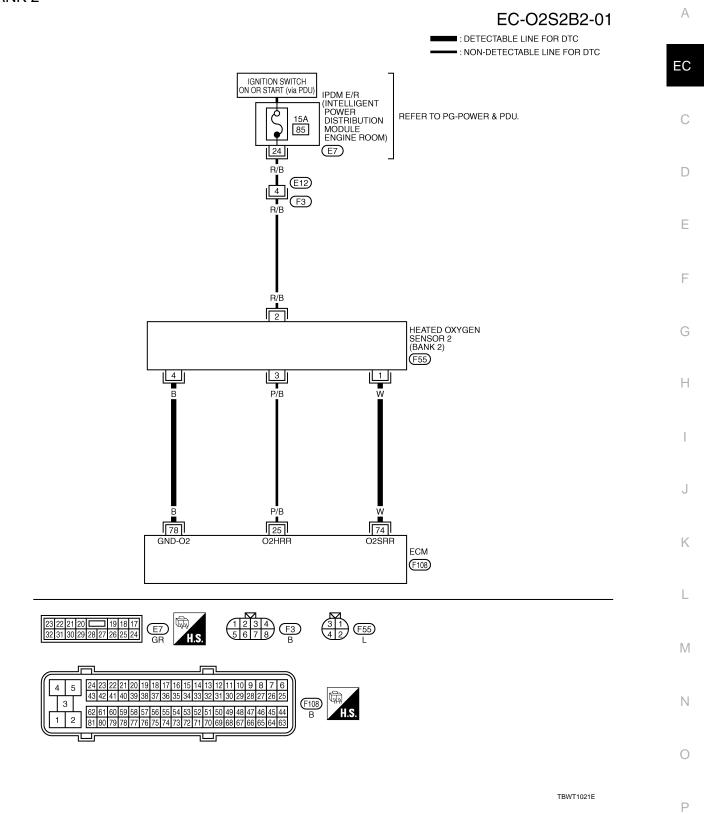
Never use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

## < SERVICE INFORMATION >

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	R/L	Heated oxygen sensor 2 heater (bank 1)	<ul> <li>[Engine is running]</li> <li>Engine speed: Below 3,600 rpm after the following conditions are met</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0 V
			<ul> <li>[Ignition switch: ON]</li> <li>Engine: Stopped</li> <li>[Engine is running]</li> <li>Engine speed: Above 3,600 rpm</li> </ul>	BATTERY VOLTAGE (11 - 14 V)
55	L/R	Heated oxygen sensor 2 (bank 1)	<ul> <li>[Engine is running]</li> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - Approximately 1.0 V
78	В	Sensor ground (Heated oxygen sensor 2)	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Approximately 0 V

[VK45DE]

BANK 2



Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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.

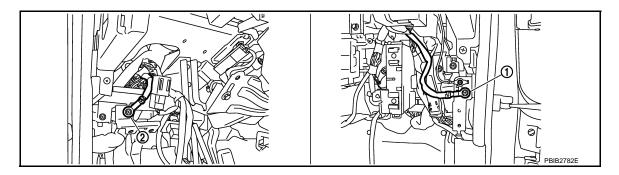
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	P/B	Heated oxygen sensor 2 heater (bank 2)	<ul> <li>[Engine is running]</li> <li>Engine speed: Below 3,600 rpm after the following conditions are met</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0 V
			[Ignition switch: ON] • Engine: Stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
74	W	Heated oxygen sensor 2 (bank 2)	<ul> <li>[Engine is running]</li> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - Approximately 1.0 V
78	В	Sensor ground (Heated oxygen sensor 2)	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Approximately 0 V

## Diagnosis Procedure

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## 1. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

## 2.CLEAR THE SELF-LEARNING DATA

### (II) With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
- 3. Clear the self-learning control coefficient by touching "CLEAR".
- 4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?

#### Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.

#### < SERVICE INFORMATION >

- Turn ignition switch OFF.
- Disconnect mass air flow sensor (1) harness connector, and 3. restart and run engine for at least 5 seconds at idle speed.
- Stop engine and reconnect mass air flow sensor harness connector.
- 5. Check that DTC P0102 is displayed.
- Erase the DTC.
- Check that DTC P0000 is displayed.
- Run engine for at least 10 minutes at idle speed.

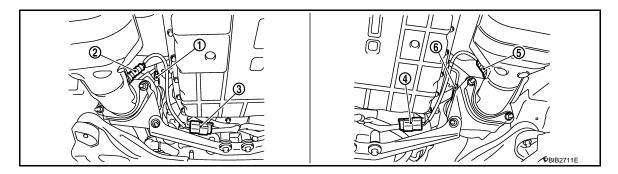
Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?

#### Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-975, "Diagnosis Procedure" or EC-984, "Diagnosis Procedure". No >> GO TO 3.

## 3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect heated oxygen sensor 2 (HO2S2) harness connector.



- 1. Air fuel ratio (A/F) sensor 1 (bank 1) 2. Heated oxygen sensor 2 (bank 1)
- 3. Heated oxygen sensor 2 (bank 1) harness connector

- Heated oxygen sensor 2 (bank 2) harness connector
- Heated oxygen sensor 2 (bank 2)
- 6. Air fuel ratio (A/F) sensor 1 (bank 2)

- Disconnect ECM harness connector.
- 4. Check harness continuity between ECM terminal 78 and HO2S2 terminal 4. Refer to Wiring Diagram.

#### Continuity should exist.

5. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## $oldsymbol{4}.$ CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check harness continuity between ECM terminal and HO2S2 terminal as per the following. Refer to Wiring Diagram.

DTC	Terminals		Bank
DIC	ECM	Sensor	Dank
P0139	55	1	1
P0159	74	1	2

#### Continuity should exist.

Check harness continuity between the following terminals and ground.

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**EC-967** Revision: 2009 June 2010 M35/M45 Refer to Wiring Diagram.

DTC	Terminals		Bank
DIC	ECM	Sensor	Balik
P0139	55	1	1
P0159	74	1	2

#### Continuity should not exist.

3. Also check harness for short to power.

#### OK or NG

OK >> GO TO 5.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 5.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-968, "Component Inspection".

#### OK or NG

OK >> GO TO 6.

NG >> Replace malfunctioning heated oxygen sensor 2.

## 6. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

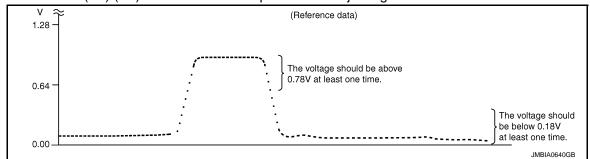
## Component Inspection

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### **HEATED OXYGEN SENSOR 2**

#### (P) With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-III.
- Check "HO2S2 (B1)/(B2)" indication at idle speed when adjusting "FUEL INJECTION" to ± 25%.



"HO2S2 (B1)/(B2)" should be above 0.78 V at least once when the "FUEL INJECTION" is + 25%. "HO2S2 (B1)/(B2)" should be below 0.18 V at least once when the "FUEL INJECTION" is – 25%.

#### **CAUTION:**

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

## < SERVICE INFORMATION > [VK45DE]

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Set voltmeter probes between ECM terminal 55 [HO2S2 (B1) signal] and ground, or 74 [HO2S2 (B2) signal] and ground.
- 6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.

(Depress and release accelerator pedal as soon as possible.)

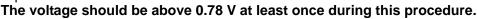
The voltage should be above 0.78 V at least once during

this procedure.

The voltage should be below 0.18 V at least once during this procedure.

If the voltage can be confirmed at step 6, step 7 is not necessary.

 Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in the D position.



The voltage should be below 0.18 V at least once during this procedure.

8. If NG, replace heated oxygen sensor 2.

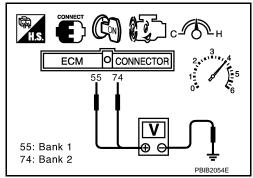
#### **CAUTION:**

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

Removal and Installation

**HEATED OXYGEN SENSOR 2** 

Refer to EM-178, "Component".



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### DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< SERVICE INFORMATION >

[VK45DE]

## DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

## On Board Diagnosis Logic

INFOID:0000000005354104

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from A/F sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (the actual mixture ratio is too lean), the ECM judges the condition as the fuel injection system malfunction and illuminates the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

	DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171 (Bank 1)  Fuel injection system too lean  P0174 0174 (Bank 2)  Fuel injection system too lean  Fuel injection system too lean  Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)  Fuel injection system too lean  Fuel injection system too lean.)  Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)  Fuel injection system too lean.	0171 (Bank 1) P0174 0174		The amount of mixture ratio compensation is too	<ul> <li>A/F sensor 1</li> <li>Fuel injector</li> <li>Exhaust gas leakage</li> <li>Incorrect fuel pressure</li> <li>Lack of fuel</li> </ul>

### **DTC Confirmation Procedure**

INFOID:0000000005354105

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

### (II) WITH CONSULT-III

- Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CON-SULT-III.
- 6. Clear the self-learning control coefficient by touching "CLEAR".
- 7. Start engine.

If it is difficult to start engine, the fuel injection system has a malfunction.

Performing the following procedure is advised.

a. Crank engine while depressing accelerator pedal.

#### NOTE:

When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

- If engine starts, go to <u>EC-975</u>, "<u>Diagnosis Procedure</u>".
   If engine does not start, check exhaust and intake air leakage visually.
- 8. Keep engine at idle for at least 5 minutes.
- Check 1st trip DTC.
- 10. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to <u>EC-975</u>, "Diagnosis Procedure".

#### NOTF:

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

### DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

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- Turn ignition switch OFF and wait at least 10 seconds.
- b. Start engine. Maintain the following conditions for at least 10 consecutive minutes.

Hold the accelerator pedal as steady as possible.

VHCL SPEED SE 50 - 120 km/h (31 - 75 MPH)

#### CAUTION:

Always drive vehicle at a safe speed.

- d. Check 1st trip DTC.
- If 1st rip DTC is detected, go to EC-975, "Diagnosis Procedure".

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- Start engine and warm it up to normal operating temperature. 1.
- Turn ignition switch OFF and wait at least 10 seconds. 2.
- Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- Disconnect mass air flow sensor (1) harness connector.
- Restart engine and let it idle for at least 5 seconds.
- Stop engine and reconnect mass air flow sensor harness connector.
- 8. Select Service \$03 with GST and check that DTC P0102 is detected.
- Select Service \$04 with GST and erase the DTC P0102.
- 10. Start engine.

If it is difficult to start engine, the fuel injection system has a malfunction.

Performing the following procedure is advised.

Crank engine while depressing accelerator pedal.

#### NOTE:

When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

- b. If engine starts, go to EC-975, "Diagnosis Procedure". If engine does not start, check exhaust and intake air leakage visually.
- Keep engine at idle for at least 5 minutes.
- 12. Check 1st trip DTC.
- 13. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to EC-975, "Diagnosis Procedure".

#### NOTE:

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

- a. Turn ignition switch OFF and wait at least 10 seconds.
- Start engine.
- c. Maintain the following conditions for at least 10 consecutive minutes.

Hold the accelerator pedal as steady as possible.

50 - 120 km/h (31 - 75 MPH) Vehicle speed

#### **CAUTION:**

Always drive vehicle at a safe speed.

- d. Check 1st trip DTC.
- If 1st rip DTC is detected, go to EC-975. "Diagnosis Procedure".

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**EC-971** Revision: 2009 June 2010 M35/M45

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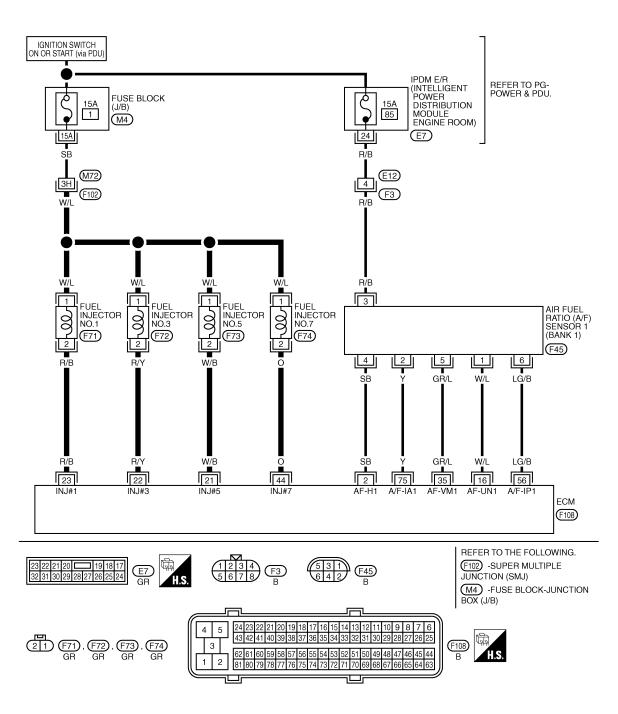
Wiring Diagram

INFOID:0000000005354106

BANK 1



: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC



TBWT1492E

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

CAUTION:

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Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	EC
2	SB	A/F sensor 1 heater (bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5 V★  → 10.0V/Div 10 ms/Div T  PBIB1584E	C
16	W/L			Approximately 3.1 V	Е
35	GR/L	A /F / (	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Approximately 2.6 V	
56	LG/B	A/F sensor 1 (bank 1)		Approximately 2.3 V	F
75	Υ		·	Approximately 2.3 V	
21 22	W/B R/Y	Fuel injector No. 5 Fuel injector No. 3	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> <li>NOTE:</li> <li>The pulse cycle changes depending on rpm at idle</li> </ul>	BATTERY VOLTAGE  (11 - 14 V)★  → 10.0V/Div 50 ms/Div  PBIB0042E	G H
23 44	R/B O	Fuel injector No. 3 Fuel injector No. 1 Fuel injector No. 7  [Engine is running]  • Warm-up condition  • Engine speed: 2,000 rpm	Warm-up condition	BATTERY VOLTAGE (11 - 14 V)★  → 10.0V/Div 50 ms/Div  PBIB0043E	J K L

<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Revision: 2009 June **EC-973** 2010 M35/M45

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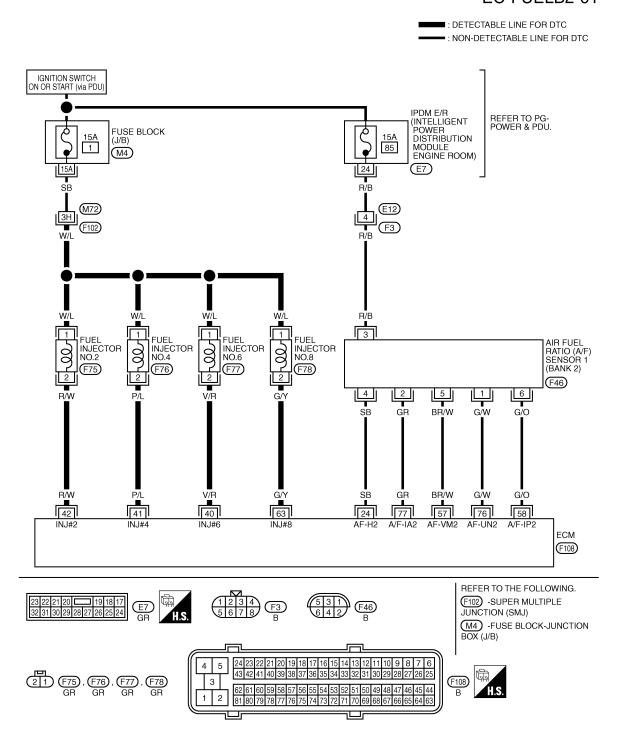
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BANK 2

#### EC-FUELB2-01



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Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

#### **CAUTION:**

Never 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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TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	SB	A/F sensor 1 heater (bank 2)	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Approximately 5 V★  → 10.0V/Div 10 ms/Div T  PBIB1584E
40 41	V/R P/L	Fuel injector No. 6 Fuel injector No. 4	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed NOTE: The pulse cycle changes depending on rpm at idle</li> </ul>	BATTERY VOLTAGE  (11 - 14 V)★  → 10.0V/Div 50 ms/Div  PBIB0042E
42 63		<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>	BATTERY VOLTAGE  (11 - 14 V)★  → 10.0V/Div 50 ms/Div  PBIB0043E	
57	BR/W			Approximately 2.6 V
58	G/O	A/F sensor 1 (bank 2)	[Engine is running]	Approximately 2.3 V
76	G/W		Warm-up condition     Idle speed	Approximately 3.1 V
77	GR		·	Approximately 2.3 V

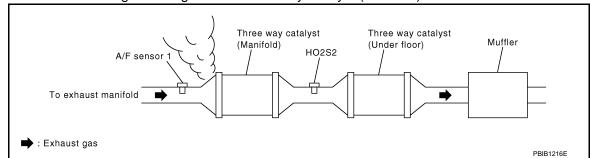
<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# Diagnosis Procedure

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# 1. CHECK EXHAUST GAS LEAKAGE

- Start engine and run it at idle.
- Listen for an exhaust gas leakage before three way catalyst (manifold).



#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace malfunctioning part.

2.CHECK FOR INTAKE AIR LEAKAGE

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- 1. Listen for an intake air leakage after mass air flow sensor.
- Check PCV hose connection.

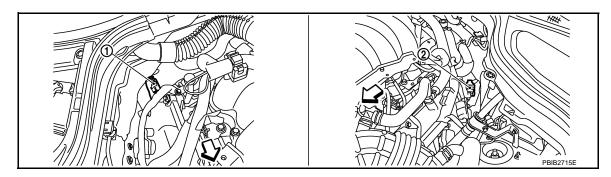
#### OK or NG

OK >> GO TO 3.

NG >> Repair or replace malfunctioning part.

3.check air fuel ratio (a/f) sensor 1 input signal circuit

- 1. Turn ignition switch OFF.
- 2. Disconnect corresponding air fuel ratio (A/F) sensor 1 harness connector.



: Vehicle front

- A/F sensor 1 (bank 2) harness connector
- 2. A/F sensor 1 (bank 1) harness connector

[VK45DE]

- 3. Disconnect ECM harness connector.
- 4. Check harness continuity between the following terminals. Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
	1	16
Bank 1	2	75
Dalik i	5	35
	6	56
	1	76
Bank 2	2	77
Dalik Z	5	57
	6	58

#### Continuity should exist.

5. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

Bar	nk 1	Bank 2		
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal	
1	16	1	76	
2	75	2	77	
5	35	5	57	
6	56	6	58	

#### Continuity should not exist.

6. Also check harness for short to power.

#### OK or NG

OK >> GO TO 4.

**[VK45DE]** < SERVICE INFORMATION > NG >> Repair open circuit or short to ground or short to power in harness or connectors. Α 4. CHECK FUEL PRESSURE Release fuel pressure to zero. Refer to EC-766, "Fuel Pressure Check". Install fuel pressure gauge and check fuel pressure. Refer to EC-766, "Fuel Pressure Check". EC At idling: Approximately 350 kPa (3.57 kg/cm<sup>2</sup>, 51 psi) OK or NG OK >> GO TO 6. NG >> GO TO 5.  ${f 5}$  . DETECT MALFUNCTIONING PART D Check the following. Fuel pump and circuit (Refer to <u>EC-1298, "Diagnosis Procedure"</u>.) Е Fuel pressure regulator (Refer to <u>EC-766</u>, "Fuel Pressure Check".) Fuel filter for clogging F >> Repair or replace malfunctioning part.  $oldsymbol{6}$  .CHECK MASS AIR FLOW SENSOR With CONSULT-III 1. Install all removed parts. Start engine and warm it up to normal operating temperature. Н Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III. 2.0 - 6.0 g·m/sec: at idling 7.0 - 20.0 g·m/sec: at 2,500 rpm **With GST** 1. Install all removed parts. Start engine and warm it up to normal operating temperature. Check mass air flow sensor signal in Service \$01 with GST. 2.0 - 6.0 q·m/sec: at idling 7.0 - 20.0 g·m/sec: at 2,500 rpm OK or NG OK (With CONSULT-III)>>GO TO 7. OK (Without CONSULT-III)>>GO TO 8. NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-870, "Diagnosis Procedure". 7.CHECK FUNCTION OF FUEL INJECTOR Ν (P) With CONSULT-III Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III. Check that each circuit produces a momentary engine speed drop. OK or NG OK >> GO TO 9. >> Perform trouble diagnosis for fuel injector, refer to EC-1293, "Diagnosis Procedure". Р NG **O.**CHECK FUNCTION OF FUEL INJECTOR Without CONSULT-III

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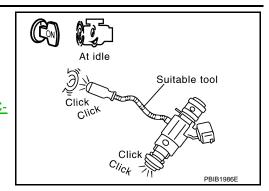
Listen to each fuel injector operating sound.

#### Operating sound should exist.

#### OK or NG

OK >> GO TO 9.

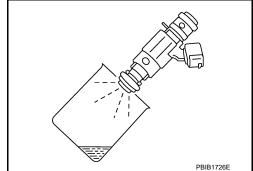
NG >> Perform trouble diagnosis for fuel injector, refer to EC-1293. "Diagnosis Procedure".



# 9. CHECK FUEL INJECTOR

- 1. Turn ignition switch OFF.
- 2. Check 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-189</u>, "<u>Component</u>". Keep fuel hose and all fuel injectors connected to fuel tube.
- 5. For DTC P0171, reconnect fuel injector harness connectors on bank 1. For DTC P0174, reconnect fuel injector harness connectors on bank 2.
- 6. Disconnect all ignition coil harness connectors.
- 7. Prepare pans or saucers under each fuel injector.
- Crank engine for about 3 seconds.
   For DTC P0171, make sure that fuel sprays out from fuel injectors on bank 1.

For DTC P0174, make sure that fuel sprays out from fuel injectors on bank 2.



#### Fuel should be sprayed evenly for each fuel injector.

#### OK or NG

OK >> GO TO 10.

NG >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones.

# 10. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

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## DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

## On Board Diagnosis Logic

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from A/F sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (the actual mixture ratio is too rich), the ECM judges the condition as the fuel injection system malfunction and illuminates the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172 0172 (Bank 1) P0175 0175 (Bank 2)	Fuel injection system too rich	Fuel injection system does not operate properly.     The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	A/F sensor 1     Fuel injector     Exhaust gas leakage     Incorrect fuel pressure     Mass air flow sensor

#### **DTC Confirmation Procedure**

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NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### (P) WITH CONSULT-III

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CON-SULT-III.
- 6. Clear the self-learning control coefficient by touching "CLEAR".

If it is difficult to start engine, the fuel injection system has a malfunction.

Performing the following procedure is advised.

a. Crank engine while depressing accelerator pedal.

#### NOTE:

When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

- b. If engine starts, go to EC-984, "Diagnosis Procedure".
  - If engine does not start, remove spark plugs and check for fouling, etc.
- 8. Keep engine at idle for at least 5 minutes.
- Check 1st trip DTC.
- The 1st trip DTC P0172 or P0175 should be detected at this stage, if a malfunction exists. If so, go to EC-984, "Diagnosis Procedure".

#### NOTE:

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine.

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DIC FU172, FU173 FUEL INSECTION 3131EM FUNCTION

Maintain the following conditions for at least 10 consecutive minutes.
 Hold the accelerator pedal as steady as possible.

VHCL SPEED SE 50 - 120 km/h (31 - 75 MPH)

#### **CAUTION:**

#### Always drive vehicle at a safe speed.

d. Check 1st trip DTC.

< SERVICE INFORMATION >

If 1st rip DTC is detected, go to <u>EC-984, "Diagnosis Procedure"</u>.

#### **WITH GST**

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Disconnect mass air flow sensor (1) harness connector.
- 6. Restart engine and let it idle for at least 5 seconds.
- Stop engine and reconnect mass air flow sensor harness connector.
- Select Service \$03 with GST and check that DTC P0102 is detected.
- 9. Select Service \$04 with GST and erase the DTC P0102.
- 10. Start engine.

If it is difficult to start engine, the fuel injection system has a malfunction.

Performing the following procedure is advised.

a. Crank engine while depressing accelerator pedal.

#### NOTE:

When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

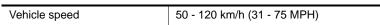
- b. If engine starts, go to <u>EC-984, "Diagnosis Procedure"</u>.
  - If engine does not start, remove spark plugs and check for fouling, etc.
- 11. Keep engine at idle for at least 5 minutes.
- 12. Check 1st trip DTC.
- 13. The 1st trip DTC P0172 or P0175 should be detected at this stage, if a malfunction exists. If so, go to <u>EC-984</u>, "Diagnosis Procedure".

#### NOTE:

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

- a. Turn ignition switch OFF and wait at least 10 seconds.
- b. Start engine.
- c. Maintain the following conditions for at least 10 consecutive minutes.

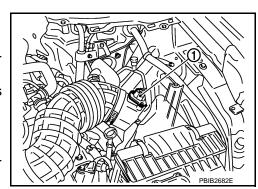
Hold the accelerator pedal as steady as possible.



#### **CAUTION:**

Always drive vehicle at a safe speed.

- d. Check 1st trip DTC.
- e. If 1st rip DTC is detected, go to <u>EC-984</u>, "<u>Diagnosis Procedure</u>".



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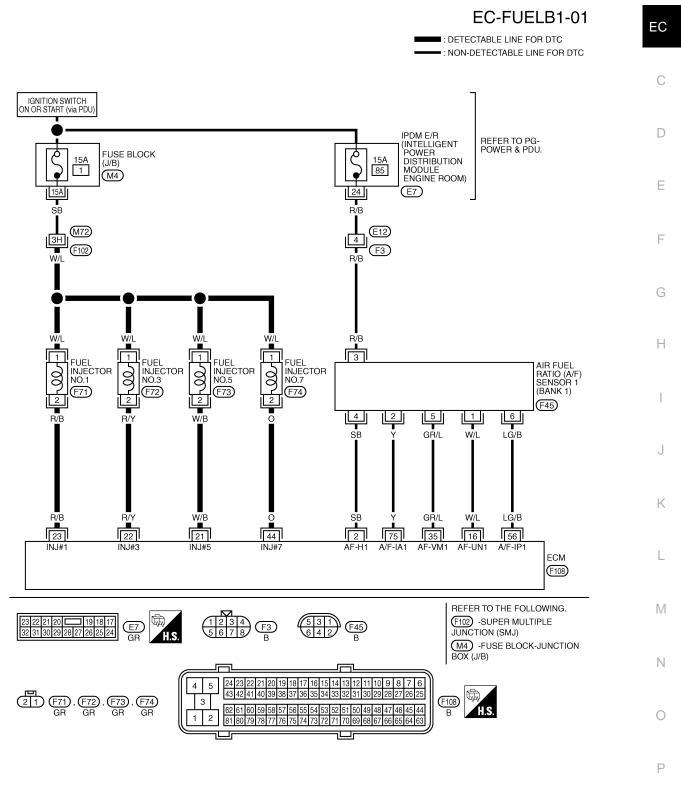
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Wiring Diagram

...g = 1...g. - ....

BANK 1



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Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

CAUTION:

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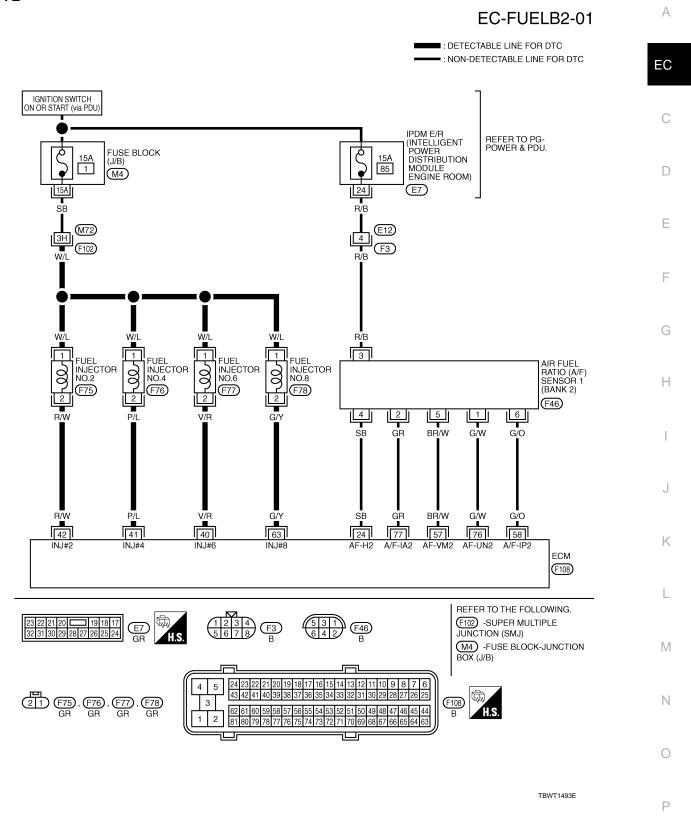
Never use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	SB	A/F sensor 1 heater (bank 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5 V★  → 10.0V/Div 10 ms/Div T  PBIB1584E
16	W/L			Approximately 3.1 V
35	GR/L	A/F sensor 1 (bank 1)	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Approximately 2.6 V
56	LG/B	Ar sensor (bank i)		Approximately 2.3 V
75	Υ			Approximately 2.3 V
21 22	W/B R/Y	,	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14 V)★  → 10.0V/Div 50 ms/Div  PBIB0042E
23 44	23 R/B Fuel injector No. 1 44 O Fuel injector No. 7  [En	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>	BATTERY VOLTAGE  (11 - 14 V) *  >> 10.0V/Div 50 ms/Div PBIB0043E	

<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

< SERVICE INFORMATION > [VK45DE]

BANK 2



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

CAUTION:

Never 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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TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	SB	A/F sensor 1 heater (bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5 V★  ≥ 10.0V/Div 10 ms/Div T  PBIB1584E
40 41	V/R P/L	Fuel injector No. 6 Fuel injector No. 4	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed NOTE:  The pulse cycle changes depending on rpm at idle</li> </ul>	BATTERY VOLTAGE  (11 - 14 V) *
42 63	R/W G/Y	Fuel injector No. 2 Fuel injector No. 8	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>	BATTERY VOLTAGE  (11 - 14 V)*  >> 10.0V/Div 50 ms/Div  PBIB0043E
57	BR/W			Approximately 2.6 V
58	G/O	A/F sensor 1 (bank 2)	[Engine is running] • Warm-up condition	Approximately 2.3 V
76	G/W	TVI SCIISUI I (DAIIK Z)	Idle speed	Approximately 3.1 V
77	GR			Approximately 2.3 V

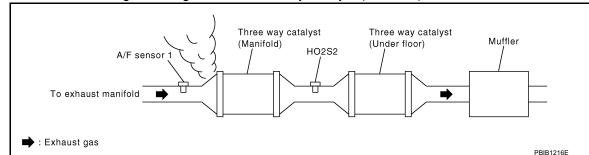
<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# Diagnosis Procedure

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# 1. CHECK EXHAUST GAS LEAKAGE

- 1. Start engine and run it at idle.
- Listen for an exhaust gas leakage before three way catalyst (manifold).



#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace malfunctioning part.

2.CHECK FOR INTAKE AIR LEAKAGE

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Listen for an intake air leakage after the mass air flow sensor.

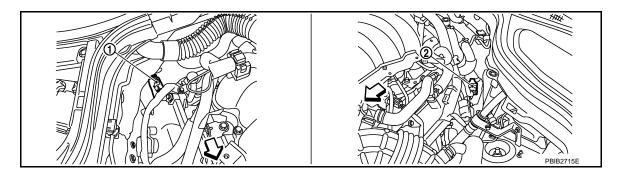
#### OK or NG

OK >> GO TO 3.

NG >> Repair or replace malfunctioning part.

# 3.CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect corresponding air fuel ratio (A/F) sensor 1 harness connector.



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- 1. A/F sensor 1 (bank 2) harness connector
- 2. A/F sensor 1 (bank 1) harness connector

3. Disconnect ECM harness connector.

4. Check harness continuity between the following terminals. Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
	1	16
Bank 1	2	75
Dalik i	5	35
	6	56
	1	76
Bank 2	2	77
Dalik Z	5	57
	6	58

#### Continuity should exist.

5. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

Bai	nk 1	Bank 2		
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal	
1	16	1	76	
2	75	2	77	
5	35	5	57	
6	56	6	58	

#### Continuity should not exist.

6. Also check harness for short to power.

#### OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

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< SERVICE INFORMATION >

# 4. CHECK FUEL PRESSURE

- 1. Release fuel pressure to zero. Refer to EC-766, "Fuel Pressure Check".
- 2. Install fuel pressure gauge and check fuel pressure. Refer to EC-766, "Fuel Pressure Check".

#### At idling: Approximately 350 kPa (3.57 kg/cm<sup>2</sup>, 51 psi)

#### OK or NG

OK >> GO TO 6. NG >> GO TO 5.

# 5. DETECT MALFUNCTIONING PART

#### Check the following.

- Fuel pump and circuit (Refer to EC-1298, "Diagnosis Procedure".)
- Fuel pressure regulator (Refer to <u>EC-766, "Fuel Pressure Check"</u>.)
  - >> Repair or replace malfunctioning part.

#### 6.CHECK MASS AIR FLOW SENSOR

#### (P) With CONSULT-III

- 1. Install all removed parts.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III.

2.0 - 6.0 g·m/sec: at idling 7.0 - 20.0 g·m/sec: at 2,500 rpm

#### With GST

- Install all removed parts.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Check mass air flow sensor signal in Service \$01 with GST.

2.0 - 6.0 g·m/sec: at idling 7.0 - 20.0 g·m/sec: at 2,500 rpm

#### OK or NG

OK (With CONSULT-III)>>GO TO 7.

OK (Without CONSULT-III)>>GO TO 8.

NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to <a href="EC-870">EC-870</a>, "Diagnosis Procedure".

#### 7. CHECK FUNCTION OF FUEL INJECTOR

#### (P) With CONSULT-III

- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 2. Check that each circuit produces a momentary engine speed drop.

#### OK or NG

OK >> GO TO 9.

NG >> Perform trouble diagnosis for fuel injector, refer to EC-1293, "Diagnosis Procedure".

#### 8.CHECK FUNCTION OF FUEL INJECTOR

#### ₩ Without CONSULT-III

#### < SERVICE INFORMATION >

[VK45DE]

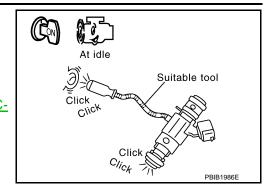
Listen to fuel injector operating sound.

Operating sound should exist.

#### OK or NG

OK >> GO TO 9.

NG >> Perform trouble diagnosis for fuel injector, refer to <u>EC-1293</u>, "<u>Diagnosis Procedure</u>".



# 9. CHECK FUEL INJECTOR

- 1. Remove fuel tube assembly. Refer to <a href="EM-189">EM-189</a>, "Component". Keep fuel hose and all fuel injectors connected to fuel tube.
- 2. Check that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- 4. Disconnect all ignition coil harness connectors.
- 5. Prepare pans or saucers under each fuel injector.
- Crank engine for approximately 3 seconds. Check that fuel does not drip from fuel injector.

#### OK or NG

OK (Does not drip.)>>GO TO 10.

NG (Drips.)>>Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one.

#### 10. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

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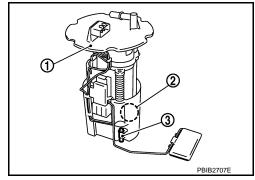
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#### DTC P0181 FTT SENSOR

## Component Description

The fuel tank temperature sensor (3) 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.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)



#### <Reference data>

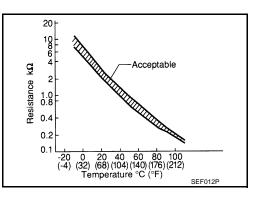
Fuel temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

<sup>\*:</sup> This data is reference value and is measured between ECM terminal 107 (Fuel tank temperature sensor) and ground.

#### **CAUTION:**

Never 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.

# On Board Diagnosis Logic



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0181 0181	Fuel tank temperature sensor circuit range/performance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	Harness or connectors     (The sensor circuit is open or shorted)     Fuel tank temperature sensor

#### **DTC Confirmation Procedure**

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### (P) WITH CONSULT-III

- 1. Turn ignition switch ON and wait at least 10 seconds...
- Check 1st trip DTC.
- 3. If 1st trip DTC is detected, go to <u>EC-990</u>, "<u>Diagnosis Procedure</u>". If 1st trip DTC is not detected, go to the following step.
- 4. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III.
- Check "COOLAN TEMP/S" indication.
   If "COOLAN TEMP/S" indication is less than 60°C (140°F), the result will be OK.
   If "COOLAN TEMP/S" indication is above 60°C (140°F), go to the following step.
- 6. Cool engine down until "COOLAN TEMP/S" indication is less than 60°C (140°F).

#### **DTC P0181 FTT SENSOR**

#### < SERVICE INFORMATION > [VK45DE]

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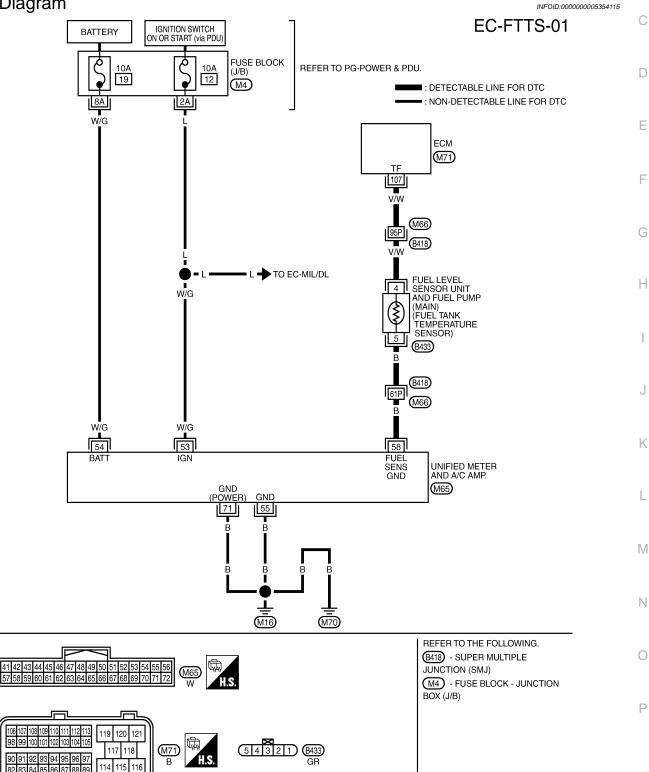
EC

- 7. Wait at least 10 seconds.
- 8. Check 1st trip DTC.
- 9. If 1st trip DTC is detected, go to EC-990, "Diagnosis Procedure".

#### **WITH GST**

Follow the procedure "WITH CONSULT-III" above.

Wiring Diagram



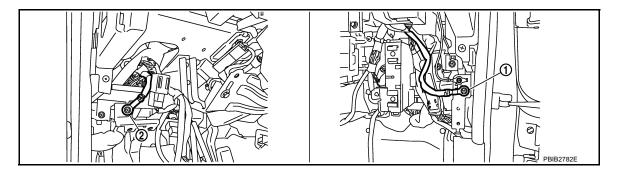
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#### **Diagnosis Procedure**

#### INFOID:0000000005354116

# 1. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".



1. Body ground M70

2. Body ground M16

#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to DI-28, "CONSULT-III Function (METER/M&A)".

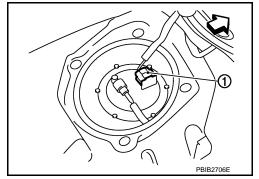
#### OK or NG

OK >> GO TO 3.

NG >> Go to DI-22, "Fuel Level Sensor Signal Inspection".

# 3.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector (1).
- Illustration shows the view with rear seat cushion and inspection hole cover (RH) removed.
- <□: Vehicle front
- 3. Turn ignition switch ON.

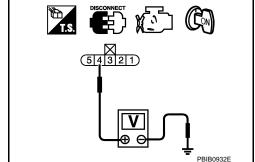


4. Check voltage between "fuel level sensor unit and fuel pump" terminal 4 and ground with CONSULT-III or tester.

#### **Voltage: Approximately 5 V**

#### OK or NG

OK >> GO TO 5. NG >> GO TO 4.



# 4. DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors M66, B418

#### **DTC P0181 FTT SENSOR**

#### < SERVICE INFORMATION >

[VK45DE]

- Harness for open or short between ECM and "fuel level sensor unit and fuel pump"
  - >> Repair open circuit or short to ground or short to power in harness or connector.

# 5. CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect "unified meter and A/C amp." harness connector.
- 3. Check harness continuity between "fuel level sensor unit and fuel pump" terminal 5 and "unified meter and A/C amp." terminal 58.

Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 7. NG >> GO TO 6.

#### 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M66, B418
- Harness for open or short between "fuel level sensor unit and fuel pump" and "unified meter and A/C amp."

>> Repair open circuit or short to ground or short to power in harness or connector.

## 7.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-991, "Component Inspection".

#### OK or NG

OK >> GO TO 8.

NG >> Replace "fuel level sensor unit and fuel pump".

#### 8. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

# Component Inspection

FUEL TANK TEMPERATURE SENSOR

- 1. Remove fuel level sensor unit.
- 2. Check resistance between "fuel level sensor unit and fuel pump" terminals 4 and 5 by heating with hot water or heat gun as shown in the figure.

Temperature [°C (°F)]	Resistance (kΩ)
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

# Hot water 1 2 3 4 5 PBIB0931E

Removal and Installation

FUEL TANK TEMPERATURE SENSOR

Refer to FL-4, "Component".

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Revision: 2009 June EC-991 2010 M35/M45

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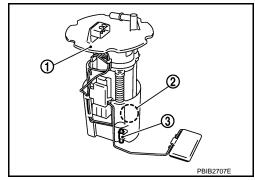
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## DTC P0182, P0183 FTT SENSOR

#### Component Description

The fuel tank temperature sensor (3) 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.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)



#### <Reference data>

Fuel temperature [°C (°F)]	Voltage* (V)	Resistance $(k\Omega)$
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

<sup>\*:</sup> This data is reference value and is measured between ECM terminal 107 (Fuel tank temperature sensor) and ground.

#### **CAUTION:**

Never 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.

# On Board Diagnosis Logic

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DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182 0182	Fuel tank temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors     (The sensor circuit is open or shorted.)
P0183 0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Fuel tank temperature sensor

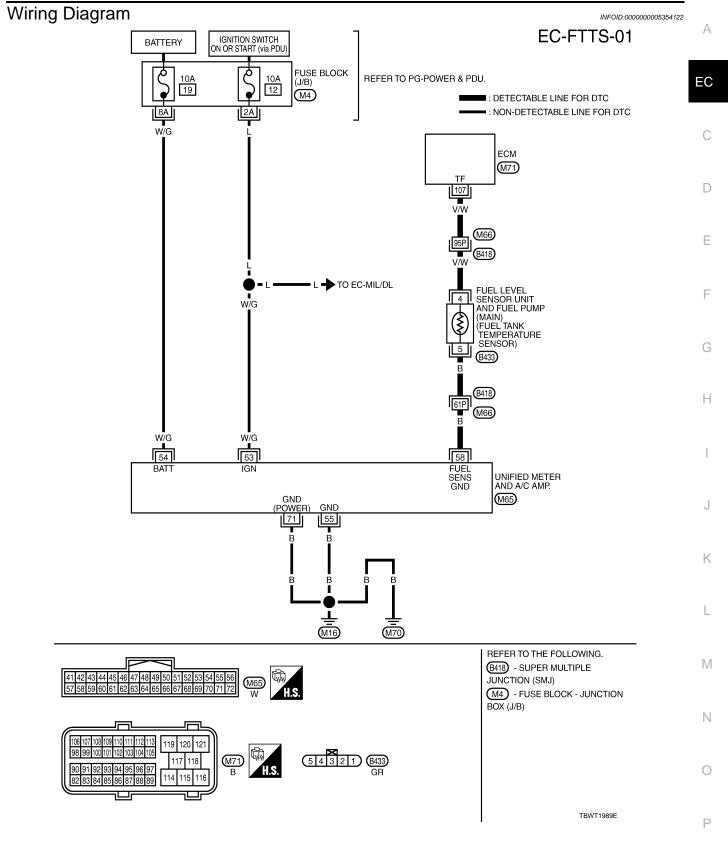
#### **DTC Confirmation Procedure**

INFOID:0000000005354121

- If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
- a. Turn ignition switch OFF and wait at least 10 seconds.
- b. Turn ignition switch ON.
- c. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON and wait at least 5 seconds.
- 3. Check 1st trip DTC.
- If 1st trip DTC is detected, go to <u>EC-993, "Diagnosis Procedure"</u>.

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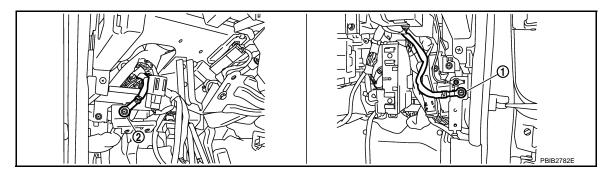


# Diagnosis Procedure

# 1. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>. "Ground Inspection".

Revision: 2009 June **EC-993** 2010 M35/M45



- 1. Body ground M70
- 2. Body ground M16

#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

#### Refer to DI-28, "CONSULT-III Function (METER/M&A)".

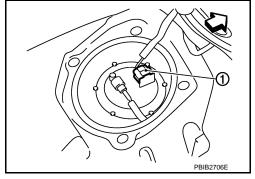
#### OK or NG

OK >> GO TO 3.

NG >> Go to DI-22, "Fuel Level Sensor Signal Inspection".

# 3.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector (1).
- Illustration shows the view with rear seat cushion and inspection hole cover (RH) removed.
- <: Vehicle front
- 3. Turn ignition switch ON.

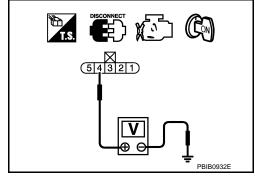


4. Check voltage between "fuel level sensor unit and fuel pump" terminal 4 and ground with CONSULT-III or tester.

#### **Voltage: Approximately 5 V**

#### OK or NG

OK >> GO TO 5. NG >> GO TO 4.



# 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M66, B418
- Harness for open or short between ECM and "fuel level sensor unit and fuel pump"
  - >> Repair open circuit or short to ground or short to power in harness or connector.

# 5. CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

#### **DTC P0182, P0183 FTT SENSOR**

#### [VK45DE] < SERVICE INFORMATION >

- Disconnect "unified meter and A/C amp." harness connector.
- Check harness continuity between "fuel level sensor unit and fuel pump" terminal 5 and "unified meter and A/C amp." terminal 58.

Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 7.

NG >> GO TO 6.

#### 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M66, B418
- Harness for open or short between "fuel level sensor unit and fuel pump" and "unified meter and A/C amp."

**EC-995** 

>> Repair open circuit or short to ground or short to power in harness or connector.

# 7.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-995, "Component Inspection".

#### OK or NG

OK >> GO TO 8.

NG >> Replace "fuel level sensor unit and fuel pump".

# 8. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

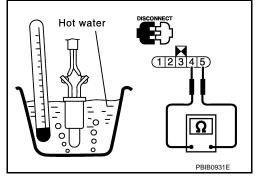
#### Component Inspection

#### FUEL TANK TEMPERATURE SENSOR

Remove fuel level sensor unit.

Check resistance between "fuel level sensor unit and fuel pump" terminals 4 and 5 by heating with hot water or heat gun as shown in the figure.

Temperature [°C (°F)]	Resistance (kΩ)
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90



#### Removal and Installation

#### FUEL TANK TEMPERATURE SENSOR

Refer to FL-4, "Component".

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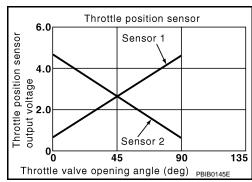
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## DTC P0222, P0223 TP SENSOR

#### Component 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 the two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving condition via the throttle control motor.



#### CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354127

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
TP SEN 1-B1 TP SEN 2-B1*	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36V
	<ul><li>(Engine stopped)</li><li>Selector lever position: D</li></ul>	Accelerator pedal: Fully depressed	Less than 4.75V

<sup>\*:</sup> Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

#### On Board Diagnosis Logic

INFOID:0000000005354128

#### These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222	Throttle position sensor 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 0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	<ul> <li>(APP sensor 2 circuit is shorted.)</li> <li>Electric throttle control actuator (TP sensor 1)</li> <li>Accelerator pedal position sensor (APP sensor 2)</li> </ul>

#### **FAIL-SAFE MODE**

When the malfunction is detected, ECM enters fail-safe mode and the MIL illuminates.

#### Engine operation condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

#### **DTC Confirmation Procedure**

INFOID:0000000005354129

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

- Start engine and let it idle for 1 second.
- 2. Check DTC.

Revision: 2009 June **EC-996** 2010 M35/M45

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If DTC is detected, go to EC-998, "Diagnosis Procedure".

Wiring Diagram

Α INFOID:0000000005354130 EC-TPS1-01 EC : DETECTABLE LINE FOR DTC : NON-DETECTABLE LINE FOR DTC ELECTRIC THROTTLE CONTROL ACTUATOR (THROTTLE POSITION SENSOR) SENSOR 1 SENSOR 2 D (F53) 3 Е F Н TO EC-MAIN TO EC-APPS2, APPS3 69 47 91 50 66 ECM M71), (F108) M<sub>16</sub> REFER TO THE FOLLOWING. F102 -SUPER MULTIPLE JUNCTION (SMJ) M 654321 F53 B Ν 119 120 121 (F108) 117 118 M71) 114 115 116 0

Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

#### < SERVICE INFORMATION >

Never 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.

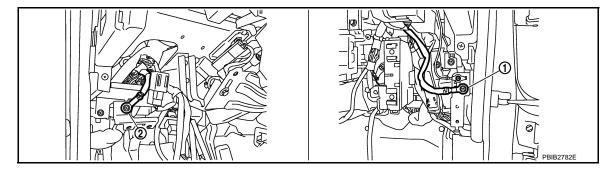
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	G	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5 V
50	50 W Throttle position sensor 1	Throttle position concer 1	[Ignition switch: ON]  • Engine: Stopped  • Selector lever position: D  • Accelerator pedal: Fully released	More than 0.36 V
50		[Ignition switch: ON]     Engine: Stopped     Selector lever position: D     Accelerator pedal: Fully depressed	Less than 4.75 V	
66	В	Sensor ground (Throttle position sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
69			[Ignition switch: ON]  • Engine: Stopped  • Selector lever position: D  • Accelerator pedal: Fully released	Less than 4.75 V
69 R	Throttle position sensor 2	[Ignition switch: ON]     Engine: Stopped     Selector lever position: D     Accelerator pedal: Fully depressed	More than 0.36 V	
91	BR	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5 V

# Diagnosis Procedure

INFOID:0000000005354131

# 1. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "<u>Ground Inspection</u>".



1. Body ground M70

2. Body ground M16

#### OK or NG

OK >> GO TO 2.

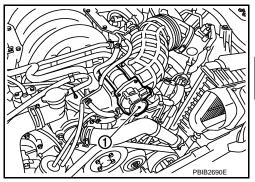
NG >> Repair or replace ground connections.

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

#### < SERVICE INFORMATION >

Disconnect electric throttle control actuator (1) harness connec-

- Illustration shows the view with intake air duct removed.
- 2. Turn ignition switch ON.

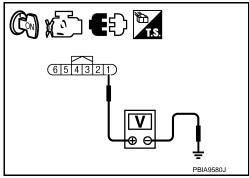


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-III or tester.

#### Voltage: Approximately 5 V

#### OK or NG

OK >> GO TO 7. NG >> GO TO 3.



# ${f 3.}$ CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-II

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.

#### Continuity should exist.

#### OK or NG

OK >> GO TO 4.

NG >> Repair open circuit.

#### 4. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 1	EC-997, "Wiring Diagram"
91	APP sensor terminal 5	EC-1254, "Wiring Diagram"

#### OK or NG

OK

NG >> Repair short to ground or short to power in harness or connectors.

#### 5. CHECK APP SENSOR

Refer to EC-1258, "Component Inspection".

#### OK or NG

OK >> GO TO 11. NG >> GO TO 6.

**6.**REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly.
- Perform EC-764, "Accelerator Pedal Released Position Learning". 2.
- 3. Perform EC-764, "Throttle Valve Closed Position Learning".
- Perform EC-765, "Idle Air Volume Learning".

**EC-999** Revision: 2009 June 2010 M35/M45

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#### >> INSPECTION END

# 7.check throttle position sensor 1 ground circuit for open and short

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 66. Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

#### $oldsymbol{\delta}$ .CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check harness continuity between ECM terminal 50 and electric throttle control actuator terminal 2. Refer to Wiring Diagram.

#### Continuity should exist.

2. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

#### 9. CHECK THROTTLE POSITION SENSOR

Refer to EC-1000, "Component Inspection".

#### OK or NG

OK >> GO TO 11.

NG >> GO TO 10.

# 10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- Replace the electric throttle control actuator.
- 2. Perform EC-764, "Throttle Valve Closed Position Learning".
- 3. Perform EC-765, "Idle Air Volume Learning".

#### >> INSPECTION END

## 11. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

# Component Inspection

INFOID:0000000005354132

#### THROTTLE POSITION SENSOR

- Reconnect all harness connectors disconnected.
- Perform <u>EC-764</u>, "Throttle Valve Closed Position Learning".
- 3. Turn ignition switch ON.
- Set selector lever to the D position.

#### **DTC P0222, P0223 TP SENSOR**

#### < SERVICE INFORMATION >

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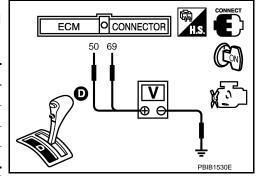
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 Check voltage between ECM terminal 50 (TP sensor 1 signal) and ground, ECM terminal 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36 V
	Fully depressed	Less than 4.75 V
69 (Throttle position sensor 2)	Fully released	Less than 4.75 V
	Fully depressed	More than 0.36 V



- 6. If NG, replace electric throttle control actuator and go to the next step.
- 7. Perform EC-764, "Throttle Valve Closed Position Learning".
- 8. Perform EC-765, "Idle Air Volume Learning".

#### Removal and Installation

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ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-174, "Component".

Revision: 2009 June **EC-1001** 2010 M35/M45

< SERVICE INFORMATION >

[VK45DE]

# DTC P0300 - P0308 MULTIPLE CYLINDER MISFIRE, NO. 1 - 8 CYLINDER MISFIRE

#### On Board Diagnosis Logic

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When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crank-shaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

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.

2. Two Trip Detection Logic (Exhaust quality deterioration)

For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only illuminate when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.

A misfire malfunction can be detected in any one cylinder or in multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300 0300	Multiple cylinder misfires detected	Multiple cylinder misfire.	
P0301 0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302 0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	Improper spark plug     Insufficient compression
P0303 0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	<ul> <li>Incorrect fuel pressure</li> <li>The fuel injector circuit is open or shorted</li> <li>Fuel injector</li> <li>Intake air leakage</li> <li>The ignition signal circuit is open or shorte</li> <li>Lack of fuel</li> <li>Signal plate</li> </ul>
P0304 0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	
P0305 0305	No. 5 cylinder misfire detected	No. 5 cylinder misfires.	
P0306 0306	No. 6 cylinder misfire detected	No. 6 cylinder misfires.	A/F sensor 1     Incorrect PCV hose connection
P0307 0307	No. 7 cylinder misfire detected	No. 7 cylinder misfires.	
P0308 0308	No. 8 cylinder misfire detected	No. 8 cylinder misfires.	

#### **DTC Confirmation Procedure**

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#### **CAUTION:**

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

- If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
- a. Turn ignition switch OFF and wait at least 10 seconds.
- b. Turn ignition switch ON.

[VK45DE] < SERVICE INFORMATION >

- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start engine and warm it up 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.
- 6. Restart engine and let it idle for approximately 15 minutes.
- 7. Check 1st trip DTC.
- If 1st trip DTC is detected, go to <u>EC-1003</u>, "<u>Diagnosis Procedure</u>".

#### NOTE:

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

- a. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- d. Start engine and drive the vehicle under similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.

Hold the accelerator pedal as steady as possible.

Similar conditions to (1st trip) freeze frame data means that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data $\pm400~\text{rpm}$
Vehicle speed	Vehicle speed in the freeze frame data $\pm$ 10 km/h (6 MPH)
Engine coolant temperature (T)	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).
condition	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).

Driving time varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

# Diagnosis Procedure

# 1.CHECK FOR INTAKE AIR LEAKAGE AND PCV HOSE

- Start engine and run it at idle speed.
- Listen for the sound of the intake air leakage.
- Check PCV hose connection.

#### OK or NG

OK >> GO TO 2.

NG >> Discover air leakage location and repair.

# 2.CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

#### OK or NG

OK (With CONSULT-III)>>GO TO 3.

OK (Without CONSULT-III>>GO TO 4.

>> Repair or replace malfunctioning part. NG

#### ${f 3.}$ PERFORM POWER BALANCE TEST

#### With CONSULT-III

**EC-1003** Revision: 2009 June 2010 M35/M45

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# FIRE (VK45DE)

- 1. Start engine and warm it up to normal operating temperature.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- Is there any cylinder which does not produces a momentary engine speed drop?

#### Yes or No

Yes >> GO TO 4. No >> GO TO 9.

# 4. CHECK FUNCTION OF FUEL INJECTOR

#### **⋈** Without CONSULT-III

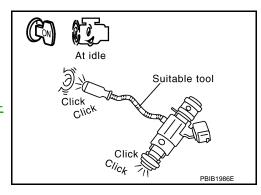
- 1. Start engine and warm it up to normal operating temperature.
- 2. Listen to fuel injector operating sound.

#### Operating sound should exist.

#### OK or NG

OK >> GO TO 5.

NG >> Perform trouble diagnosis for fuel injector, refer to <u>EC-</u>1293, "Diagnosis Procedure".



# 5. CHECK FUNCTION OF IGNITION COIL-I

#### **CAUTION:**

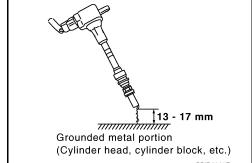
Perform the following procedure in a place with no combustible objects and good ventilation.

- 1. Turn ignition switch OFF.
- 2. Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

#### NOTE:

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- 3. Start engine.
- After engine stalls, crank it two or three times to release all fuel pressure.
- Turn ignition switch OFF.
- 6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 7. Remove ignition coil and spark plug of the cylinder to be checked.
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 9. Connect spark plug and harness connector to ignition coil.
- 10. Fix ignition coil using a rope etc. with gap of 13 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
- Crank engine for approximately 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



#### Spark should be generated.

#### **CAUTION:**

- Never place the spark plug and the ignition coil within 50 cm each other. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might damage the ignition coil if the gap of more than 17 mm is made.

When the gap is less than 13 mm, spark might be generated even if the coil is malfunctioning.

#### OK or NG

OK >> GO TO 9.

# < SERVICE INFORMATION > [VK45DE]

NG >> GO TO 6.

# 6. CHECK FUNCTION OF IGNITION COIL-II

- 1. Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a non-malfunctioning spark plug.
- Crank engine for approximately 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

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#### Spark should be generated.

#### OK or NG

OK >> GO TO 7.

NG >> Check ignition coil, power transistor and their circuits. Refer to EC-1313, "Diagnosis Procedure".

# 7. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

#### OK or NG

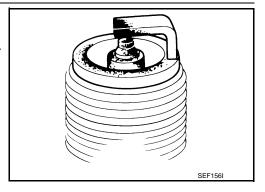
OK

>> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <a href="EM-272"><u>EM-272</a>, "Standard and Limit"</u>.

NG

>> 1. Repair or clean spark plug.

2. GO TO 8.



#### 8. CHECK FUNCTION OF IGNITION COIL-III

- 1. Reconnect the initial spark plugs.
- 2. Crank engine for approximately 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

#### Spark should be generated.

#### OK or NG

OK >> INSPECTION END

NG >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-272</u>, "Standard and Limit".

# 9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-227, "On-Vehicle Service".

#### OK or NG

OK >> GO TO 10.

NG >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

# 10. CHECK FUEL PRESSURE

- Install all removed parts.
- Release fuel pressure to zero. Refer to <u>EC-766, "Fuel Pressure Check"</u>.
- 3. Install fuel pressure gauge and check fuel pressure. Refer to EC-766, "Fuel Pressure Check".

EC-1005

#### At idling: Approximately 350 kPa (3.57 kg/cm<sup>2</sup>, 51 psi)

#### OK or NG

OK >> GO TO 12.

NG >> GO TO 11.

# 11. DETECT MALFUNCTIONING PART

#### Check the following.

Revision: 2009 June

- Fuel pump and circuit (Refer to <u>EC-1298, "Diagnosis Procedure"</u>.)
- Fuel pressure regulator (Refer to <u>EC-766, "Fuel Pressure Check".)</u>

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# FIRE < SERVICE INFORMATION >

- Fuel lines
- · Fuel filter for clogging

>> Repair or replace malfunctioning part.

# 12. CHECK IGNITION TIMING

Check the following items. Refer to EC-760, "Basic Inspection".

Items	Specifications
Target idle speed	$650 \pm 50$ rpm (in P or N position)
Ignition timing	12 ± 5°BTDC (in P or N position)

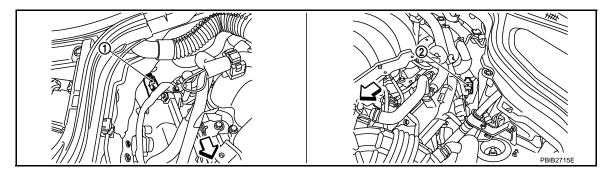
#### OK or NG

OK >> GO TO 13.

NG >> Follow the EC-760, "Basic Inspection".

# $13. {\tt check\ air\ fuel\ ratio\ (a/f)\ sensor\ 1\ input\ signal\ circuit}$

- 1. Turn ignition switch OFF.
- 2. Disconnect corresponding air fuel ratio (A/F) sensor 1 harness connector.



- A/F sensor 1 (bank 2) harness connector
- 2. A/F sensor 1 (bank 1) harness connector

[VK45DE]

- 3. Disconnect ECM harness connector.
- 4. Check harness continuity between the following terminals. Refer to Wiring Diagram.

1	A/F sensor 1 terminal	ECM terminal
Bank 1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

#### Continuity should exist.

5. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76

[VK45DE]

Bank 1		Bank 2	
2	75	2	77
5	35	5	57
6	56	6	58

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#### Continuity should not exist.

Also check harness for short to power.

#### OK or NG

OK >> GO TO 14.

NG >> Repair open circuit or short to ground or short to power in harness or connectors. 

# 14.CHECK A/F SENSOR 1 HEATER

Refer to EC-851, "Component Inspection".

#### OK or NG

OK >> GO TO 16. NG >> GO TO 15. F

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# 15.replace air fuel ratio (a/f) sensor 1

Replace malfunctioning A/F sensor 1.

#### **CAUTION:**

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

# >> INSPECTION END

# 16. CHECK MASS AIR FLOW SENSOR

#### (II) With CONSULT-III

- Start engine and warm it up to normal operating temperature.
- Check "MASS AIRFLOW" in "DATA MONITOR" mode with CONSULT-III.

2.0 - 6.0 g·m/sec: at idling 7.0 - 20.0 g·m/sec: at 2,500 rpm

- 1. Start engine and warm it up to normal operating temperature.
- Check mass air flow sensor signal in Service \$01 with GST.

2.0 - 6.0 g·m/sec: at idling 7.0 - 20.0 g·m/sec: at 2,500 rpm

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#### OK or NG

OK >> GO TO 17.

NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or

ground. Refer to EC-870, "Diagnosis Procedure".

#### 17. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in EC-775, "Symptom Matrix Chart".

#### OK or NG

OK >> GO TO 18.

NG >> Repair or replace malfunctioning part.

# 18.erase the 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.

FIRE < SERVICE INFORMATION > [VK45DE]

Erase the 1st trip DTC from the ECM memory after performing the tests.

>> GO TO 19.

19. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

>> INSPECTION END

Revision: 2009 June **EC-1008** 2010 M35/M45

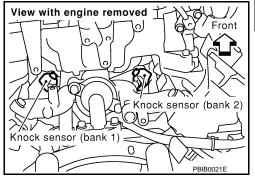
[VK45DE]

INFOID:0000000005354137

## DTC P0327, P0328, P0332, P0333 KS

## **Component 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.



## On Board Diagnosis Logic

The MIL will not illuminate for these diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0327 0327 (Bank 1)	Knock sensor circuit low	An excessively low voltage from the sensor	Harness or connectors     (The sensor circuit is open or shorted.)
P0332 0332 (Bank 2)	input	is sent to ECM.	
P0328 0328 (Bank 1)	Knock sensor circuit high	An excessively high voltage from the sensor	Knock sensor
P0333 0333 (Bank 2)	input	is sent to ECM.	

#### **DTC Confirmation Procedure**

NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

- 1. Start engine and let it idle for at least 5 seconds.
- 2. Check 1st trip DTC.
- If 1st trip DTC is detected, go to <u>EC-1011, "Diagnosis Procedure"</u>.

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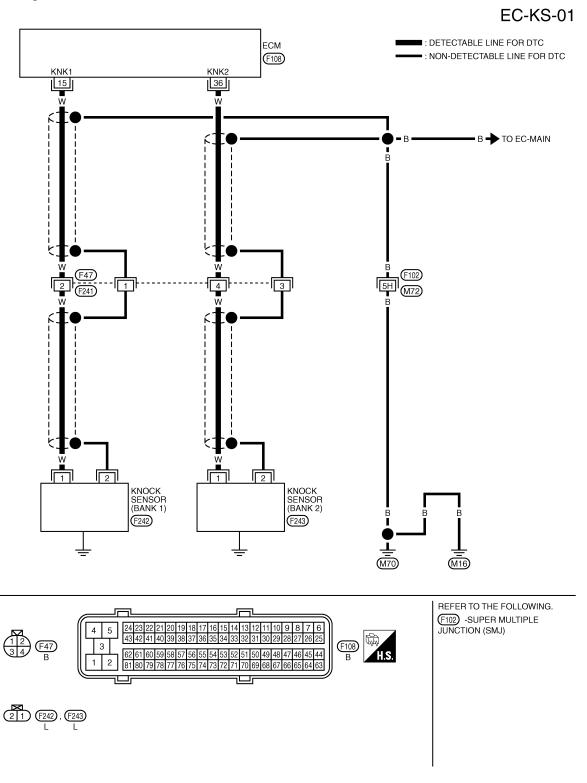
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Wiring Diagram

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TBWT1026E



Specification data are reference values and are measured between each terminal and ground.

#### **CAUTION:**

Never 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 P0327, P0328, P0332, P0333 KS

< SERVICE INFORMATION >

[VK45DE]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15 36	W	Knock sensor (bank 1) Knock sensor (bank 2)	[Engine is running] • Idle speed	Approximately 2.5 V

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## Diagnosis Procedure

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## 1. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check resistance between ECM terminals 15, 36 and ground. Refer to Wiring Diagram.

#### NOTE:

It is necessary to use an ohmmeter which can measure more than 10 M $\Omega$ .

#### Resistance: Approximately 532 - 588 k $\Omega$ [at 20°C (68°F)]

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 5.

NG >> GO TO 2.

# 2.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

- 1. Disconnect knock sensor harness connector.
- Check harness continuity between the following;
   ECM terminal 15 and knock sensor (bank1) terminal 1,
   ECM terminal 36 and knock sensor (bank 2) terminal 1.
   Refer to Wiring Diagram.



3. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 4. NG >> GO TO 3.

## 3. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors F47, F241
- Harness for open or short between ECM and knock sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 4. CHECK KNOCK SENSOR

Refer to EC-1012, "Component Inspection".

#### OK or NG

OK >> GO TO 5.

NG >> Replace knock sensor.

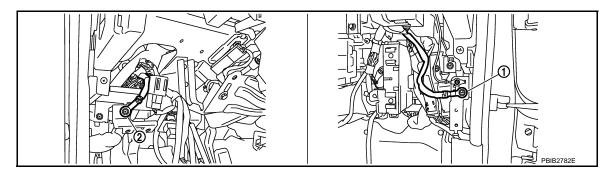
## 5. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".

View with engine removed
Front
Knock sensor (bank 2)
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Revision: 2009 June **EC-1011** 2010 M35/M45



- 1. Body ground M70
- 2. Body ground M16

#### OK or NG

OK >> GO TO 6.

NG >> Repair or replace ground connections.

## 6.CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect knock sensor harness connector.
- 2. Check harness continuity between knock sensor terminal 2 and ground. Refer to Wiring Diagram.

#### Continuity should exist.

3. Also check harness for short to power.

#### OK or NG

OK >> GO TO 8. NG >> GO TO 7.

## 7. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors F47, F241
- Harness connectors F102, M72
- Harness for open or short between knock sensor terminal 2 and ground
  - >> Repair open circuit or short to power in harness or connectors.

## 8. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

## Component Inspection

INFOID:0000000005354142

#### KNOCK SENSOR

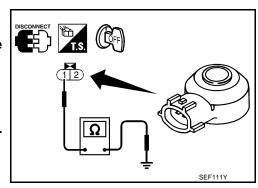
Check resistance between knock sensor terminal 1 and ground.

It is necessary to use an ohmmeter which can measure more than 10  $\text{M}\Omega.$ 

Resistance: Approximately 532 - 588 kΩ [at 20°C (68°F)]

#### **CAUTION:**

Never use any knock sensors that have been dropped or physically damaged. Use only new ones.



## DTC P0327, P0328, P0332, P0333 KS

	DIC F0321, F0320, F0332, F0333 N3
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Removal and Installation

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**KNOCK SENSOR** 

Refer to EM-246, "Component".

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## DTC P0335 CKP SENSOR (POS)

## Component Description

The crankshaft position sensor (POS) is located on the A/T converter housing 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.

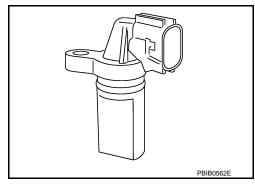
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

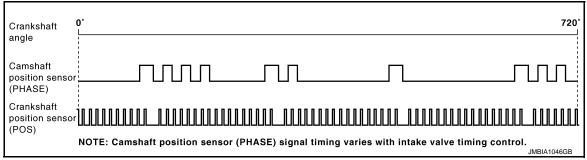
The changing gap causes the magnetic field near the sensor to change.

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.





#### CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354145

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	Run engine and compare CONSULT-III value with the tachometer indication.	Almost the same speed as the tachometer indication.

## On Board Diagnosis Logic

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DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	Crankshaft position sensor (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>	Harness or connectors     (The sensor circuit is open or shorted)     Crankshaft position sensor (POS)     Signal plate

#### **DTC Confirmation Procedure**

INFOID:0000000005354147

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.

Revision: 2009 June **EC-1014** 2010 M35/M45

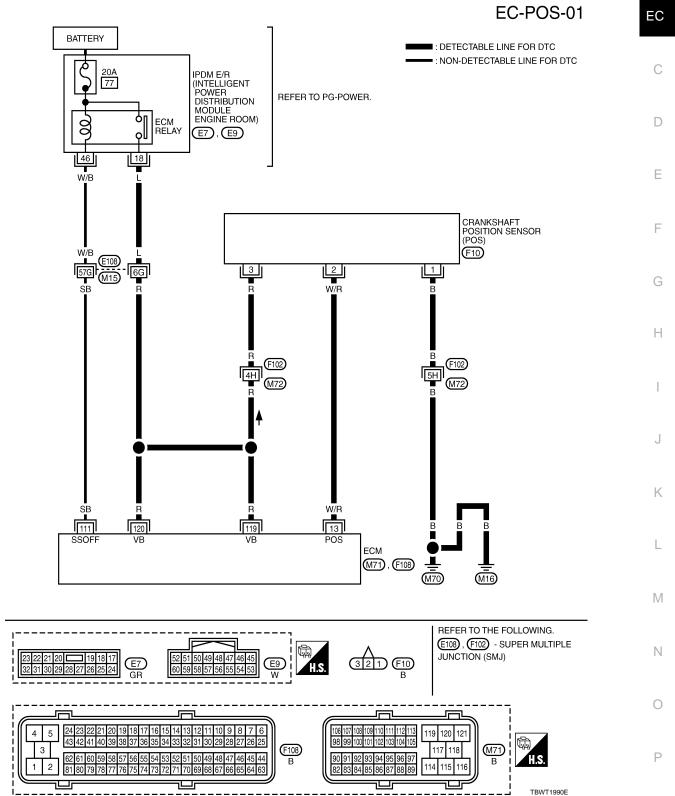
< SERVICE INFORMATION > [VK45DE]

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INFOID:0000000005354148

- Check 1st trip DTC.
- 3. If 1st trip DTC is detected, go to <a href="EC-1016">EC-1016</a>, "Diagnosis Procedure".

## Wiring Diagram



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

#### **CAUTION:**

Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	W/R	Crankshaft position sensor	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> <li>NOTE:</li> <li>The pulse cycle changes depending on rpm at idle</li> </ul>	1.0 - 2.0 V★  >> 5.0 V/Div 1 ms/Div   T  PBIB1041E
13	13 W/R (POS)	(POS)	[Engine is running] • Engine speed: 2,000 rpm	1.0 - 2.0 V★    1.0 - 2.0 V★
111	111 SB	ECM relay (Self shut-off)	<ul><li>[Engine is running]</li><li>[Ignition switch: OFF]</li><li>For a few seconds after turning ignition switch OFF</li></ul>	0 - 1.5 V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
119 120	R R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

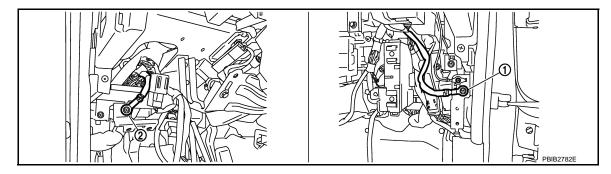
<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# Diagnosis Procedure

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# 1. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "<u>Ground Inspection</u>".



1. Body ground M70

2. Body ground M16

#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

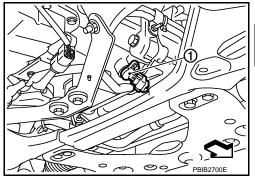
## DTC P0335 CKP SENSOR (POS)

#### < SERVICE INFORMATION >

[VK45DE]

# 2.check crankshaft position (ckp) sensor (pos) power supply circuit

- Disconnect crankshaft position (CKP) sensor (POS) (1) harness connector.
- Illustration shows the view from under the vehicle.
- < ∵: Vehicle front
  </p>
- Turn ignition switch ON.

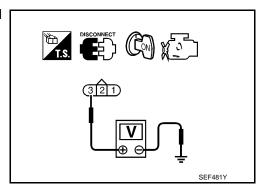


3. Check voltage between CKP sensor (POS) terminal 3 and ground with CONSULT-III or tester.

#### Voltage: Battery voltage

#### OK or NG

OK >> GO TO 4. NG >> GO TO 3.



## 3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness connectors F102, M72
- Harness for open or short between crankshaft position sensor (POS) and ECM
- Harness for open or short between crankshaft position sensor (POS) and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

## f 4.CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Check harness continuity between CKP sensor (POS) terminal 1 and ground. Refer to Wiring Diagram.

#### Continuity should exist.

Also check harness for short to power.

#### OK or NG

OK >> GO TO 6. NG >> GO TO 5.

## ${f 5.}$ DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F102, M72
- Harness for open or short between crankshaft position sensor (POS) and ground

>> Repair open circuit or short to power in harness or connectors.

## $oldsymbol{6}$ .CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Disconnect ECM harness connector.
- Check harness continuity between ECM terminal 13 and CKP sensor (POS) terminal 2. Refer to Wiring Diagram.

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#### Continuity should exist.

3. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 7.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 7.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-1018, "Component Inspection".

#### OK or NG

OK >> GO TO 8.

NG >> Replace crankshaft position sensor (POS).

## 8. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

#### OK or NG

OK >> GO TO 9.

NG >> Replace the signal plate.

#### 9. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

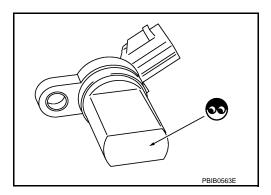
#### >> INSPECTION END

## Component Inspection

INFOID:0000000005354150

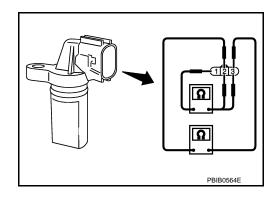
#### CRANKSHAFT POSITION SENSOR (POS)

- 1. Loosen the fixing bolt of the sensor.
- 2. Disconnect crankshaft position sensor (POS) harness connector.
- 3. Remove the sensor.
- 4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance [at 25°C (77°F)]
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or $\infty$ $\Omega$
2 (+) - 3 (-)	



## **DTC P0335 CKP SENSOR (POS)**

# < SERVICE INFORMATION >

[VK45DE]

Removal and Installation

INFOID:0000000005354151

**CRANKSHAFT POSITION SENSOR (POS)** 

Refer to EM-182, "Component".

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INFOID:0000000005354152

## DTC P0340 CAMSHAFT POSITION (CMP) SENSOR (PHASE)

## Component Description

The camshaft position sensor (PHASE) senses the protrusion of exhaust valve cam sprocket 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.

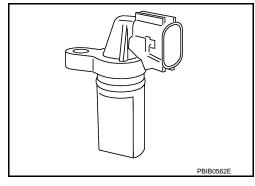
The sensor consists of a permanent magnet and Hall IC.

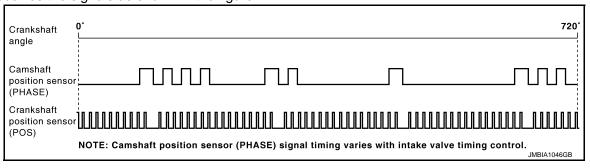
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

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.





## On Board Diagnosis Logic

INFOID:0000000005354153

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340	Camshaft position sensor (PHASE) circuit	<ul> <li>The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking.</li> <li>The cylinder No. signal is not sent to ECM during engine running.</li> <li>The cylinder No. signal is not in the normal pattern during engine running.</li> </ul>	<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Camshaft position sensor (PHASE)</li> <li>Camshaft sprocket (EXH)</li> <li>Starter motor (Refer to <u>SC-8.</u>)</li> <li>Starting system circuit (Refer to <u>SC-8.</u>)</li> <li>Dead (Weak) battery</li> </ul>

#### **DTC Confirmation Procedure**

INFOID:0000000005354154

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

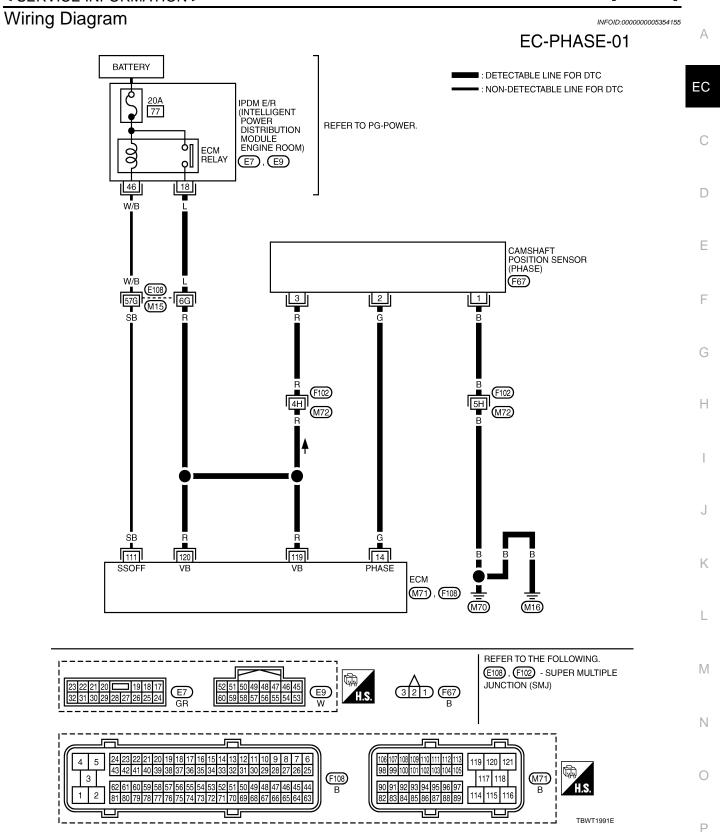
#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

- 1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
- Check 1st trip DTC.
- If 1st trip DTC is detected, go to <u>EC-1022, "Diagnosis Procedure"</u>.
   If 1st trip DTC is not detected, go to next step.
- 4. Maintain engine speed at more than 800 rpm for at least 5 seconds.
- Check 1st trip DTC.
- If 1st trip DTC is detected, go to <u>EC-1022</u>, "<u>Diagnosis Procedure</u>".

< SERVICE INFORMATION >

[VK45DE1



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III. **CAUTION:** 

< SERVICE INFORMATION >

[VK45DE]

Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	G	Camshaft position sensor	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> <li>NOTE:</li> <li>The pulse cycle changes depending on rpm at idle</li> </ul>	1.0 - 4.0 V★  → 5.0 V/Div 20 ms/Div [T]  PBIB1039E
14	(PHASE)	(PHASE)	[Engine is running] • Engine speed: 2,000 rpm	1.0 - 4.0 V★  >> 5.0 V/Div 20 ms/Div  PBIB1040E
111	111 SB	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5 V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
119 120	R R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

INFOID:0000000005354156

## 1. CHECK STARTING SYSTEM

Turn ignition switch to the START position.

Does the engine turn over?

Does the starter motor operate?

#### Yes or No

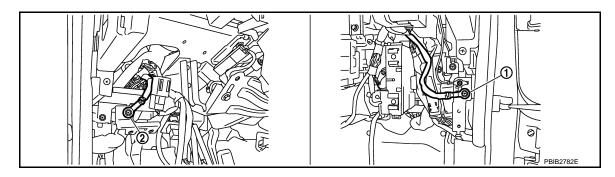
Yes >> GO TO 2.

No >> Check starting system. (Refer to <u>SC-8, "System Description"</u>.)

## 2. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".

[VK45DE] < SERVICE INFORMATION >



1. Body ground M70

2. Body ground M16

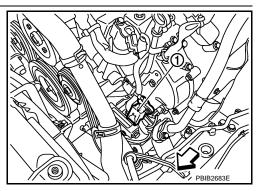
#### OK or NG

OK >> GO TO 3.

NG >> Repair or replace ground connections.

## 3.check camshaft position (cmp) sensor (phase) power supply circuit

- 1. Disconnect camshaft position (CMP) sensor (PHASE) (1) harness connector.
- Illustration shows the view with intake air duct removed.
- ∀: Vehicle front
- Turn ignition switch ON.

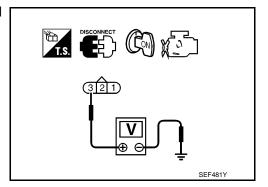


Check voltage between CMP sensor (PHASE) terminal 3 and ground with CONSULT-III or tester.

#### Voltage: Battery voltage

#### OK or NG

OK >> GO TO 5. NG >> GO TO 4.



## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness connectors F102, M72
- Harness for open or short between camshaft position sensor (PHASE) and ECM
- Harness for open or short between camshaft position sensor (PHASE) and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 5.CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Check harness continuity between CMP sensor (PHASE) terminal 1 and ground. Refer to Wiring Diagram.

#### Continuity should exist.

Also check harness for short to power.

**EC-1023** Revision: 2009 June 2010 M35/M45

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OK or NG

OK >> GO TO 7.

NG >> GO TO 6.

## 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F102, M72
- · Harness for open or short between CMP sensor (PHASE) and ground
  - >> Repair open circuit or short to power in harness or connectors.

## 7.CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect ECM harness connector.
- Check harness continuity between ECM terminal 14 and CMP sensor (PHASE) terminal 2. Refer to Wiring Diagram.

#### Continuity should exist.

3. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 8.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-1024, "Component Inspection".

#### OK or NG

OK >> GO TO 9.

NG >> Replace camshaft position sensor (PHASE).

## 9. CHECK CAMSHAFT SPROCKET (EXH)

Visually check camshaft sprocket (EXH) for chipping.

#### OK or NG

OK >> GO TO 10.

NG >> Replace camshaft sprocket (exhaust).

## 10.CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

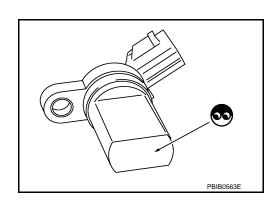
## Component Inspection

INFOID:0000000005354157

[VK45DE]

#### **CAMSHAFT POSITION SENSOR (PHASE)**

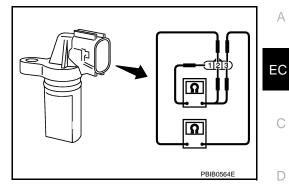
- Loosen the fixing bolt of the sensor.
- 2. Disconnect camshaft position sensor (PHASE) harness connector.
- 3. Remove the sensor.
- 4. Visually check the sensor for chipping.



# < SERVICE INFORMATION >

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance [at 25°C (77°F)]
3(+) - 1 (-)	
2 (+) - 1 (-)	Except 0 or $\infty \Omega$
3 (+) - 2 (-)	



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## Removal and Installation

CAMSHAFT POSITION SENSOR (PHASE)

Refer to EM-211, "Component".

EC-1025 Revision: 2009 June 2010 M35/M45

[VK45DE]

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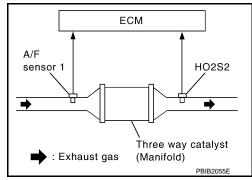
## DTC P0420, P0430 THREE WAY CATALYST FUNCTION

## On Board Diagnosis 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 0420 (Bank 1) P0430 0430 (Bank 2)	Catalyst system efficiency below threshold	<ul> <li>Three way catalyst (manifold) does not operate properly.</li> <li>Three way catalyst (manifold) does not have enough oxygen storage capacity.</li> </ul>	Three way catalyst (manifold) Exhaust tube Intake air leakage Fuel injector Fuel injector leakage Spark plug Improper ignition timing

#### **DTC Confirmation Procedure**

INFOID:0000000005354160

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

#### (P) WITH CONSULT-III

#### **TESTING CONDITION:**

#### Do not hold engine speed for more than the specified minutes below.

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III.
- 8. Check that "COOLAN TEMP/S" indication is more than 70°C (158°F). If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
- 9. Open engine hood.
- 10. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-III.
- Rev engine between 2,000 and 3,000 rpm and maintain that speed for 3 consecutive minutes, then
  release the accelerator pedal completely.
  If "INCMP" of "CATALYST" changed to "CMPLT", go to step 14.
- Wait 5 seconds at idle.
- 13. Rev engine between 2,000 and 3,000 rpm and maintain that speed until "INCMP" of "CATALYST" changes to "CMPLT" (It will take approximately 5 minutes).
  If not "CMPLT", stop engine and cool it down to less than 70°C (158°F), and then retest from step 1.
- 14. Check 1st trip DTC.

#### DTC P0420, P0430 THREE WAY CATALYST FUNCTION

< SERVICE INFORMATION >

[VK45DE]

15. If 1st trip DTC is detected, go to EC-1027, "Diagnosis Procedure"

#### Overall Function Check

INFOID:0000000005354161

Use this procedure to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

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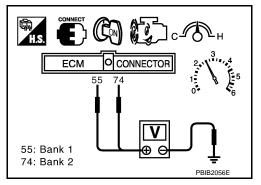
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#### WITH GST

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. 3.
- 4. Let engine idle for 1 minute.
- 5. Open engine hood.
- Set voltmeter probe between ECM terminal 55 [HO2S2 (bank 1) signal] and ground, ECM terminal 74 [HO2S2 (bank 2) signal] and ground.
- 7. Keep engine speed at 2,500 rpm constant under no load.
- Check that the voltage does not vary for more than 5 seconds. If the voltage fluctuation cycle takes less than 5 seconds, go to EC-1027, "Diagnosis Procedure".
  - 1 cycle:  $0.6 1.0 \rightarrow 0 0.3 \rightarrow 0.6 1.0$



## Diagnosis Procedure

INFOID:0000000005354162

## CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dents.

#### OK or NG

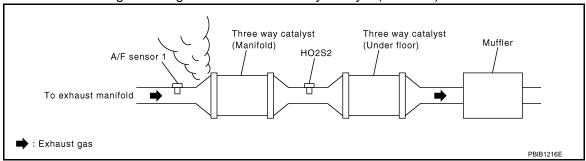
OK >> GO TO 2.

NG >> Repair or replace.

## 2.CHECK EXHAUST GAS LEAKAGE

Start engine and run it at idle.

Listen for an exhaust gas leakage before the three way catalyst (manifold).



#### OK or NG

OK >> GO TO 3.

NG >> Repair or replace malfunctioning part.

## 3.CHECK INTAKE AIR LEAKAGE

Listen for an intake air leakage after the mass air flow sensor.

#### OK or NG

OK >> GO TO 4.

>> Repair or replace malfunctioning part. NG

#### 4.CHECK IGNITION TIMING

Check the following items. Refer to EC-760, "Basic Inspection".

EC-1027 Revision: 2009 June 2010 M35/M45

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#### < SERVICE INFORMATION >

Items	Specifications
Target idle speed	$650 \pm 50$ rpm (in P or N position)
Ignition timing	12 ± 5°BTDC (in P or N position)

#### OK or NG

OK >> GO TO 5.

NG >> Follow the instructions on <u>EC-760</u>, "Basic Inspection".

## 5. CHECK FUEL INJECTORS

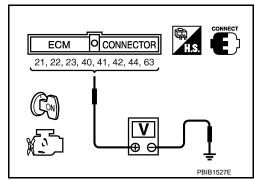
- Stop engine and then turn ignition switch ON.
- Check voltage between ECM terminals 21, 22, 23, 40, 41, 42, 44, 63 and ground with CONSULT-III or tester.
   Refer to Wiring Diagram for fuel injectors, <u>EC-1292</u>, "Wiring Diagram".

#### Battery voltage should exist.

#### OK or NG

OK >> GO TO 6.

NG >> Perform <u>EC-1293</u>, "Diagnosis Procedure".



## 6.CHECK FUNCTION OF IGNITION COIL-I

#### **CAUTION:**

Perform the following procedure in a place with no combustible objects and good ventilation.

- Turn ignition switch OFF.
- Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

#### NOTE:

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- Turn ignition switch OFF.
- 6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 7. Remove ignition coil and spark plug of the cylinder to be checked.
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 9. Connect spark plug and harness connector to ignition coil.
- 10. Fix ignition coil using a rope etc. with gap of 13 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
- Crank engine for approximately 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

# Grounded metal portion (Cylinder head, cylinder block, etc.)

PBIB2325E

#### Spark should be generated.

#### **CAUTION:**

- Never place the spark plug and the ignition coil within 50 cm each other. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might damage the ignition coil if the gap of more than 17 mm is made.
   NOTE:

When the gap is less than 13 mm, spark might be generated even if the coil is malfunctioning.

#### OK or NG

DTC P0420, P0430 THREE WAY CATALYST FUNCTION [VK45DE] < SERVICE INFORMATION > OK >> GO TO 10. NG >> GO TO 7. Α 7.CHECK FUNCTION OF IGNITION COIL-II Turn ignition switch OFF. EC Disconnect spark plug and connect a non-malfunctioning spark plug. 2. Crank engine for approximately 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion. Spark should be generated. OK or NG D OK >> GO TO 8. NG >> Check ignition coil, power transistor and their circuits. Refer to EC-1313, "Diagnosis Procedure". 8.CHECK SPARK PLUG Check the initial spark plug for fouling, etc. OK or NG OK >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-272, "Standard and Limit". NG >> 1. Repair or clean spark plug. GO TO 9. Н SEF156I 9. CHECK FUNCTION OF IGNITION COIL-III Reconnect the initial spark plugs. 2. Crank engine for approximately 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion. Spark should be generated. OK or NG K OK >> INSPECTION END NG >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-272. "Standard and Limit". L 10. CHECK FUEL INJECTOR Turn ignition switch OFF. 1. Remove fuel tube assembly. Refer to EM-189, "Component". 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.

Check that fuel does not drip from fuel injector.

#### OK or NG

OK (Does not drip.)>>GO TO 11.

NG (Drips.)>>Replace the fuel injector(s) from which fuel is dripping.

## 11. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### Trouble is fixed.>>INSPECTION END

Trouble is not fixed.>>Replace malfunctioning three way catalyst assembly.

Revision: 2009 June **EC-1029** 2010 M35/M45

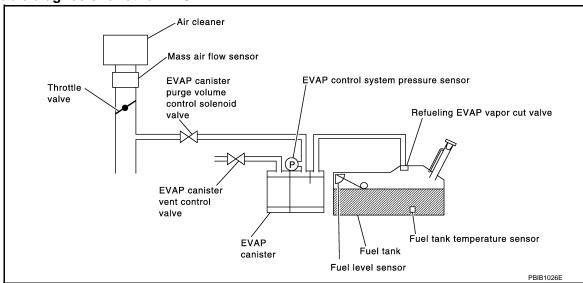
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## System Description

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#### NOTE:

If DTC P0441 is displayed with other DTC such as P2122, P2123, P2127, P2128 or P2138, first perform the trouble diagnosis for other DTC.



In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

## On Board Diagnosis Logic

INFOID:0000000005354164

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 0441	EVAP control system in- correct purge flow	EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	EVAP canister purge volume control solenoid valve stuck closed     EVAP control system pressure sensor and the circuit     Loose, disconnected or improper connection of rubber tube     Blocked rubber tube     Cracked EVAP canister     EVAP canister purge volume control solenoid valve circuit     Accelerator pedal position sensor     Blocked purge port     EVAP canister vent control valve

#### **DTC Confirmation Procedure**

INFOID:0000000005354165

#### **CAUTION:**

Always drive vehicle at a safe speed.

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Always perform test at a temperature of 5°C (41°F) or more.

Revision: 2009 June **EC-1030** 2010 M35/M45

## < SERVICE INFORMATION > [VK45DE]

#### (P) WITH CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and let it idle for at least 70 seconds.
- Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CON-SULT-III.
- 7. Touch "START". If "COMPLETED" is displayed, go to step 9.
- 8. When the following conditions are met, "TESTING" will be displayed on the CONSULT-III screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Selector lever	Suitable position
VHCL SPEED SE	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,000 rpm
B/FUEL SCHDL	1.0 - 10.0 msec
COOLAN TEMP/S	70 - 100°C (158 - 212°F)

#### If "TESTING" does not change for a long time, retry from step 2.

 Check that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, go to <u>EC-1031</u>, "<u>Diagnosis Procedure</u>".

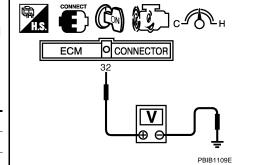
#### **Overall Function Check**

Use this procedure to check the overall function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

#### **® WITH GST**

- 1. Lift up drive wheels.
- 2. Start engine (VDC switch OFF) and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF, wait at least 10 seconds.
- 4. Start engine and wait at least 70 seconds.
- 5. Set voltmeter probes to ECM terminals 32 (EVAP control system pressure sensor signal) and ground.
- Check EVAP control system pressure sensor value at idle speed and note it.
- Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch	ON
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Selector lever position	Any position other than P, N or R



- Check that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
- If NG, go to <u>EC-1031</u>, "<u>Diagnosis Procedure</u>".

## Diagnosis Procedure

## CHECK EVAP CANISTER

Turn ignition switch OFF.

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INFOID:0000000005354167

#### < SERVICE INFORMATION >

[VK45DE]

2. Check EVAP canister for cracks.

#### OK or NG

OK (With CONSULT-III)>>GO TO 2.

OK (Without CONSULT-III)>>GO TO 3.

NG >> Replace EVAP canister.

## 2. CHECK PURGE FLOW

#### (P) With CONSULT-III

- 1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve and EVAP service port from EVAP service port. For the location of EVAP service port, refer to <u>EC-720</u>, "<u>Description</u>".
- Install vacuum gauge between the vacuum hose and EVAP service port.
- 3. Start engine and let it idle.
- 4. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III.
- 5. Rev engine up to 2,000 rpm.
- Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG VOL C/V" indication and check vacuum existence.

PURG VOL C/V	Vacuum
100%	Should exist.
0%	Should not exist.

#### OK or NG

OK >> GO TO 7.

NG >> GO TO 4.

## 3. CHECK PURGE FLOW

#### **⋈** Without CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- Stop engine.
- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve and EVAP service port. For the location of EVAP service port, refer to <u>EC-720</u>, "<u>Description</u>".
- 4. Install vacuum gauge between the vacuum hose and EVAP service port.
- 5. Start engine and let it idle.

#### Do not depress accelerator pedal even slightly.

Check vacuum gauge indication before 60 seconds pass after starting engine.

#### Vacuum should not exist.

7. Rev engine up to 2,000rpm after 100 seconds pass after starting engine.

#### Vacuum should exist.

#### OK or NG

OK >> GO TO 7.

NG >> GO TO 4.

## 4. CHECK EVAP PURGE LINE

- 1. Turn ignition switch OFF.
- Check EVAP purge line for improper connection or disconnection. Refer to <u>EC-720</u>, "<u>Description</u>".

#### OK or NG

OK >> GO TO 5.

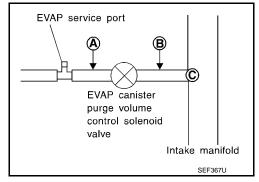
NG >> Repair malfunctioning part.

#### ${f 5.}$ CHECK EVAP PURGE HOSE AND PURGE PORT

#### < SERVICE INFORMATION >

[VK45DE]

- Disconnect purge hoses connected to EVAP service port (A) and EVAP canister purge volume control solenoid valve (B).
- Blow air into each hose and EVAP purge port (C).



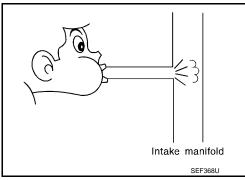
Check that air flows freely.

#### OK or NG

OK (With CONSULT-III)>>GO TO 6.

OK (Without CONSULT-III)>>GO TO 7.

NG >> Repair or clean hoses and/or purge port.



## 6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### (P) With CONSULT-III

- Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

#### OK or NG

OK >> GO TO 8.

NG >> GO TO 7.

## .CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1055, "Component Inspection".

## OK or NG

OK

NG >> Replace EVAP canister purge volume control solenoid valve.

## 8.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

- Disconnect EVAP control system pressure sensor harness connector.
- Check connectors for water.

#### Water should not exist.

#### OK or NG

OK >> GO TO 9.

NG >> Replace EVAP control system pressure sensor.

## 9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to EC-1070, "DTC Confirmation Procedure" for DTC P0452, EC-1076, "DTC Confirmation Procedure" for DTC P0453.

#### OK or NG

OK >> GO TO 10.

NG >> Replace EVAP control system pressure sensor.

## 10.CHECK RUBBER TUBE FOR CLOGGING

Disconnect rubber tube connected to EVAP canister vent control valve.

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2010 M35/M45

[VK45DE]

#### DIC PU441 EVAP CONTROL STSTE

2. Check the rubber tube for clogging.

< SERVICE INFORMATION >

#### OK or NG

OK >> GO TO 11.

NG >> Clean the rubber tube using an air blower.

11. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-1060, "Component Inspection".

#### OK or NG

OK >> GO TO 12.

NG >> Replace EVAP canister vent control valve.

# 12. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks. Refer to EC-720. "Description".

#### OK or NG

OK >> GO TO 13.

NG >> Replace malfunctioning part.

## 13. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 14.

## 14. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

>> INSPECTION END

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[VK45DE]

INFOID:0000000005354168

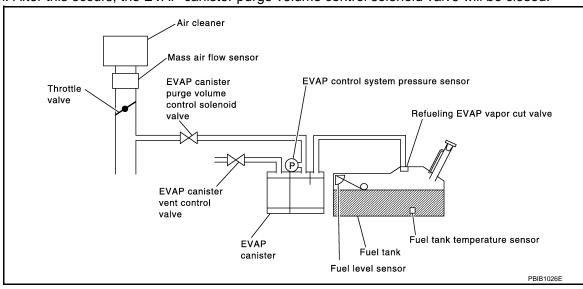
## DTC P0442 EVAP CONTROL SYSTEM

## On Board Diagnosis Logic

This diagnosis detects leakage in the EVAP purge line using engine intake manifold vacuum.

If pressure does not increase, the ECM will check for leakage in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following "Vacuum test" conditions.

The EVAP canister vent control valve is closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve will then be opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0442 0442	EVAP control system small leak detected (negative pressure)	EVAP control system has a leak, EVAP control system does not op- erate properly.	<ul> <li>Incorrect fuel tank vacuum relief valve</li> <li>Incorrect fuel filler cap used</li> <li>Fuel filler cap remains open or does not 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 leakage</li> <li>EVAP purge line (pipe and rubber tube) leakage</li> <li>EVAP purge line rubber tube bent</li> <li>Loose or disconnected rubber tube</li> <li>EVAP canister vent control valve and the circuit</li> <li>EVAP canister purge volume control solenoid valve and the circuit</li> <li>Fuel tank temperature sensor</li> <li>O-ring of EVAP canister vent control valve is missing or damaged</li> <li>EVAP canister is saturated with water</li> <li>EVAP control system pressure sensor</li> <li>Fuel level sensor and the circuit</li> <li>Refueling EVAP vapor cut valve</li> <li>ORVR system leakage</li> </ul>

#### **CAUTION:**

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the
- If the fuel filler cap is not tightened properly, the MIL may illuminate.
- Use only a genuine NISSAN rubber tube as a replacement.

#### **DTC Confirmation Procedure**

INFOID:0000000005354169

NOTE:

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#### [VK45DE]

#### < SERVICE INFORMATION >

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

- Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Always perform test at a temperature of 0 to 30°C (32 to 86°F).

#### (A) WITH CONSULT-III

- 1. Turn ignition switch ON.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 4. Check that the following conditions are met.

COOLAN TEMP/S: 0 - 70°C (32 - 158°F)

INT/A TEMP SE: 0 - 30°C (32 - 86°F)

Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.

Follow the instructions displayed.

#### NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to EC-760, "Basic Inspection".

6. Check that "OK" is displayed.

If "NG" is displayed, refer to EC-1036, "Diagnosis Procedure".

#### NOTE:

Check that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

#### **WITH GST**

#### NOTE:

Be sure to read the explanation of "Driving Pattern" in <u>EC-735</u>, "<u>Emission-Related Diagnostic Information</u>" before driving vehicle.

- 1. Start engine.
- 2. Drive vehicle according to "Driving Pattern" in EC-735, "Emission-Related Diagnostic Information".
- 3. Stop vehicle.
- 4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- Select Service \$07 with GST.
  - If P0442 is displayed on the screen, go to EC-1036, "Diagnosis Procedure".
  - If P0441 is displayed on the screen, go to <u>EC-1031</u>, "<u>Diagnosis Procedure</u>".

## Diagnosis Procedure

INFOID:0000000005354170

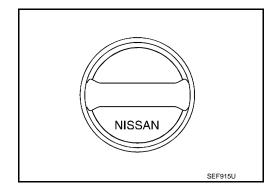
## 1. CHECK FUEL FILLER CAP DESIGN

- 1. Turn ignition switch OFF.
- 2. Check for genuine NISSAN fuel filler cap design.

#### OK or NG

OK >> GO TO 2.

NG >> Replace with genuine NISSAN fuel filler cap.



## 2.CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

[VK45DE] < SERVICE INFORMATION >

#### OK or NG

>> GO TO 3. OK

NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.

2. Retighten until ratcheting sound is heard.

## 3.CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

#### OK or NG

OK >> GO TO 5.

NG >> GO TO 4.

## 4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-722, "Component Inspection".

#### OK or NG

OK >> GO TO 5.

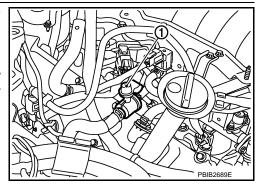
NG >> Replace fuel filler cap with a genuine one.

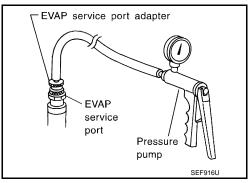
## $oldsymbol{5}.$ INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter (commercial service tool) and pressure pump to EVAP service port (1) securely.

#### NOTE:

Improper installation of the EVAP service port adapter (commercial service tool) to the EVAP service port may cause leak-





With CONSULT-III>>GO TO 6. Without CONSULT-III>>GO TO 7.

## **6.**CHECK FOR EVAP LEAK

#### (P) With CONSULT-III

- Turn ignition switch ON.
- Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-III.
- Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

#### **CAUTION:**

- · Never use compressed air or a high pressure pump.
- Never exceed 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi) of pressure in the system.

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#### < SERVICE INFORMATION >

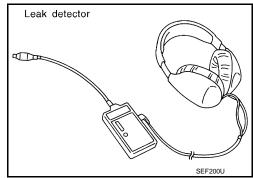
[VK45DE]

Using EVAP leak detector (commercial service tool), locate the EVAP leak. For the leak detector (commercial service tool), refer to the instruction manual for more details. Refer to EC-720, "Description".

OK or NG

OK >> GO TO 8.

NG >> Repair or replace malfunctioning part.



## 7.CHECK FOR EVAP LEAK

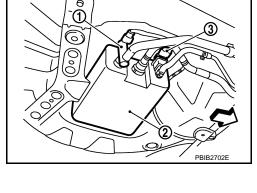
#### **⋈** Without CONSULT-III

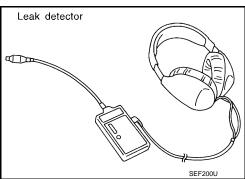
- Turn ignition switch OFF.
- Apply 12 volts DC to EVAP canister vent control valve (1). The valve will close. (Continue to apply 12 volts until the end of test.)
- Illustration shows the view from under the vehicle
- ⟨□: Vehicle front
- EVAP canister (2)
- EVAP control system pressure sensor (3)
- Pressurize the EVAP line using pressure pump with 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm<sup>2</sup>, 0.2 to 0.4 psi), then remove pump and EVAP service port adapter (commercial service tool).
  - **CAUTION:**
  - · Never use compressed air or a high pressure pump.
  - Never exceed 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi) of pressure in the system.
- Using EVAP leak detector (commercial service tool), locate the EVAP leak. For the leak detector (commercial service tool), refer to the instruction manual for more details. Refer to EC-720. "Description".



OK >> GO TO 8.

NG >> Repair or replace malfunctioning part.





## 8.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly. Refer to EC-724, "Removal and Installation".
- EVAP canister vent control valve. Refer to EC-1060, "Component Inspection".

#### OK or NG

OK >> GO TO 9.

NG >> Repair or replace EVAP canister vent control valve and O-ring.

## 9.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

#### < SERVICE INFORMATION >

[VK45DE]

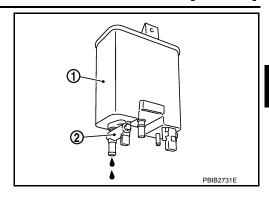
- Does water drain from the EVAP canister (1)?
- EVAP canister vent control valve (2)

#### Yes or No

Yes >> GO TO 10.

No (With CONSULT-III)>>GO TO 12.

No (Without CONSULT-III)>>GO TO 13.



## 10. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor

The weight should be less than 2.0 kg (4.4 lb).

#### OK or NG

OK (With CONSULT-III)>>GO TO 12.

OK (Without CONSULT-III)>>GO TO 13.

>> GO TO 11.

## 11. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

## 12. Check evap canister purge volume control solenoid valve operation

#### (P) With CONSULT-III

- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve and EVAP service port from EVAP service port.
- Start engine.
- 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
- Touch "Qu" on CONSULT-III screen to increase "PURG VOL C/V" indication to 100%.
- Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

#### OK or NG

OK >> GO TO 15.

NG >> GO TO 14.

## 13.check evap canister purge volume control solenoid valve operation

#### Without CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Stop engine.
- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve and EVAP service port from EVAP service port.
- 4. Start engine and let it idle for at least 80 seconds.
- Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

#### Vacuum should exist.

#### OK or NG

OK >> GO TO 15.

NG >> GO TO 14.

## 14. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-788, "Vacuum Hose Drawing".

#### OK or NG

OK >> GO TO 15.

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#### < SERVICE INFORMATION >

[VK45DE]

NG >> Repair or reconnect the hose.

# 15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1055, "Component Inspection".

#### OK or NG

OK >> GO TO 16.

NG >> Replace EVAP canister purge volume control solenoid valve.

## 16. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-995, "Component Inspection".

#### OK or NG

OK >> GO TO 17.

NG >> Replace fuel level sensor unit.

## 17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1068, "Component Inspection".

#### OK or NG

OK >> GO TO 18.

NG >> Replace EVAP control system pressure sensor.

## 18. 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-720</u>, "<u>Description</u>".

#### OK or NG

OK >> GO TO 19.

NG >> Repair or reconnect the hose.

## 19. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 20.

## 20.CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kinks, looseness and improper connection. For location, refer to <u>EC-720</u>, "<u>Description</u>".

#### OK or NG

OK >> GO TO 21.

NG >> Repair or replace hoses and tubes.

## 21. CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kinks, cracks, looseness and improper connection.

#### OK or NG

OK >> GO TO 22.

NG >> Repair or replace hose, tube or filler neck tube.

## 22.CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-728, "Component Inspection".

#### OK or NG

OK >> GO TO 23.

NG >> Replace refueling EVAP vapor cut valve with fuel tank.

## 23. CHECK FUEL LEVEL SENSOR

Refer to DI-24, "Electrical Component Inspection".

#### OK or NG

OK >> GO TO 24.

NG >> Replace fuel level sensor unit.

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< SERVICE INFORMATION > [VK45DE]

# $\overline{24.}$ CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

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# DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE < SERVICE INFORMATION > [VK45DE]

# DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description INFOID:0000000005354171

#### SYSTEM DESCRIPTION

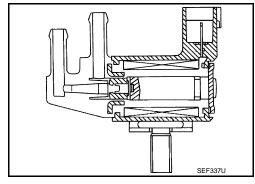
Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1			
Mass air flow sensor	Amount of intake air			
Engine coolant temperature sensor	Engine coolant temperature			
Battery	Battery voltage*1			
Throttle position sensor	Throttle position	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve	
Accelerator pedal position sensor	Accelerator pedal position	_ pargo non conner		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)			
Fuel tank temperature sensor	Fuel temperature in fuel tank			
Unified meter and A/C amp.	Vehicle speed*2			

<sup>\*1:</sup> ECM determines the start signal status by the signals of engine speed and battery voltage.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

#### COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve is used to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



## CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354172

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	Engine: After warming up     Selector lever position: P or N     Air conditioner switch: OFF	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%
	No load	2,000 rpm	_

<sup>\*2:</sup> This signal is sent to the ECM via the CAN communication line.

#### DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VK45DE] < SERVICE INFORMATION >

## On Board Diagnosis Logic

INFOID:0000000005502522

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	Е
P0443 0443	EVAP canister purge volume control solenoid valve	The canister purge flow is detected during the vehicle is stopped while the engine is running, even when EVAP canister purge volume control solenoid valve is completely closed.	EVAP control system pressure sensor     EVAP canister purge volume control solenoid valve     (EVAP canister purge volume control solenoid valve is stuck open.)	
		B) The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	EVAP canister vent control valve     EVAP canister     Hoses     (Hoses are connected incorrectly or clogged.)	

#### **DTC Confirmation Procedure**

INFOID:0000000005502523

Perform PROCEDURE FOR MALFUNCTION A first.

If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B. NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### PROCEDURE FOR MALFUNCTION A

#### **TESTING CONDITION:**

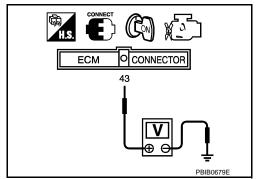
- Perform "DTC Confirmation Procedure" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Always perform test at a temperature of 5 to 60°C (41 to 140°F).
- Cool the vehicle so that engine coolant temperature becomes same level as ambient temperature.

#### (P) With CONSULT-III

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- Check that the following condition are met. FUEL T/TMP SE: 0 – 35°C (32 – 95°F)
- Start engine and wait at least 60 seconds.
- Check 1st trip DTC.
- If 1st trip DTC is detected, go to <u>EC-1046, "Diagnosis Procedure"</u>.

#### With GST

- Turn ignition switch ON.
- 2. Set voltmeter probes to ECM terminal 43 (FTT sensor signal) and ground.
- Check that the voltage is 3.1 4.2 V.
- Start engine and wait at least 60 seconds.
- Check 1st trip DTC.
- If 1st trip DTC is detected, go to EC-1046, "Diagnosis Procedure".



#### PROCEDURE FOR MALFUNCTION B

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

Always perform test at a temperature of 5°C (41°F) or more.

(P) With CONSULT-III

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# DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VK45DE]

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 5. Touch "START".
- 6. Start engine and let it idle until "TESTING" on CONSULT-III changes to "COMPLETED". (It will take approximately 10 seconds.)

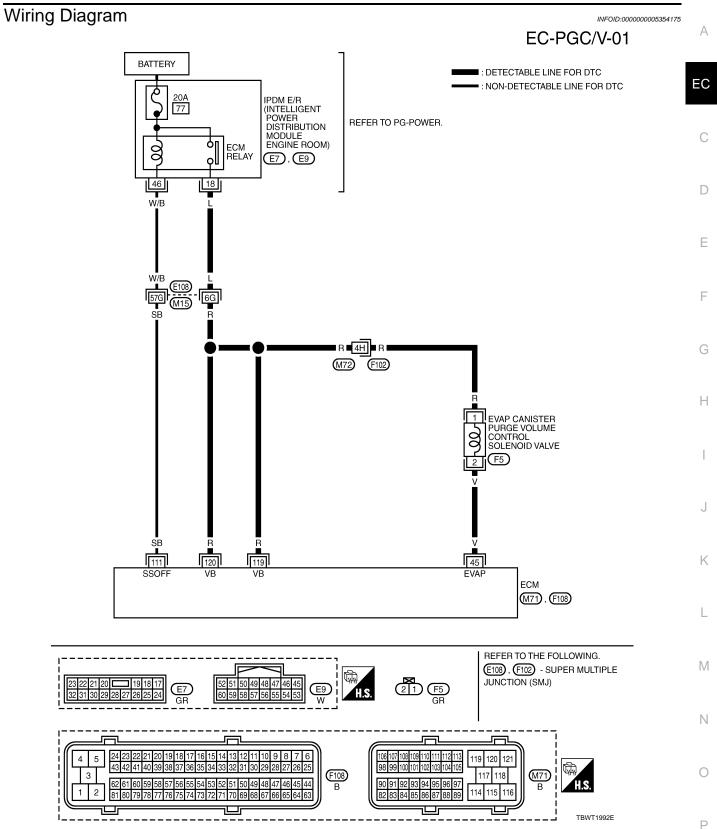
If "TESTING" is not displayed after 5 minutes, retry from step 2.

7. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to EC-1046, "Diagnosis Procedure".

#### With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and let it idle for at least 20 seconds.
- 4. Select Service \$07 with GST.
- 5. If 1st trip DTC is detected, go to EC-1046, "Diagnosis Procedure".

< SERVICE INFORMATION > [VK45DE]



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

CAUTION:

< SERVICE INFORMATION >

[VK45DE]

Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	V	EVAP canister purge volume control solenoid valve	<ul> <li>[Engine is running]</li> <li>Idle speed</li> <li>Accelerator pedal: Not depressed even slightly, after engine starting</li> </ul>	BATTERY VOLTAGE  (11 - 14 V)*  10.0 V/Div 50 ms/Div SEC990C
45	V		<ul> <li>[Engine is running]</li> <li>Engine speed: Approx. 2,000 rpm (More than 100 seconds after starting engine)</li> </ul>	BATTERY VOLTAGE  (11 - 14 V)*  10.0 V/Dlv 50 ms/Dlv   I
111	SB	ECM relay (Self shut-off)	<ul><li>[Engine is running]</li><li>[Ignition switch: OFF]</li><li>For a few seconds after turning ignition switch OFF</li></ul>	0 - 1.5 V
			<ul> <li>[Ignition switch: OFF]</li> <li>More than a few seconds after turning ignition switch OFF</li> </ul>	BATTERY VOLTAGE (11 - 14 V)
119 120	R R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

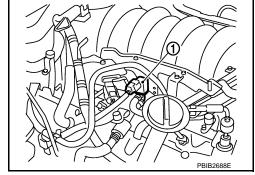
<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# Diagnosis Procedure

INFOID:0000000005354176

# 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 (1) harness connector.
- 3. Turn ignition switch ON.



#### DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VK45DE]

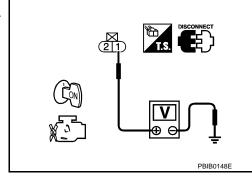
< SERVICE INFORMATION >

Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-III or tester.

#### Voltage: Battery voltage

#### OK or NG

OK >> GO TO 3. NG >> GO TO 2.



# 2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness connectors M72, F102
- IPDM E/R harness connector E7
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

# 3.check evap canister purge volume control solenoid valve output signal circuit FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between ECM terminal 45 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

# f 4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

- Disconnect EVAP control system pressure sensor harness connector.
- 2. Check connectors for water.

#### Water should not exist.

#### OK or NG

OK >> GO TO 5.

NG >> Replace EVAP control system pressure sensor.

## ${f 5}$ .CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1068, "Component Inspection".

#### OK or NG

OK (With CONSULT-III)>>GO TO 6.

OK (Without CONSULT-III)>>GO TO 7.

>> Replace EVAP control system pressure sensor.

### **O.**CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### (P) With CONSULT-III

- Turn ignition switch OFF.
- Reconnect harness connectors disconnected.
- Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

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2010 M35/M45

#### DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE **IVK45DE1**

#### < SERVICE INFORMATION >

OK or NG

OK >> GO TO 8.

NG >> GO TO 7.

# 7.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### Refer to EC-1049, "Component Inspection".

#### OK or NG

OK >> GO TO 8.

NG >> Replace EVAP canister purge volume control solenoid valve.

# $oldsymbol{8}.$ CHECK RUBBER TUBE FOR CLOGGING

- Disconnect rubber tube connected to EVAP canister vent control valve.
- Check the rubber tube for clogging.

#### OK or NG

OK >> GO TO 9.

NG >> Clean the rubber tube using an air blower.

# $oldsymbol{9}.$ CHECK EVAP CANISTER VENT CONTROL VALVE

## Refer to EC-1060, "Component Inspection".

#### OK or NG

OK >> GO TO 10.

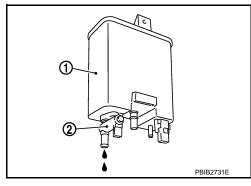
NG >> Replace EVAP canister vent control valve.

# 10.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- Does water drain from the EVAP canister (1)?
- EVAP canister vent control valve (2)

#### Yes or No

Yes >> GO TO 11. Nο >> GO TO 13.



# 11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

#### The weight should be less than 2.0 kg (4.4 lb).

#### OK or NG

OK >> GO TO 13.

>> GO TO 12. NG

# 12. DETECT MALFUNCTIONING PART

#### Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

#### >> Repair hose or replace EVAP canister.

# 13. CHECK INTERMITTENT INCIDENT

Refer to EC-822. "Diagnosis Procedure".

#### >> INSPECTION END

# DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE SERVICE INFORMATION > [VK45DE]

< SERVICE INFORMATION > Component Inspection

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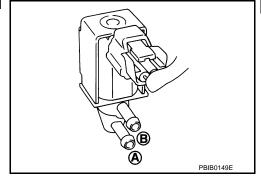
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#### EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### (II) With CONSULT-III

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

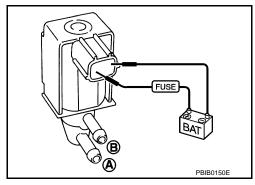
Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Yes
0%	No



#### Without CONSULT-III

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)	
12 V direct current supply between terminals 1 and 2	Yes	
No supply	No	



#### Removal and Installation

INFOID:0000000005354178

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE Refer to EM-174, "Component".

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Revision: 2009 June **EC-1049** 2010 M35/M45

< SERVICE INFORMATION >

[VK45DE]

# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLE-NOID VALVE

Description INFOID:000000005354179

#### SYSTEM DESCRIPTION

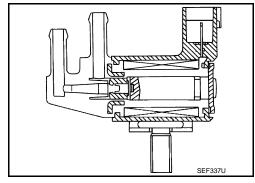
Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1			
Mass air flow sensor	Amount of intake air			
Engine coolant temperature sensor	Engine coolant temperature			
Battery	Battery voltage*1			
Throttle position sensor	Throttle position	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve	
Accelerator pedal position sensor	Accelerator pedal position	parge new control control control control	Control Colonida Valvo	
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)			
Fuel tank temperature sensor	Fuel temperature in fuel tank			
Unified meter and A/C amp.	Vehicle speed*2			

<sup>\*1:</sup> ECM determines the start signal status by the signals of engine speed and battery voltage.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

#### COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve is used to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



#### CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354180

Specification data are reference values.

MONITOR ITEM	CC	SPECIFICATION	
PURG VOL C/V	Engine: After warming up     Selector lever position: P or N     Air conditioner switch: OFF	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%
	No load	2,000 rpm	_

<sup>\*2:</sup> This signal is sent to the ECM via the CAN communication line.

#### < SERVICE INFORMATION >

[VK45DE]

# On Board Diagnosis Logic

INFOID:0000000005354181

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444 0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	Harness or connectors     (The solenoid valve circuit is open or shorted.)     EVAP canister purge volume control solenoid valve
P0445 0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	Harness or connectors     (The solenoid valve circuit is shorted.)     EVAP canister purge volume control solenoid valve

#### **DTC Confirmation Procedure**

INFOID:0000000005354182

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm battery voltage is more than 11 V at idle.

- 1. Start engine and let it idle for at least 13 seconds.
- 2. Check 1st trip DTC.
- 3. If 1st trip DTC is detected, go to <a href="EC-1053"><u>EC-1053</a>, "Diagnosis Procedure".</u></a>

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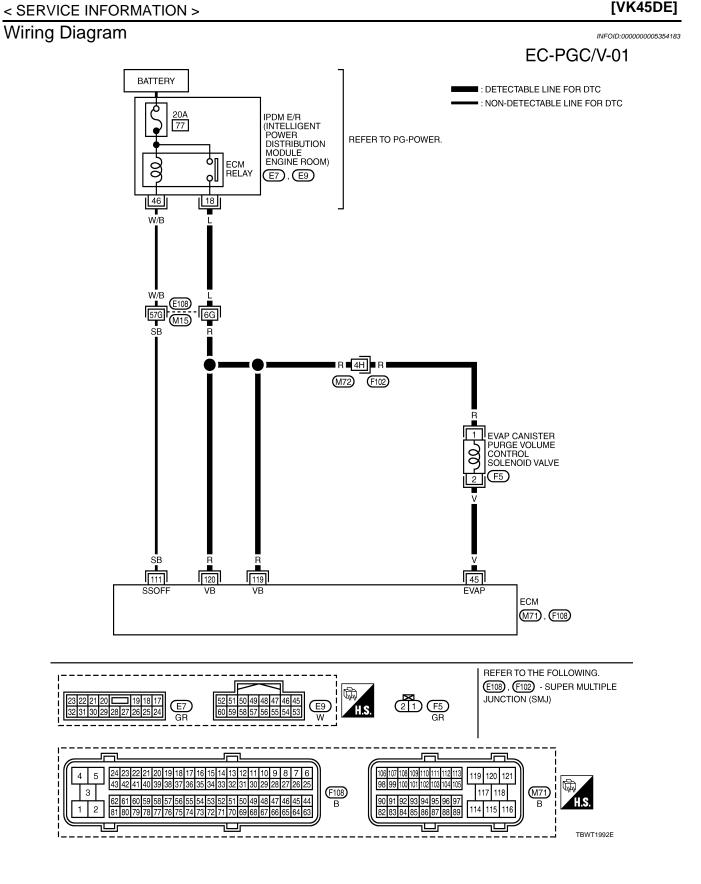
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**VALVE** 



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III. **CAUTION:** 

< SERVICE INFORMATION >

[VK45DE]

Never 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.

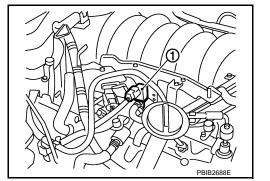
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	V	EVAP canister purge volume control solenoid valve	<ul> <li>[Engine is running]</li> <li>Idle speed</li> <li>Accelerator pedal: Not depressed even slightly, after engine starting</li> </ul>	BATTERY VOLTAGE  (11 - 14 V)*  Discrete statement of the
45	V		<ul> <li>[Engine is running]</li> <li>Engine speed: Approx. 2,000 rpm (More than 100 seconds after starting engine)</li> </ul>	BATTERY VOLTAGE  (11 - 14 V)*  INDICATE SECURITY
111	SB	SB ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5 V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
119 120	R R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# Diagnosis Procedure

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 (1) harness connector.
- 3. Turn ignition switch ON.



Revision: 2009 June **EC-1053** 2010 M35/M45

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#### < SERVICE INFORMATION >

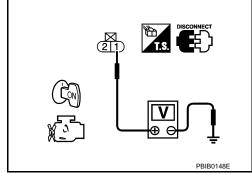
[VK45DE]

 Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-III or tester.

#### Voltage: Battery voltage

#### OK or NG

OK >> GO TO 3. NG >> GO TO 2.



# 2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness connectors M72, F102
- IPDM E/R harness connector E7
- 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.
- Check harness continuity between ECM terminal 45 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK (With CONSULT-III)>>GO TO 4.

OK (Without CONSULT-III)>>GO TO 5.

NG >> 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

#### (P) With CONSULT-III

- 1. Reconnect all harness connectors disconnected.
- Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

#### OK or NG

OK >> GO TO 6.

NG >> GO TO 5.

#### 5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### Refer to EC-1055, "Component Inspection".

#### OK or NG

OK >> GO TO 6.

NG >> Replace EVAP canister purge volume control solenoid valve.

#### 6.CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

#### < SERVICE INFORMATION >

[VK45DE]

Component Inspection

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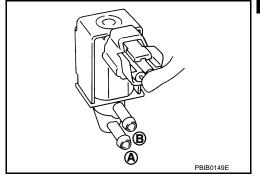
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#### EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### (II) With CONSULT-III

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

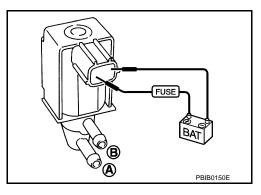
Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)	
100%	Yes	
0%	No	



#### Without CONSULT-III

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Yes
No supply	No



#### Removal and Installation

INFOID:0000000005354186

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE Refer to EM-174, "Component".

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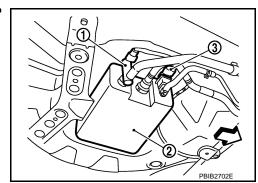
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#### DTC P0447 EVAP CANISTER VENT CONTROL VALVE

# Component Description

The EVAP canister vent control valve (1) is located on the EVAP canister (2) and is used to seal the canister vent.

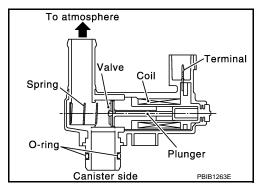
- Illustration shows the view from under the vehicle.
- <=: Vehicle front
- EVAP control system pressure sensor (3)



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.



#### CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354188

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	Ignition switch: ON	OFF

# On Board Diagnosis Logic

INFOID:0000000005354189

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0447 0447	EVAP canister vent control valve circuit open	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	Harness or connectors     (The valve circuit is open or shorted.)     EVAP canister vent control valve

#### **DTC Confirmation Procedure**

INFOID:0000000005354190

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

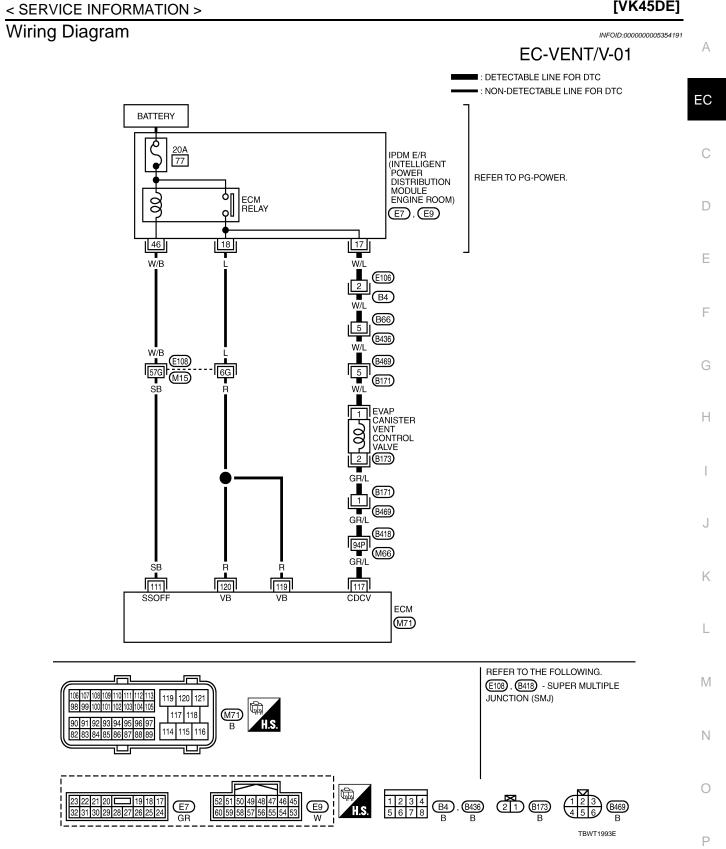
#### **TESTING CONDITION:**

Before performing the following procedure, confirm battery voltage is more than 11 V at idle.

- 1. Start engine and wait at least 8 seconds.
- Check 1st trip DTC.
- If 1st trip DTC is detected, go to <u>EC-1058</u>, "<u>Diagnosis Procedure</u>".

#### DTC P0447 EVAP CANISTER VENT CONTROL VALVE

[VK45DE]



Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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 P0447 EVAP CANISTER VENT CONTROL VALVE

< SERVICE INFORMATION >

[VK45DE]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	111 SB	ECM relay	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5 V
		(Self shut-off)	[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
117	GR/L	EVAP canister vent control valve	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
119 120	R R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

# Diagnosis Procedure

INFOID:0000000005354192

#### 1. INSPECTION START

Do you have CONSULT-III?

#### Yes or No

Yes >> GO TO 2. No >> GO TO 3.

# 2. CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

#### (II) With CONSULT-III

- 1. Turn ignition switch OFF and then turn ON.
- 2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Touch "ON/OFF" on CONSULT-III screen.
- 4. Check for operating sound of the valve.

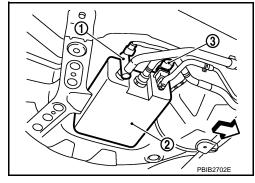
#### Clicking noise should be heard.

#### OK or NG

OK >> GO TO 7. NG >> GO TO 3.

# ${f 3.}$ CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect EVAP canister vent control valve (1) harness connector.
- Illustration shows the view from under the vehicle.
- <□: Vehicle front
- EVAP canister (2)
- EVAP control system pressure sensor (3)
- 3. Turn ignition switch ON.



#### DTC P0447 EVAP CANISTER VENT CONTROL VALVE

#### < SERVICE INFORMATION >

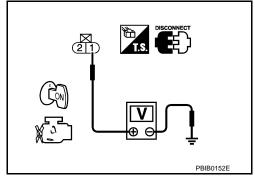
[VK45DE]

Check voltage between EVAP canister vent control valve terminal 1 and ground with CONSULT-III or tester.

#### Voltage: Battery voltage

#### OK or NG

OK >> GO TO 5. >> GO TO 4. NG



# 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, B4
- Harness connectors B66, B436
- Harness connectors B469, B171
- IPDM E/R harness connector E7
- Harness for open or short between EVAP canister vent control valve and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

# ${f 5.}$ CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check harness continuity between ECM terminal 117 and EVAP canister vent control valve terminal 2. Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 7.

NG >> GO TO 6.

#### 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B171, B469
- Harness connectors B418, M66
- Harness for open or short between EVAP canister vent control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

# 7.CHECK RUBBER TUBE FOR CLOGGING

- Disconnect rubber tube connected to EVAP canister vent control valve.
- Check the rubber tube for clogging.

#### OK or NG

OK >> GO TO 8.

NG >> Clean the rubber tube using an air blower.

## 8.CHECK EVAP CANISTER VENT CONTROL VALVE

#### Refer to EC-1060, "Component Inspection".

#### OK or NG

OK >> GO TO 9.

NG >> Replace EVAP canister vent control valve.

#### $\mathbf{9}.$ CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

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Revision: 2009 June

#### >> INSPECTION END

#### Component Inspection

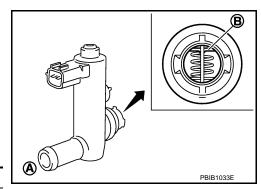
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#### EVAP CANISTER VENT CONTROL VALVE

#### (II) With CONSULT-III

- 1. Remove EVAP canister vent control valve from EVAP canister.
- Check portion (B) of EVAP canister vent control valve for rust. If NG, replace EVAP canister vent control valve. If OK, go to next step.
- 3. Reconnect harness connectors disconnected.
- Turn ignition switch ON.
- 5. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 6. Check air passage continuity and operation delay time. Check that new O-ring is installed properly.

VENT CONT/V indication	Air passage continuity between (A) and (B)
ON	No
OFF	Yes



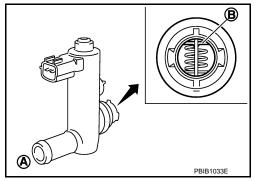
#### Operation takes less than 1 second.

If NG, go to next step.

- 7. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 8. Perform step 6 again.
  If NG, replace EVAP canister vent control valve.

#### (X) Without CONSULT-III

- Remove EVAP canister vent control valve from EVAP canister.
- 2. Check portion (B) of EVAP canister vent control valve for rust.



Check air passage continuity and operation delay time under the following conditions.

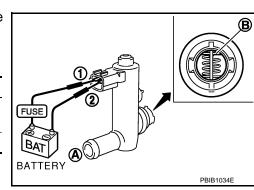
Check that new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	No
OFF	Yes

#### Operation takes less than 1 second.

If NG, go to next step.

- 4. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- Perform step 3 again.
   If NG, replace EVAP canister vent control valve.



[VK45DE]

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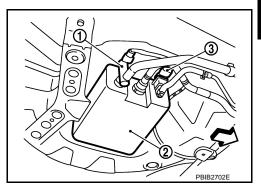
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#### DTC P0448 EVAP CANISTER VENT CONTROL VALVE

# Component Description

The EVAP canister vent control valve (1) is located on the EVAP canister (2) and is used to seal the canister vent.

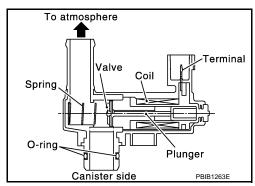
- Illustration shows the view from under the vehicle.
- ← : Vehicle front
- EVAP control system pressure sensor (3)



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.



#### CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	Ignition switch: ON	OFF

# On Board Diagnosis Logic

INFOID:0000000005354196

INFOID:0000000005354197

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0448 0448	EVAP canister vent control valve close	EVAP canister vent control valve remains closed under specified driving conditions.	EVAP canister vent control valve     EVAP control system pressure sensor and the circuit     Blocked rubber tube to EVAP canister vent control valve     EVAP canister is saturated with water

#### **DTC Confirmation Procedure**

- If DTC Confirmation Procedure has been previously conducted, always perform the following procedure 1. before conducting the next test.
- Turn ignition switch OFF and wait at least 10 seconds. a.
- b. Turn ignition switch ON.
- C. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON and wait at least 5 seconds.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and let it idle for at least 1 minute.
- 5. Repeat next procedures 3 times.

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EC-1061 Revision: 2009 June 2010 M35/M45

#### DTC P0448 EVAP CANISTER VENT CONTROL VALVE

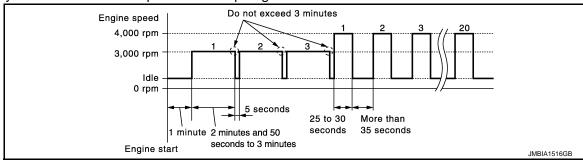
#### < SERVICE INFORMATION >

[VK45DE]

a. Rev engine between 3,000 and 3,500 rpm, then maintain that speed for 2 minutes and 50 seconds to 3 minutes.

#### Do not exceed 3 minutes.

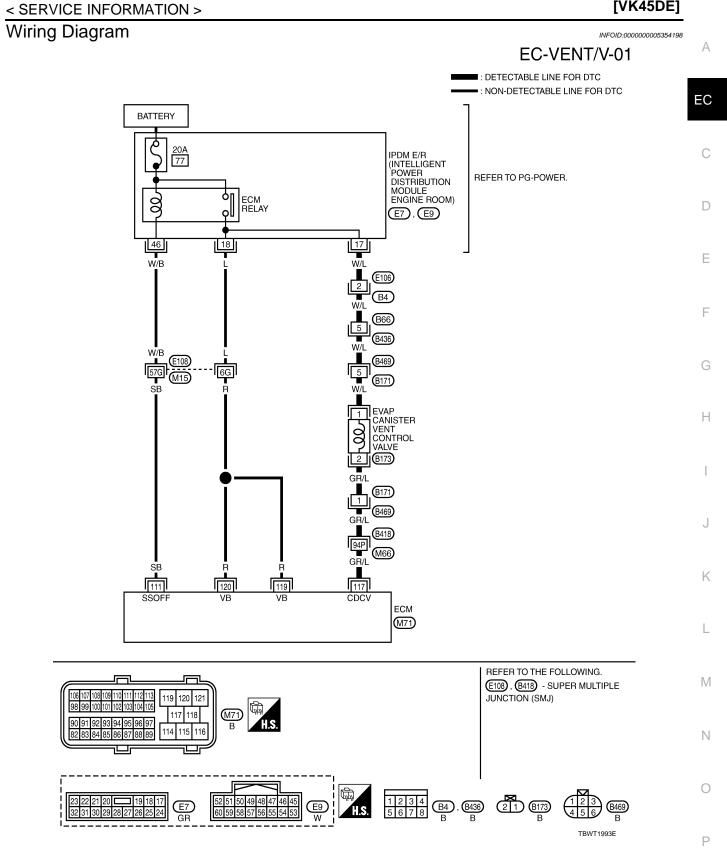
- b. Fully released accelerator pedal and keep engine idle for approximately 5 seconds.
- 6. Check 1st trip DTC.
- 7. If 1st trip DTC is detected, go to <a href="EC-1064">EC-1064</a>, "Diagnosis Procedure". If 1st trip DTC is not detected, go to the next step.
- 8. Repeat next procedure 20 times.
- a. Quickly rev engine between 4,000 and 4,500 rpm or more, then maintain that speed for 25 to 30 seconds.
- b. Fully released accelerator pedal and keep engine idle for at least 35 seconds.



- 9. Check 1st trip DTC.
- 10. If 1st trip DTC is detected, go to EC-1064, "Diagnosis Procedure".

#### DTC P0448 EVAP CANISTER VENT CONTROL VALVE





Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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.

#### < SERVICE INFORMATION >

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	SB	ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5 V
		(Sell Shut-Oil)	[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
117	GR/L	EVAP canister vent control valve	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
119 120	R R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

#### Diagnosis Procedure

INFOID:0000000005354199

# 1. CHECK RUBBER TUBE

- 1. Turn ignition switch OFF.
- 2. Disconnect rubber tube connected to EVAP canister vent control valve (1).
- Illustration shows the view from under the vehicle.
- EVAP canister (2)
- EVAP control system pressure sensor (3)
- 3. Check the rubber tube for clogging.

#### OK or NG

OK >> GO TO 2.

NG >> Clean rubber tube using an air blower.

# DEBIR 2702F

# 2.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-1065, "Component Inspection".

#### OK or NG

OK >> GO TO 3.

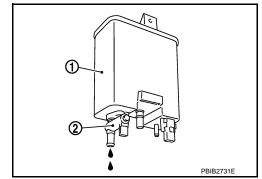
NG >> Replace EVAP canister vent control valve.

# 3. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

- 1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- 2. Check if water will drain from the EVAP canister (1).
- EVAP canister vent control valve (2)

#### Yes or No

Yes >> GO TO 4. No >> GO TO 6.



# 4. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

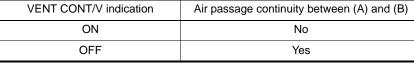
The weight should be less than 2.0 kg (4.4 lb).

DTC P0448 EVAP CANISTER VENT CONTROL VALVE [VK45DE] < SERVICE INFORMATION > OK or NG Α OK >> GO TO 6. NG >> GO TO 5. 5.DETECT MALFUNCTIONING PART EC Check the following. EVAP canister for damage EVAP hose between EVAP canister and vehicle frame for clogging or poor connection >> Repair hose or replace EVAP canister. 6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR D Disconnect EVAP control system pressure sensor harness connector. 2. Check connectors for water. Е Water should not exist. OK or NG F OK >> GO TO 7. NG >> Replace EVAP control system pressure sensor. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR Refer to EC-1068, "Component Inspection". OK or NG OK >> GO TO 8. Н NG >> Replace EVAP control system pressure sensor. 8. CHECK INTERMITTENT INCIDENT Refer to EC-822, "Diagnosis Procedure". >> INSPECTION END Component Inspection INFOID:0000000005354200 EVAP CANISTER VENT CONTROL VALVE (P) With CONSULT-III

- 1. Remove EVAP canister vent control valve from EVAP canister.
- Check portion (B) of EVAP canister vent control valve for rust. If NG, replace EVAP canister vent control valve. If OK, go to next step.
- Reconnect harness connectors disconnected.
- 4. Turn ignition switch ON.
- Perform "VENT CONTROL/V" in "ACTIVE TEST" mode. 5.
- Check air passage continuity and operation delay time.

Check that new O-ring is in	nstalled properly.
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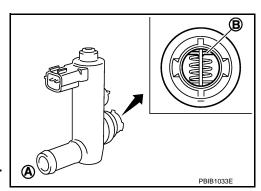
VENT CONT/V indication	Air passage continuity between (A) and (B)	
ON	No	
OFF	Yes	



Operation takes less than 1 second.

If NG, go to next step.

- 7. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- Perform step 6 again. If NG, replace EVAP canister vent control valve.



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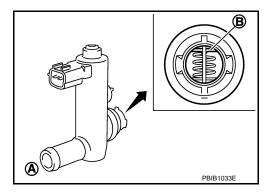
#### DTC P0448 EVAP CANISTER VENT CONTROL VALVE

[VK45DE]

#### (X) Without CONSULT-III

< SERVICE INFORMATION >

- Remove EVAP canister vent control valve from EVAP canister.
- Check portion (B) of EVAP canister vent control valve for rust.



Check air passage continuity and operation delay time under the following conditions.

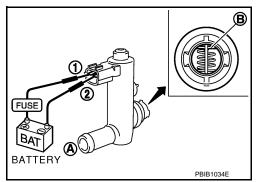
Check that new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	No
OFF	Yes

Operation takes less than 1 second.

If NG, go to next step.

- 4. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 5. Perform step 3 again. If NG, replace EVAP canister vent control valve.



< SERVICE INFORMATION >

[VK45DE]

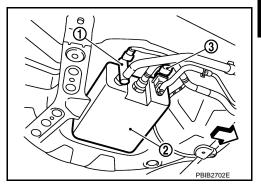
INFOID:0000000005354201

#### DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

# Component Description

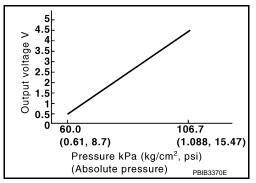
The EVAP control system pressure sensor (3) detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.

- Illustration shows the view from under the vehicle.
- ✓⊇: Vehicle front
- EVAP canister vent control valve (1)
- EVAP canister (2)



#### CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354202



Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	Ignition switch: ON	Approx. 1.8 - 4.8 V

# On Board Diagnosis Logic

INFOID:0000000005354203

#### NOTE:

If DTC P0451 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1121, "DTC Confirmation Procedure".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0451 0451	EVAP control system pressure sensor performance	ECM detects a sloshing signal from the EVAP control system pressure sensor	Harness or connectors     EVAP control system pressure sensor

#### **DTC Confirmation Procedure**

INFOID:0000000005354204 Ν

- 1. If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and wait at least 40 seconds.

NOTE:

Do not depress accelerator pedal even slightly.

- Check 1st trip DTC.
- If 1st trip DTC is detected, go to EC-1068, "Diagnosis Procedure".

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EC-1067 Revision: 2009 June 2010 M35/M45

DIG PU431 EVAP CONTROL STSTEM PRESSURE SENSO

Diagnosis Procedure

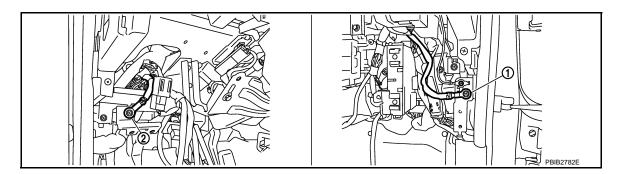
< SERVICE INFORMATION >

INFOID:0000000005354205

[VK45DE]

# 1. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

# 2. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

- Disconnect EVAP control system pressure sensor (3) harness connector.
- Illustration shows the view from under the vehicle.
- <□: Vehicle front
- EVAP canister vent control valve (1)
- EVAP canister (2)
- 2. Check sensor harness connector for water.

#### Water should not exist.

#### OK or NG

OK >> GO TO 3.

NG >> Repair or replace harness connector.

# 3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1068, "Component Inspection".

#### OK or NG

OK >> GO TO 4.

NG >> Replace EVAP control system pressure sensor.

#### 4. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

For Wiring Diagram, refer to EC-1072, "Wiring Diagram".

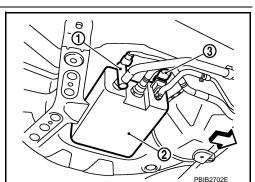
#### >> INSPECTION END

#### Component Inspection

INFOID:0000000005354206

#### **EVAP CONTROL SYSTEM PRESSURE SENSOR**

- Remove EVAP control system pressure sensor with its harness connector.
   Always replace O-ring with a new one.
- Install a vacuum pump to EVAP control system pressure sensor.



# < SERVICE INFORMATION >

Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

Applied vacuum [kPa (kg/cm², psi)]	Voltage
Not applied	1.8 - 4.8 V
-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value

# EVAP control system 32 Pump Pump

#### **CAUTION:**

- Always calibrate the vacuum pump gauge when using it.
- Do not apply vacuum below -93.3 kPa (-0.952 kg/cm², 13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).
- 4. If NG, replace EVAP control system pressure sensor.

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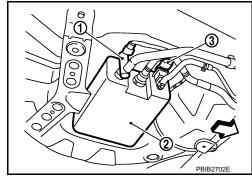
INFOID:000000005354207

# DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

# Component Description

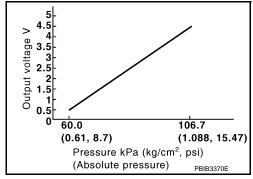
The EVAP control system pressure sensor (3) detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.

- Illustration shows the view from under the vehicle.
- <=: Vehicle front
- EVAP canister vent control valve (1)
- EVAP canister (2)



#### CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354208



Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	Ignition switch: ON	Approx. 1.8 - 4.8 V

# On Board Diagnosis Logic

INFOID:0000000005354209

#### NOTE:

If DTC P0452 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1121, "DTC Confirmation Procedure".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452 0452	EVAP control system pressure sensor low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors     (The sensor circuit is open or shorted.)     EVAP control system pressure sensor

#### **DTC Confirmation Procedure**

INFOID:0000000005354210

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Always perform test at a temperature of 5°C (41°F) or more.

#### (P) WITH CONSULT-III

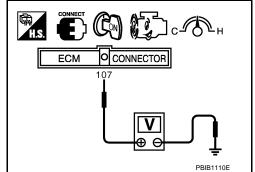
- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.

< SERVICE INFORMATION >

- Select "DATA MONITOR" mode with CONSULT-III.
- 5. Check that "FUEL T/TMP SE" indication is more than 0°C (32°F).
- 6. Start engine and wait at least 20 seconds.
- 7. Check 1st trip DTC.
- 8. If 1st trip DTC is detected, go to <a href="EC-1073">EC-1073</a>, "Diagnosis Procedure".

#### WITH GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Check that voltage between ECM terminal 107 (Fuel tank temperature sensor signal) and ground is less than 4.2 V.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and wait at least 20 seconds.
- 5. Check 1st trip DTC.
- If 1st trip DTC is detected, go to <u>EC-1073</u>, "<u>Diagnosis Procedure</u>".



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Revision: 2009 June **EC-1071** 2010 M35/M45

[VK45DE]

TBWT1994E

< SERVICE INFORMATION > Wiring Diagram INFOID:0000000005354211 EC-PRE/SE-01 : DETECTABLE LINE FOR DTC : NON-DETECTABLE LINE FOR DTC EVAP CONTROL SYSTEM PRESSURE SENSOR **B**172  $\Box$ B/W R/G R/G 3 B/W R/G B/W B/W 78P 79P R/G B/W R/G B/W 38H 37H R/G B/W в/w 67 R/G 32 48 FTPRS GND-A ECM (F108) REFER TO THE FOLLOWING. (F102), (B418) - SUPER MULTIPLE JUNCTION (SMJ) 3 2 1 B172 GR (F108)

Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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.

< SERVICE INFORMATION >

[VK45DE]

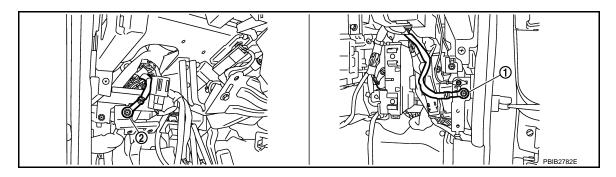
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	R/G	EVAP control system pres- sure sensor	[Ignition switch: ON]	Approximately 1.8 - 4.8 V
48	BR	Sensor power supply (EVAP control system pressure sensor)	[Ignition switch: ON]	Approximately 5 V
67	B/W	Sensor ground (EVAP control system pressure sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V

# Diagnosis Procedure

INFOID:0000000005354212

# 1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".



1. Body ground M70

2. Body ground M16

#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

# 2. CHECK CONNECTOR

- Disconnect EVAP control system pressure sensor (3) harness connector.
- Illustration shows the view from under the vehicle.
- <□: Vehicle front
- EVAP canister vent control valve (1)
- EVAP canister (2)
- Check sensor harness connector for water.

#### Water should not exist.

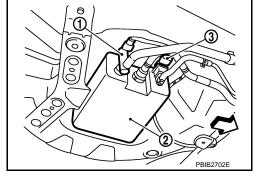
#### OK or NG

OK >> GO TO 3.

NG >> Repair or replace harness connector.

# 3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.



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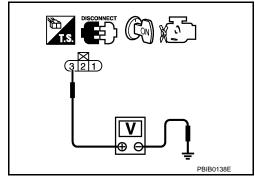
[VK45DE]

Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-III or tester.

#### **Voltage: Approximately 5V**

#### OK or NG

OK >> GO TO 5. NG >> GO TO 4.



# 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B171, B469
- Harness connectors B418, M66
- Harness connectors M72, F102
- 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.

# 5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal
   67

Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 7. NG >> GO TO 6.

## 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B171, B469
- Harness connectors B418, M66
- Harness connectors M72, F102
- · 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.

# 7.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check harness continuity between ECM terminal 32 and EVAP control system pressure sensor terminal 2.

Refer to Wiring Diagram.

#### Continuity should exist.

2. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 9. NG >> GO TO 8.

# 8.DETECT MALFUNCTIONING PART

Check the following.

#### DIG PU432 EVAP CONTROL STSTEM PRESSURE SENSOR

- Harness connectors B171, B469
- Harness connectors B418, M66

< SERVICE INFORMATION >

- Harness connectors M72, F102
- 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.

## 9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1075, "Component Inspection".

#### OK or NG

OK >> GO TO 10.

NG >> Replace EVAP control system pressure sensor.

# 10. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

# Component Inspection

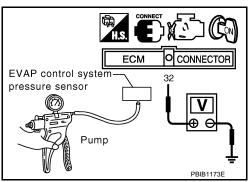
**EVAP CONTROL SYSTEM PRESSURE SENSOR** 

- Remove EVAP control system pressure sensor with its harness connector.
   Always replace O-ring with a new one.
- 2. Install a vacuum pump to EVAP control system pressure sensor.
- 3. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

Applied vacuum [kPa (kg/cm², psi)]	Voltage	
Not applied	1.8 - 4.8 V	
-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value	

#### **CAUTION:**

- Always calibrate the vacuum pump gauge when using it.
- Do not apply vacuum below -93.3 kPa (-0.952 kg/cm², 13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).
- 4. If NG, replace EVAP control system pressure sensor.



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Revision: 2009 June **EC-1075** 2010 M35/M45

[VK45DE]

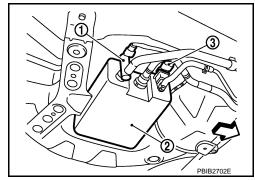
INFOID:0000000005354214

## DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

# **Component Description**

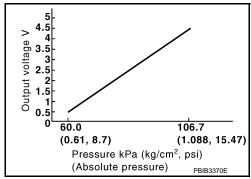
The EVAP control system pressure sensor (3) detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.

- Illustration shows the view from under the vehicle.
- ✓⊇: Vehicle front
- EVAP canister vent control valve (1)
- EVAP canister (2)



#### CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354215



Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	Ignition switch: ON	Approx. 1.8 - 4.8 V

# On Board Diagnosis Logic

INFOID:0000000005354216

#### NOTE:

If DTC P0453 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1121, "DTC Confirmation Procedure".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0453 0453	EVAP control system pressure sensor high input	An excessively high voltage from the sensor is sent to ECM.	Harness or connectors     (The sensor circuit is open or shorted.)     EVAP control system pressure sensor     EVAP canister vent control valve     EVAP canister     Rubber hose from EVAP canister vent control valve to vehicle frame

#### **DTC Confirmation Procedure**

INFOID:0000000005354217

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Always perform test at a temperature of 5°C (41°F) or more.

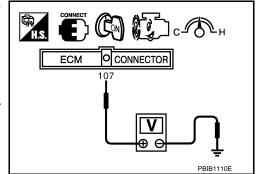
(II) WITH CONSULT-III

< SERVICE INFORMATION > [VK45DE]

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Select "DATA MONITOR" mode with CONSULT-III.
- 5. Check that "FUEL T/TMP SE" indication is more than 0°C (32°F).
- 6. Start engine and wait at least 20 seconds.
- 7. Check 1st trip DTC.
- 8. If 1st trip DTC is detected, go to EC-1079, "Diagnosis Procedure".

#### **WITH GST**

- 1. Start engine and warm it up to normal operating temperature.
- 2. Check that voltage between ECM terminal 107 (Fuel tank temperature sensor signal) and ground is less than 4.2 V.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and wait at least 20 seconds.
- 5. Check 1st trip DTC.
- 6. If 1st trip DTC is detected, go to <u>EC-1079</u>, "<u>Diagnosis Procedure</u>".



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< SERVICE INFORMATION > Wiring Diagram INFOID:0000000005354218 EC-PRE/SE-01 : DETECTABLE LINE FOR DTC : NON-DETECTABLE LINE FOR DTC EVAP CONTROL SYSTEM PRESSURE SENSOR **B**172  $\Box$ B/W R/G R/G 3 B/W R/G B/W B/W 78P 79P R/G B/W R/G B/W 38H 37H R/G B/W в/w 67 R/G 32 48 FTPRS GND-A ECM (F108) REFER TO THE FOLLOWING. (F102), (B418) - SUPER MULTIPLE JUNCTION (SMJ) 3 2 1 B172 GR (F108)

Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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.

< SERVICE INFORMATION >

[VK45DE]

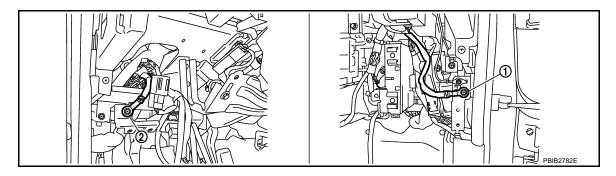
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	R/G	EVAP control system pres- sure sensor	[Ignition switch: ON]	Approximately 1.8 - 4.8 V
48	BR	Sensor power supply (EVAP control system pressure sensor)	[Ignition switch: ON]	Approximately 5 V
67	B/W	Sensor ground (EVAP control system pressure sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V

# Diagnosis Procedure

INFOID:0000000005354219

# 1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".



1. Body ground M70

2. Body ground M16

#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

# 2. CHECK CONNECTOR

- Disconnect EVAP control system pressure sensor (3) harness connector.
- Illustration shows the view from under the vehicle.
- <□: Vehicle front
- EVAP canister vent control valve (1)
- EVAP canister (2)
- Check sensor harness connector for water.

#### Water should not exist.

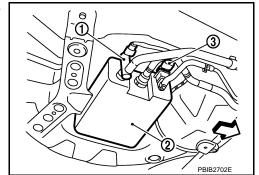
#### OK or NG

OK >> GO TO 3.

NG >> Repair or replace harness connector.

# 3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.



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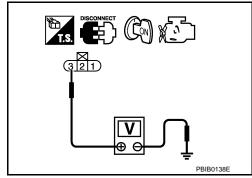
[VK45DE]

Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-III or tester.

#### **Voltage: Approximately 5V**

#### OK or NG

OK >> GO TO 5. NG >> GO TO 4.



# 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B171, B469
- Harness connectors B418, M66
- Harness connectors M72, F102
- 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.

# 5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal
   67

Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 7. NG >> GO TO 6.

# 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B171, B469
- Harness connectors B418, M66
- Harness connectors M72, F102
- · 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.

# 7.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check harness continuity between ECM terminal 32 and EVAP control system pressure sensor terminal 2.

Refer to Wiring Diagram.

#### Continuity should exist.

2. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 9. NG >> GO TO 8.

# 8.DETECT MALFUNCTIONING PART

Check the following.

### DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

# < SERVICE INFORMATION >

- Harness connectors B171, B469
- Harness connectors B418, M66
- Harness connectors M72, F102
- 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.

# 9. CHECK RUBBER TUBE

- Disconnect rubber tube connected to EVAP canister vent control valve.
- Check the rubber tube for clogging, vent or kinked.

#### OK or NG

OK >> GO TO 10.

NG >> Clean the rubber tube using an air blower, repair or replace rubber tube.

# 10.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-1060, "Component Inspection".

### OK or NG

OK >> GO TO 11.

NG >> Replace EVAP canister vent control valve.

# 11. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1082, "Component Inspection".

#### OK or NG

OK >> GO TO 12.

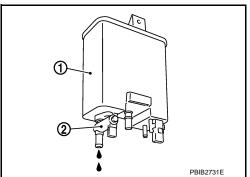
NG >> Replace EVAP control system pressure sensor.

# 12.check if evap canister is saturated with water

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- Check if water will drain from the EVAP canister (1).
- EVAP canister vent control valve (2)

#### Yes or No

Yes >> GO TO 13. No >> GO TO 15.



# 13. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.0 kg (4.4 lb).

#### OK or NG

OK >> GO TO 15. NG >> GO TO 14.

14.DETECT MALFUNCTIONING PART

#### Check the following.

Revision: 2009 June

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection
  - >> Repair hose or replace EVAP canister.

# 15. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

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# DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

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#### >> INSPECTION END

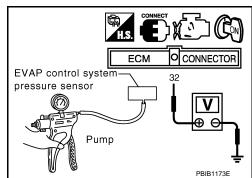
# Component Inspection

INFOID:0000000005354220

## **EVAP CONTROL SYSTEM PRESSURE SENSOR**

- Remove EVAP control system pressure sensor with its harness connector.
   Always replace O-ring with a new one.
- 2. Install a vacuum pump to EVAP control system pressure sensor.
- 3. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

Applied vacuum [kPa (kg/cm², psi)]	Voltage	
Not applied	1.8 - 4.8 V	
-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value	



#### **CAUTION:**

- Always calibrate the vacuum pump gauge when using it.
- Do not apply vacuum below -93.3 kPa (-0.952 kg/cm², 13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).
- 4. If NG, replace EVAP control system pressure sensor.

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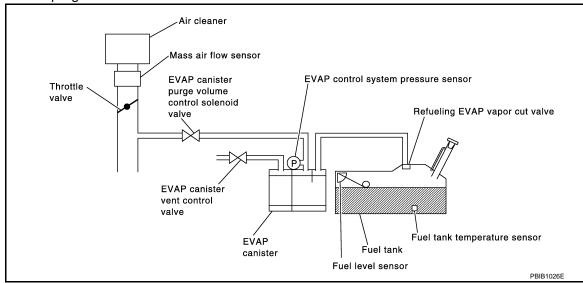
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# DTC P0455 EVAP CONTROL SYSTEM

# On Board Diagnosis Logic

INFOID:0000000005354221

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0455 0455	EVAP control system gross leak detected	EVAP control system has a very large leak such as fuel filler cap fell off, EVAP control system does not operate properly.	Fuel filler cap remains open or does not close. Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Foreign matter caught in fuel filler cap Leakage is in line between intake manifold and EVAP canister purge volume control solenoid valve. Foreign matter caught in EVAP canister vent control valve. EVAP canister or fuel tank leakage EVAP purge line (pipe and rubber tube) leakage EVAP purge line rubber tube bent. Loose or disconnected rubber tube EVAP canister vent control valve and the circuit EVAP canister purge volume control solenoid valve and the circuit Fuel tank temperature sensor O-ring of EVAP canister vent control valve is missing or damaged. EVAP control system pressure sensor Refueling EVAP vapor cut valve ORVR system leakage

#### **CAUTION:**

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.
- If the fuel filler cap is not tightened properly, the MIL may illuminate.
- Use only a genuine NISSAN rubber tube as a replacement.

## **DTC Confirmation Procedure**

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## **CAUTION:**

Never remove fuel filler cap during the DTC Confirmation Procedure. NOTE:

< SERVICE INFORMATION >

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- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.
- If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

- Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedure.

## (II) WITH CONSULT-III

- 1. Tighten fuel filler cap securely until ratcheting sound is heard.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- Check that the following conditions are met.

COOLAN TEMP/S: 0 - 70°C (32 - 158°F) INT/A TEMP SE: 0 - 60°C (32 - 140°F)

Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.

Follow the instructions displayed.

#### NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to <u>EC-760</u>, "Basic Inspection".

7. Check that "OK" is displayed.

If "NG" is displayed, select "SELF-DIAG RESULTS" mode and check that "EVAP GROSS LEAK [P0455]" is displayed. If it is displayed, go to <a href="EC-1084">EC-1084</a>. "Diagnosis Procedure".

If P0442 is displayed, perform Diagnostic Procedure for DTC P0442, refer to <u>EC-1036, "Diagnosis Procedure"</u>.

### **WITH GST**

#### NOTE:

Be sure to read the explanation on "Driving Pattern" in <u>EC-735, "Emission-Related Diagnostic Information"</u> before driving vehicle.

- Start engine.
- 2. Drive vehicle according to "Driving Pattern" in <a href="EC-735">EC-735</a>, "Emission-Related Diagnostic Information".
- Stop vehicle.
- 4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- Check 1st trip DTC.
- If P0455 is displayed, go to <u>EC-1084</u>, "<u>Diagnosis Procedure</u>".
   If P0442 is displayed, go to <u>EC-1036</u>, "<u>Diagnosis Procedure</u>".
  - If P0441 is displayed, go to EC-1031, "Diagnosis Procedure".

# Diagnosis Procedure

INFOID:0000000005354223

# 1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.

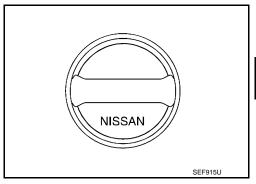
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Check for genuine NISSAN fuel filler cap design.

### OK or NG

OK >> GO TO 2.

NG >> Replace with genuine NISSAN fuel filler cap.



# 2.CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

# OK or NG

OK >> GO TO 3.

NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.

2. Retighten until ratcheting sound is heard.

# 3.CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

### OK or NG

OK >> GO TO 5.

NG >> GO TO 4.

# f 4.CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-722, "Component Inspection".

## OK or NG

OK >> GO TO 5.

NG >> Replace fuel filler cap with a genuine one.

## ${f 5.}$ CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection.

Refer to EC-720, "Description".

#### OK or NG

OK >> GO TO 6.

NG >> Repair or reconnect the hose.

# 6.CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 7.

# 7.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

EVAP canister vent control valve is installed properly.

Refer to EC-724, "Removal and Installation".

EVAP canister vent control valve.

Refer to EC-1060, "Component Inspection".

# OK or NG

OK >> GO TO 8.

NG >> Repair or replace EVAP canister vent control valve and O-ring.

# 8. INSTALL THE PRESSURE PUMP

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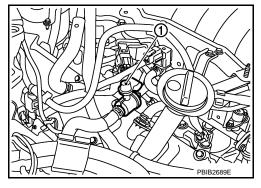
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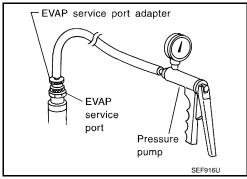
[VK45DE]

To locate the EVAP leakage, install EVAP service port adapter (commercial service tool) and pressure pump to EVAP service port (1) securely.

### NOTE:

Improper installation of the EVAP service port adapter (commercial service tool) to the EVAP service port may cause leaking.





With CONSULT-III>>GO TO 9. Without CONSULT-III>>GO TO 10.

# 9. CHECK FOR EVAP LEAK

# (P) With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-III.
- Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

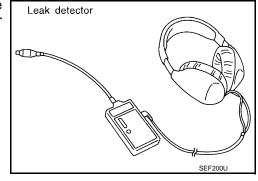
### **CAUTION:**

- Never use compressed air or a high pressure pump.
- Never exceed 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi) of pressure in the system.
- Using EVAP leak detector (commercial service tool), locate the EVAP leak. For the leak detector (commercial service tool), refer to the instruction manual for more details. Refer to <u>EC-720</u>, "<u>Description</u>".

#### OK or NG

OK >> GO TO 11.

NG >> Repair or replace malfunctioning part.



# 10. CHECK FOR EVAP LEAK

## **⋈** Without CONSULT-III

1. Turn ignition switch OFF.

### < SERVICE INFORMATION >

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- Apply 12 V DC to EVAP canister vent control valve (1). The valve will close. (Continue to apply 12 V until the end of test.)
- Illustration shows the view from under the vehicle
- : Vehicle front
- EVAP canister (2)
- EVAP control system pressure sensor (3)
- 3. Pressurize the EVAP line using pressure pump with 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm<sup>2</sup>, 0.2 to 0.4 psi), then remove pump and EVAP service port adapter (commercial service tool). **CAUTION:**

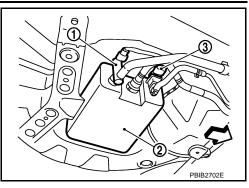


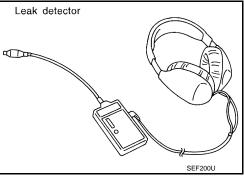
- Never exceed 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi) of pressure in the system.
- 4. Using EVAP leak detector (commercial service tool), locate the EVAP leak. For the leak detector (commercial service tool), refer to the instruction manual for more details. Refer to EC-720, "Description".



OK >> GO TO 12.

NG >> Repair or replace malfunctioning part.





# 11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

### (P) With CONSULT-III

- 1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve and EVAP service port from EVAP service port.
- 2. Start engine.
- 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
- 4. Touch "Qu" on CONSULT-III screen to increase "PURG VOL C/V" indication to 100%.
- 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

#### OK or NG

OK >> GO TO 14. NG >> GO TO 13.

12.check evap canister purge volume control solenoid valve operation

## **Without CONSULT-III**

- Start engine and warm it up to normal operating temperature. 1.
- 3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve and EVAP service port from EVAP service port.
- Start engine and let it idle for at least 80 seconds.
- 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

### Vacuum should exist.

#### OK or NG

OK >> GO TO 15. NG >> GO TO 13.

# 13.check vacuum hose

Check vacuum hoses for clogging or disconnection. Refer to EC-788, "Vacuum Hose Drawing".

#### OK or NG

OK (With CONSULT-III)>>GO TO 14.

OK (Without CONSULT-III)>>GO TO 15.

NG >> Repair or reconnect the hose.

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# 14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

### (P) With CONSULT-III

1. Start engine.

2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

#### OK or NG

OK >> GO TO 16. NG >> GO TO 15.

15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1055, "Component Inspection".

#### OK or NG

OK >> GO TO 16.

NG >> Replace EVAP canister purge volume control solenoid valve.

16. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-995, "Component Inspection".

#### OK or NG

OK >> GO TO 17.

NG >> Replace fuel level sensor unit.

17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1068, "Component Inspection".

### OK or NG

OK >> GO TO 18.

NG >> Replace EVAP control system pressure sensor.

# 18. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kinks, looseness and improper connection. For location, refer to <u>EC-720</u>, "<u>Description</u>".

### OK or NG

OK >> GO TO 19.

NG >> Repair or replace hoses and tubes.

# 19. CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kinks, cracks, looseness and improper connection.

#### OK or NG

OK >> GO TO 20.

NG >> Repair or replace hose, tube or filler neck tube.

# 20. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-728, "Component Inspection".

### OK or NG

OK >> GO TO 21.

NG >> Replace refueling EVAP vapor cut valve with fuel tank.

# 21. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

[VK45DE]

INFOID:0000000005354224

# DTC P0456 EVAP CONTROL SYSTEM

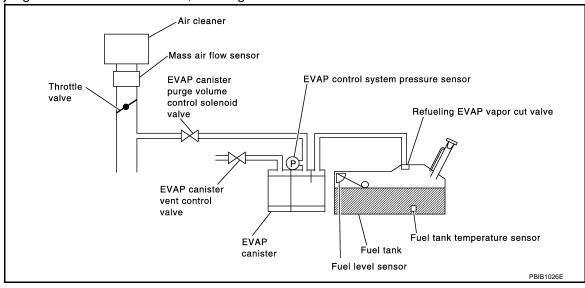
# On Board Diagnosis Logic

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.

If ECM judges that a leak which corresponds to a very small leak, the very small leak P0456 will be detected.

If ECM judges that a leak equivalent to a small leak, EVAP small leak P0442 will be detected.

If ECM judges that there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0456 0456	Evaporative emission control system very small leak (negative pressure check)	EVAP system has a very small leak.     EVAP system does not operate properly.	Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Fuel filler cap remains open or does not close. Foreign matter caught in fuel filler cap. Leakage is in line between intake manifold and EVAP canister purge volume control solenoid valve. Foreign matter caught in EVAP canister vent control valve.  EVAP canister or fuel tank leakage EVAP purge line (pipe and rubber tube) leakage EVAP purge line rubber tube bent Loose or disconnected rubber tube EVAP canister vent control valve and the circuit EVAP canister purge volume control solenoid valve and the circuit Fuel tank temperature sensor O-ring of EVAP canister vent control valve is missing or damaged EVAP canister is saturated with water EVAP control system pressure sensor Refueling EVAP vapor cut valve ORVR system leakage Fuel level sensor and the circuit Foreign matter caught in EVAP canister purge volume control solenoid valve

## **CAUTION:**

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.
- If the fuel filler cap is not tightened properly, the MIL may illuminate.
- Use only a genuine NISSAN rubber tube as a replacement.

EC-1089 Revision: 2009 June 2010 M35/M45

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# **DTC Confirmation Procedure**

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#### NOTE:

- If DTC P0456 is displayed with P0442, first perform the trouble diagnosis for DTC P0456.
- After repair, check that the hoses and clips are installed properly.
- If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

- · Open engine hood before conducting the following procedure.
- If any of the following conditions are met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.
- Fuel filler cap is removed.
- Fuel is refilled or drained.
- EVAP component part/parts is/are removed.
- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

### (P) WITH CONSULT-III

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Check that the following conditions are met.

**FUEL LEVEL SE: 0.25 - 1.4 V** 

COOLAN TEMP/S: 0 - 32°C (32 - 90°F) FUEL T/TMP SE: 0 - 35°C (32 - 95°F) INT/A TEMP SE: More than 0°C (32°F)

If NG, turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle), or refill/drain fuel until the output voltage of the "FUEL LEVEL SE" meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1.

- Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- Select "EVAP V/S LEAK P0456/P1456" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.

Follow the instructions displayed.

6. Check that "OK" is displayed.

If "NG" is displayed, go to EC-1091, "Diagnosis Procedure".

#### NOTE:

- If the engine speed cannot be maintained within the range displayed on CONSULT-III screen, go to EC-760, "Basic Inspection".
- Check that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

## **Overall Function Check**

INFOID:0000000005354226

#### WITH GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

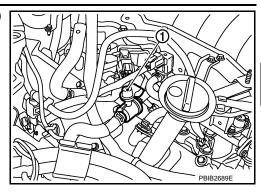
#### **CAUTION:**

- Never use compressed air, doing so may damage the EVAP system.
- Never start engine.
- Never exceeded 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi).

### < SERVICE INFORMATION >

[VK45DE]

Attach the EVAP service port adapter (commercial service tool) securely to the EVAP service port (1).



- Set the pressure pump and a hose.
- 3. Also set a vacuum gauge via 3-way connector and a hose.
- 4. Turn ignition switch ON.
- 5. Connect GST and select Service \$08.
- 6. Using Service \$08 control the EVAP canister vent control valve
- 7. Apply pressure and make sure the following conditions are satisfied.

Pressure to be applied: 2.7 kPa (0.028 kg/cm<sup>2</sup>, 0.39 psi) Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (0.004 kg/cm<sup>2</sup>, 0.06 psi).

If NG, go to EC-1091, "Diagnosis Procedure".

If OK, go to next step.

- 8. Disconnect GST.
- 9. Start engine and warm it up to normal operating temperature.
- 10. Turn ignition switch OFF and wait at least 10 seconds.
- 11. Restart engine and let it idle for 90 seconds.
- 12. Keep engine speed at 2,000 rpm for 30 seconds.
- Turn ignition switch OFF.

#### NOTE:

For more information, refer to GST instruction manual.

# Diagnosis Procedure

INFOID:0000000005354227

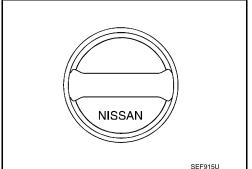
# 1.CHECK FUEL FILLER CAP DESIGN

- Turn ignition switch OFF.
- 2. Check for genuine NISSAN fuel filler cap design.

#### OK or NG

OK >> GO TO 2.

NG >> Replace with genuine NISSAN fuel filler cap.



# 2 .CHECK FUEL FILLER CAP INSTALLATION

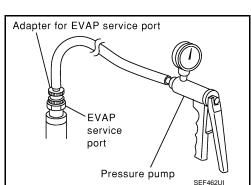
Check that the cap is tightened properly by rotating the cap clockwise.

#### OK or NG

OK >> GO TO 3.

NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.

Retighten until ratcheting sound is heard.



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#### < SERVICE INFORMATION >

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# 3.CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

#### OK or NG

OK >> GO TO 4

NG >> GO TO 4.

# f 4.CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-722, "Component Inspection".

### OK or NG

OK >> GO TO 5.

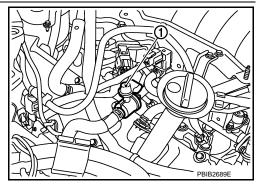
NG >> Replace fuel filler cap with a genuine one.

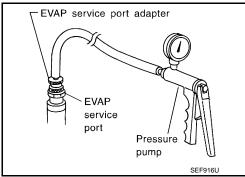
# 5. INSTALL THE PRESSURE PUMP

To locate the EVAP leakage, install EVAP service port adapter (commercial service tool) and pressure pump to EVAP service port (1) securely.

#### NOTE:

Improper installation of the EVAP service port adapter (commercial service tool) to the EVAP service port may cause leaking.





With CONSULT-III>>GO TO 6. Without CONSULT-III>>GO TO 7.

# 6. CHECK FOR EVAP LEAK

#### (P) With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-III.
- Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

### **CAUTION:**

- Never use compressed air or a high pressure pump.
- Never exceed 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi) of pressure in the system.

## < SERVICE INFORMATION >

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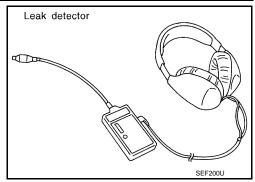
Using EVAP leak detector (commercial service tool), locate the EVAP leak. For the leak detector (commercial service tool), refer to the instruction manual for more details.

Refer to EC-720, "Description".

## OK or NG

OK >> GO TO 8.

NG >> Repair or replace malfunctioning part.



# 7 . CHECK FOR EVAP LEAK

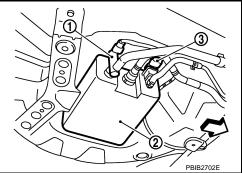
### (R) Without CONSULT-III

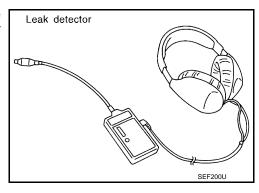
- Turn ignition switch OFF.
- Apply 12 V DC to EVAP canister vent control valve (1). The valve will close. (Continue to apply 12 V until the end of test.)
- Illustration shows the view from under the vehicle
- ⟨□: Vehicle front
- EVAP canister (2)
- EVAP control system pressure sensor (3)
- 3. Pressurize the EVAP line using pressure pump with 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm<sup>2</sup>, 0.2 to 0.4 psi), then remove pump and EVAP service port adapter (commercial service tool). **CAUTION:** 
  - · Never use compressed air or a high pressure pump.
  - Never exceed 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi) of pressure in the system.
- 4. Using EVAP leak detector (commercial service tool), locate the EVAP leak. For the leak detector (commercial service tool), refer to the instruction manual for more details. Refer to EC-720, "Description".

### OK or NG

OK >> GO TO 8.

NG >> Repair or replace malfunctioning part.





# 8.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly. Refer to EC-724, "Removal and Installation".
- EVAP canister vent control valve. Refer to EC-1060, "Component Inspection".

### OK or NG

OK >> GO TO 9.

NG >> Repair or replace EVAP canister vent control valve and O-ring.

# $\mathbf{9}.$ CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

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#### < SERVICE INFORMATION >

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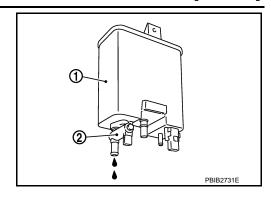
- 2. Does water drain from the EVAP canister?
- EVAP canister (1)
- EVAP canister vent control valve (2)

#### Yes or No

Yes >> GO TO 10.

No (With CONSULT-III)>>GO TO 12.

No (Without CONSULT-III)>>GO TO 13.



# 10. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.0 kg (4.4 lb).

### OK or NG

OK (With CONSULT-III)>>GO TO 12.

OK (Without CONSULT-III)>>GO TO 13.

NG >> GO TO 11.

# 11. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

# 12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

### (P) With CONSULT-III

- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve and EVAP service port from EVAP service port.
- Start engine.
- 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
- 4. Touch "Qu" on CONSULT-III screen to increase "PURG VOL CONT/V" indication to 100%.
- 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

#### OK or NG

OK >> GO TO 15.

NG >> GO TO 14.

# 13. Check evap canister purge volume control solenoid valve operation

#### ₩ Without CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- Stop engine.
- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve and EVAP service port from EVAP service port.
- 4. Start engine and let it idle for at least 80 seconds.
- 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

#### Vacuum should exist.

#### OK or NG

OK >> GO TO 15.

NG >> GO TO 14.

# 14. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-788, "Vacuum Hose Drawing".

### OK or NG

OK >> GO TO 15.

DIC P0456 EVAP CONTROL SYSTEM	
< SERVICE INFORMATION >	[VK45DE]
NG >> Repair or reconnect the hose.	
15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	А
Refer to EC-1055, "Component Inspection".	
OK or NG	EC
OK >> GO TO 16.  NG >> Replace EVAP canister purge volume control solenoid valve.	
NG >> Replace EVAP canister purge volume control solenoid valve.  16. CHECK FUEL TANK TEMPERATURE SENSOR	
	C
Refer to EC-995, "Component Inspection".	
<u>OK or NG</u> OK >> GO TO 17.	D
NG >> Replace fuel level sensor unit.	
17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	E
Refer to EC-1068, "Component Inspection".	
OK or NG	
OK >> GO TO 18.	F
NG >> Replace EVAP control system pressure sensor.	
18.CHECK EVAP PURGE LINE	G
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper concepted to EC-720, "Description".	nnection.
OK or NG	
OK >> GO TO 19.	Н
NG >> Repair or reconnect the hose.	
19.clean evap purge line	I
Clean EVAP purge line (pipe and rubber tube) using air blower.	
	J
>> GO TO 20.	J
20.CHECK EVAP/ORVR LINE	
Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kinks, looseness a	nd improper K
connection. For location, refer to <u>EC-720, "Description"</u> . <u>OK or NG</u>	
OK >> GO TO 21.	L
NG >> Repair or replace hoses and tubes.	
21. CHECK RECIRCULATION LINE	
Check recirculation line between filler neck tube and fuel tank for clogging, kinks, cracks, loo	seness and
improper connection.	
OK or NG	N
OK >> GO TO 22.  NG >> Repair or replace hose, tube or filler neck tube.	
22.CHECK REFUELING EVAP VAPOR CUT VALVE	
Refer to EC-728, "Component Inspection".	
OK or NG	
OK >> GO TO 23.	Р
NG >> Replace refueling EVAP vapor cut valve with fuel tank.	
23. CHECK FUEL LEVEL SENSOR	
Refer to DI-22, "Fuel Level Sensor Signal Inspection".	
OK or NG	
OK >> GO TO 24.  NG >> Replace fuel level sensor unit.	
NG >> Replace fuel level sensor unit.	

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 $\overline{24}$ . CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

>> INSPECTION END

[VK45DE]

INFOID:0000000005354228

# DTC P0460 FUEL LEVEL SENSOR

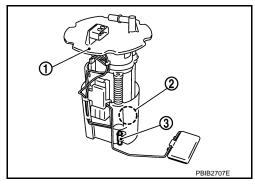
# Component Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the "unified meter and A/C amp.". The "unified meter and A/C amp." sends the fuel level sensor signal to the ECM via the CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel tank temperature sensor (3)



INFOID:0000000005354229

# On Board Diagnosis Logic

#### NOTE:

- If DTC P0460 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0460 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1120, "DTC Confirmation Procedure".

When the vehicle is parked, the fuel level in the fuel tank is naturally stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0460 0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	Harness or connectors     (The CAN communication line is open or shorted)     Harness or connectors     (The sensor circuit is open or shorted)     Unified meter and A/C amp.     Fuel level sensor

# **DTC Confirmation Procedure**

- If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
- a. Turn ignition switch OFF and wait at least 10 seconds.
- b. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start engine and wait maximum of 2 consecutive minutes.
- 3. Check 1st trip DTC.
- If 1st trip DTC is detected, go to <u>EC-1097</u>, "<u>Diagnosis Procedure</u>".

# **Diagnosis Procedure**

 ${f 1}$  .CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to DI-28, "CONSULT-III Function (METER/M&A)".

## OK or NG

OK >> GO TO 2.

NG >> Go to DI-22, "Fuel Level Sensor Signal Inspection".

# 2. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

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# **DTC P0460 FUEL LEVEL SENSOR**

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>> INSPECTION END

Removal and Installation

FUEL LEVEL SENSOR Refer to FL-4, "Component".

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# DTC P0461 FUEL LEVEL SENSOR

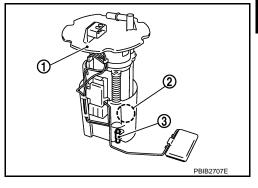
# Component Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the "unified meter and A/C amp.". The "unified meter and A/C amp." sends the fuel level sensor signal to the ECM via the CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel tank temperature sensor (3)



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# On Board Diagnosis Logic

#### NOTE:

- If DTC P0461 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0461 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1120, "DTC Confirmation Procedure".

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 0461	Fuel level sensor circuit range/performance	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.	Harness or connectors     (The CAN communication line is open or shorted)     Harness or connectors     (The sensor circuit is open or shorted)     Unified meter and A/C amp.     Fuel level sensor

### Overall Function Check

Use this procedure to check the overall function of the fuel level sensor. During this check, a 1st trip DTC might not be confirmed.

#### **WARNING:**

When performing the following procedure, always observe the handling of the fuel. Refer to FL-3, "General Precaution".

#### **TESTING CONDITION:**

Before starting overall function check, preparation of draining fuel and refilling fuel is required.

### (P) WITH CONSULT-III

## NOTE:

Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/ 8 Imp gal) in advance.

- 1. Prepare a fuel container and a spare hose.
- Release fuel pressure from fuel line, refer to EC-766, "Fuel Pressure Check".
- 3. Remove the fuel feed hose on the fuel level sensor unit.
- Connect a spare fuel hose where the fuel feed hose was removed.
- 5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.
- Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-III.
- Check "FUEL LEVEL SE" output voltage and note it.
- Touch "ON" and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
- 11. Fill fuel into the fuel tank for 30  $\ell$  (7-7/8 US gal, 6-5/8 Imp gal).
- 12. Check "FUEL LEVEL SE" output voltage and note it.

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Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-III.

10. Check "FUEL LEVEL SE" output voltage and note it.

# DTC P0461 FUEL LEVEL SENSOR

#### < SERVICE INFORMATION >

[VK45DE]

13. Confirm whether the voltage changes more than 0.03V during step 7 to 10 and 10 to 12. If NG, go to <u>EC-1100</u>, "<u>Diagnosis Procedure</u>".

### WITH GST

#### NOTE:

Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30  $\,\ell$  (7-7/8 US gal, 6-5/8 Imp gal) in advance.

- 1. Prepare a fuel container and a spare hose.
- Release fuel pressure from fuel line. Refer to EC-766, "Fuel Pressure Check".
- 3. Remove the fuel feed hose on the fuel level sensor unit.
- 4. Connect a spare fuel hose where the fuel feed hose was removed.
- Turn ignition switch ON.
- 6. Drain fuel by 30  $\ell$  (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
- 7. Confirm that the fuel gauge indication varies.
- 8. Fill fuel into the fuel tank for 30  $\ell$  (7-7/8 US gal, 6-5/8 Imp gal).
- 9. Confirm that the fuel gauge indication varies.
- 10. If NG, go to EC-1100, "Diagnosis Procedure".

# Diagnosis Procedure

INFOID:0000000005354236

1. CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to DI-28, "CONSULT-III Function (METER/M&A)".

#### OK or NG

OK >> GO TO 2.

NG >> Go to DI-22, "Fuel Level Sensor Signal Inspection".

# 2.CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

## Removal and Installation

INFOID:0000000005354237

### **FUEL LEVEL SENSOR**

Refer to FL-4, "Component".

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# DTC P0462, P0463 FUEL LEVEL SENSOR CIRCUIT

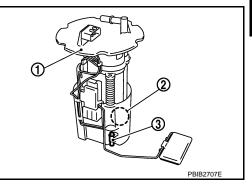
# Component Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the "unified meter and A/C amp.". The "unified meter and A/C amp." sends the fuel level sensor signal to the ECM via the CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel tank temperature sensor (3)



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# On Board Diagnosis Logic

NOTE:

- If DTC P0462 or P0463 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0462 or P0463 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1120, "DTC Confirmation Procedure".

This diagnosis detects open or short circuit malfunction.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0462 0462	Fuel level sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors     (The CAN communication line is open or charted)	
P0463 0463	Fuel level sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	<ul> <li>shorted)</li> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Unified meter and A/C amp.</li> <li>Fuel level sensor</li> </ul>	

## **DTC Confirmation Procedure**

NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

## **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 11 V at ignition switch ON.

- Turn ignition switch ON and wait at least 5 seconds.
- Check 1st trip DTC.
- If 1st trip DTC is detected, go to EC-1101, "Diagnosis Procedure".

# Diagnosis Procedure

INFOID:0000000005354241

INFOID:0000000005354240

 ${f 1}$  .CHECK DTC WITH "UNIFIED METER AND A/C AMP." Refer to DI-28, "CONSULT-III Function (METER/M&A)".

OK or NG

OK >> GO TO 2.

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NG >> Go to DI-22, "Fuel Level Sensor Signal Inspection".

2.CHECK INTERMITTENT INCIDENT

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# DTC P0462, P0463 FUEL LEVEL SENSOR CIRCUIT

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Refer to EC-822, "Diagnosis Procedure".

>> INSPECTION END

Removal and Installation

INFOID:0000000005354242

FUEL LEVEL SENSOR Refer to FL-4, "Component".

# DTC P0500 VSS

Description INFOID:0000000005354243

#### NOTE:

- If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1120, "DTC Confirmation Procedure".

The vehicle speed signal is sent to the "unified meter and A/C amp." from the "ABS actuator and electric unit (control unit)" via the CAN communication line. The "unified meter and A/C amp." then sends a signal to the ECM via the CAN communication line.

# On Board Diagnosis Logic

INFOID:0000000005354244

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500 0500	Vehicle speed sensor	The vehicle speed signal sent to ECM is almost 0 km/h (0 MPH) even when vehicle is being driven.	Harness or connectors     (The CAN communication line is open or shorted)     Harness or connectors     (The vehicle speed signal circuit is open or shorted)     Wheel sensor     Unified meter and A/C amp.     ABS actuator and electric unit (control unit)

### **DTC Confirmation Procedure**

INFOID:0000000005354245

#### **CAUTION:**

Always drive vehicle at a safe speed.

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Steps 1 and 2 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.

### (P) WITH CONSULT-III

- Start engine (VDC switch OFF). 1.
- Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT-III. The vehicle speed on CON-SULT-III should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position. If NG, go to EC-1104, "Diagnosis Procedure".

If OK, go to following step.

- Select "DATA MONITOR" mode with CONSULT-III.
- Warm engine up to normal operating temperature.
- Maintain the following conditions for at least 50 consecutive seconds.

ENG SPEED	More than 1,550 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	5.4 - 31.8 msec
Selector lever position	Except P or N
PW/ST SIGNAL	OFF

- Check 1st trip DTC.
- If 1st trip DTC is detected, go to EC-1104, "Diagnosis Procedure".

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## **DTC P0500 VSS**

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# **Overall Function Check**

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Use this procedure to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

## **WITH GST**

- 1. Lift up drive wheels.
- Start engine.
- Read vehicle speed signal in Service \$01 with GST.
   The vehicle speed signal on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
- 4. If NG, go to EC-1104, "Diagnosis Procedure".

# Diagnosis Procedure

INFOID:0000000005354247

# 1. CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

Refer to BRC-30, "CONSULT-III Function (ABS)".

### OK or NG

OK >> GO TO 2.

NG >> Repair or replace malfunctioning part.

2.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to DI-28, "CONSULT-III Function (METER/M&A)".

>> INSPECTION END

[VK45DE] < SERVICE INFORMATION >

# DTC P0506 ISC SYSTEM

Description INFOID:0000000005354248

#### NOTE:

### If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration and engine load (air conditioner, power steering and cooling fan operation, etc.).

# On Board Diagnosis Logic

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0506 0506	Idle speed control system RPM lower than expected	The idle speed is less than the target idle speed by 100 rpm or more.	Electric throttle control actuator     Intake air leakage

## **DTC Confirmation Procedure**

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- If idle speed is out of the specified value, perform <u>EC-765, "Idle Air Volume Learning"</u>, before conducting DTC Confirmation Procedure. For idle speed, refer to the EC-1337, "Idle Speed and Ignition Timing".
- If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
- Turn ignition switch OFF and wait at least 10 seconds. 1.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.
- Always perform the test at a temperature above –10°C (14°F).
- 1. Open engine hood.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and run it for at least 1 minute at idle speed.
- 7. Check 1st trip DTC.
- If 1st trip DTC is detected, go to EC-1105, "Diagnosis Procedure".

## Diagnosis Procedure

# 1. CHECK INTAKE AIR LEAKAGE

- Start engine and let it idle.
- 2. Listen for an intake air leakage after the mass air flow sensor.

#### OK or NG

OK >> GO TO 2.

NG >> Discover air leakage location and repair.

# 2.REPLACE ECM

- 1. Stop engine.
- Replace ECM.

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# **DTC P0506 ISC SYSTEM**

[VK45DE]

# < SERVICE INFORMATION >

- Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to BL-224, "ECM Re-Communicating Function".
- Perform <u>EC-764</u>, "VIN Registration".
   Perform <u>EC-764</u>, "Accelerator Pedal Released Position Learning".
   Perform <u>EC-764</u>, "Throttle Valve Closed Position Learning".
   Perform <u>EC-765</u>, "Idle Air Volume Learning".

### >> INSPECTION END

[VK45DE] < SERVICE INFORMATION >

# DTC P0507 ISC SYSTEM

Description INFOID:0000000005354252

#### NOTE:

NOTE:

# If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration and engine load (air conditioner, power steering and cooling fan operation, etc.).

# On Board Diagnosis Logic

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0507 0507	Idle speed control system RPM higher than expected	The idle speed is more than the target idle speed by 200 rpm or more.	Electric throttle control actuator     Intake air leakage     PCV system

## **DTC Confirmation Procedure**

- If idle speed is out of the specified value, perform EC-765, "Idle Air Volume Learning", before conducting DTC Confirmation Procedure. For idle speed, refer to the EC-1337, "Idle Speed and Ignition
- If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.
- Always perform the test at a temperature above –10°C (14°F).
- 1. Open engine hood.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and run it for at least 1 minute at idle speed.
- Check 1st trip DTC.
- If 1st trip DTC is detected, go to EC-1107, "Diagnosis Procedure".

# Diagnosis Procedure

# 1. CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

# OK or NG

OK >> GO TO 2.

NG >> Repair or replace malfunctioning part.

# 2.CHECK INTAKE AIR LEAKAGE

- Start engine and let it idle.
- Listen for an intake air leakage after the mass air flow sensor.

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## **DTC P0507 ISC SYSTEM**

[VK45DE] < SERVICE INFORMATION >

### OK or NG

OK >> GO TO 3.

NG >> Discover air leakage location and repair.

# 3. REPLACE ECM

- Stop engine.
- 2. Replace ECM.
- Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to BL-224, "ECM Re-Communicating Function".
- Perform EC-764, "VIN Registration".
- 5. Perform EC-764, "Accelerator Pedal Released Position Learning".
- Perform EC-764, "Throttle Valve Closed Position Learning". Perform EC-765, "Idle Air Volume Learning".

## >> INSPECTION END

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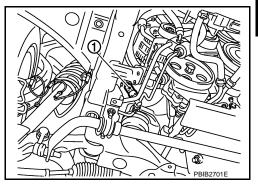
# DTC P0550 PSP SENSOR

# **Component Description**

Power steering pressure (PSP) sensor (1) is installed to the power steering high-pressure tube and detects a power steering load.

This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.

• Illustration shows the view from under the vehicle.



# CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	Engine: After warming up, idle the	Steering wheel: Not being turned	OFF
1 W/OT GIGNAL	engine	Steering wheel: Being turned	ON

# On Board Diagnosis Logic

The MIL will not illuminate for this diagnosis.

NOTE:

If DTC P0550 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-1121, "DTC Confirmation Procedure"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0550 0550	Power steering pressure sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	Harness or connectors     (The sensor circuit is open or shorted)     Power steering pressure sensor

## **DTC Confirmation Procedure**

- 1. If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
- a. Turn ignition switch OFF and wait at least 10 seconds.
- b. Turn ignition switch ON.
- c. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start engine and let it idle for at least 5 seconds.
- Check 1st trip DTC.
- If 1st trip DTC is detected, go to <u>EC-1111</u>, "<u>Diagnosis Procedure</u>".

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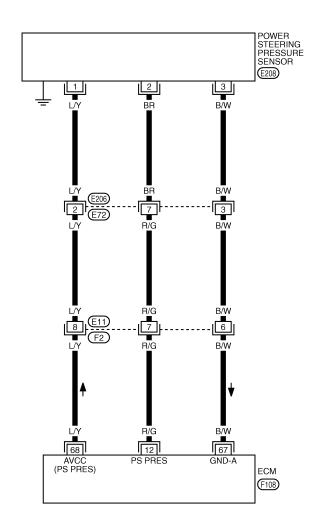
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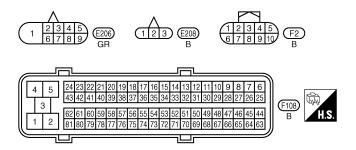
Wiring Diagram

INFOID:0000000005354260

# EC-PS/SEN-01

: DETECTABLE LINE FOR DTC : NON-DETECTABLE LINE FOR DTC





TBWT1032E

Specification data are reference values and are measured between each terminal and ground.

# **CAUTION:**

Never 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.

### < SERVICE INFORMATION >

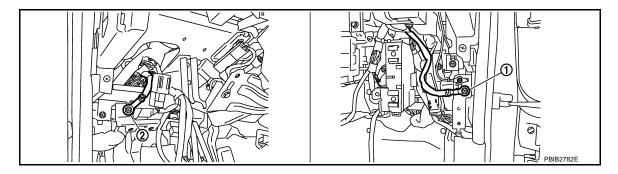
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12 R/G	Power steering pressure	[Engine is running] • Steering wheel: Being turned	0.5 - 4.5 V	
	K/G	sensor	[Engine is running] • Steering wheel: Not being turned	0.4 - 0.8 V
67	B/W	Sensor ground (Power steering pressure sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
68	L/Y	Sensor power supply (Power steering pressure sensor)	[Ignition switch: ON]	Approximately 5 V

# Diagnosis Procedure

INFOID:0000000005354261

# 1. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".



1. Body ground M70

2. Body ground M16

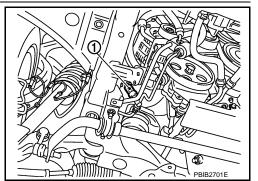
## OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

# 2.CHECK PSP SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect PSP sensor (1) harness connector.
- Illustration shows the view from under the vehicle.
- 2. Turn ignition switch ON.



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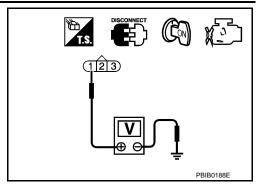
#### < SERVICE INFORMATION >

Check voltage between PSP sensor terminal 1 and ground with CONSULT-III or tester.

### **Voltage: Approximately 5 V**

### OK or NG

OK >> GO TO 4. NG >> GO TO 3.



# 3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E206, E72
- Harness connectors E11, F2
- Harness for open or short between power steering pressure sensor and ECM
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

# ${f 4.}$ CHECK PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between PSP sensor terminal 3 and ECM terminal 67. Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 6. NG >> GO TO 5.

# 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E206, E72
- Harness connectors E11, F2
- Harness for open or short between power steering pressure sensor and ECM
  - >> Repair open circuit or short to ground short to power in harness or connectors.

# 6.CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check harness continuity between ECM terminal 12 and PSP sensor terminal 2. Refer to Wiring Diagram.

#### Continuity should exist.

Also check harness for short to ground and short to power.

## OK or NG

OK >> GO TO 8. NG >> GO TO 7.

# 7.DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E206, E72
- Harness connectors E11, F2
- Harness for open or short between power steering pressure sensor and ECM
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

## **DTC P0550 PSP SENSOR**

# < SERVICE INFORMATION > [VK45DE]

# 8. CHECK PSP SENSOR

Refer to EC-1113, "Component Inspection".

OK or NG

OK >> GO TO 9.

NG >> Replace PSP sensor.

# 9. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

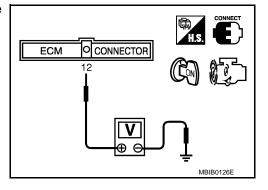
### >> INSPECTION END

# Component Inspection

### POWER STEERING PRESSURE SENSOR

- Reconnect all harness connectors disconnected.
- Start engine and let it idle.
- 3. Check voltage between ECM terminal 12 and ground under the following conditions.

Condition	Voltage	
Steering wheel: Being turned.	0.5 - 4.5 V	
Steering wheel: Not being turned.	0.4 - 0.8 V	



# Removal and Installation

## POWER STEERING PRESSURE SENSOR

Refer to PS-36, "Removal and Installation".

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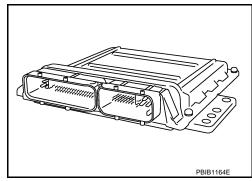
[VK45DE]

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# DTC P0603 ECM POWER SUPPLY

# Component 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.



# On Board Diagnosis Logic

INFOID:0000000005354265

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0603 0603	ECM power supply circuit	ECM back up RAM system does not function properly.	Harness or connectors     [ECM power supply (back up) circuit is open or shorted.]     ECM

# **DTC Confirmation Procedure**

INFOID:0000000005354266

- 1. If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
- a. Turn ignition switch OFF and wait at least 10 seconds.
- b. Turn ignition switch ON.
- c. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON and wait at least 10 seconds.
- 3. Turn ignition switch OFF, wait at least 5 minutes.
- 4. Turn ignition switch ON and wait at least 10 seconds.
- Repeat steps 2 and 3 for five times.
- 6. Check 1st trip DTC.
- 7. If 1st trip DTC is detected, go to EC-1116, "Diagnosis Procedure".

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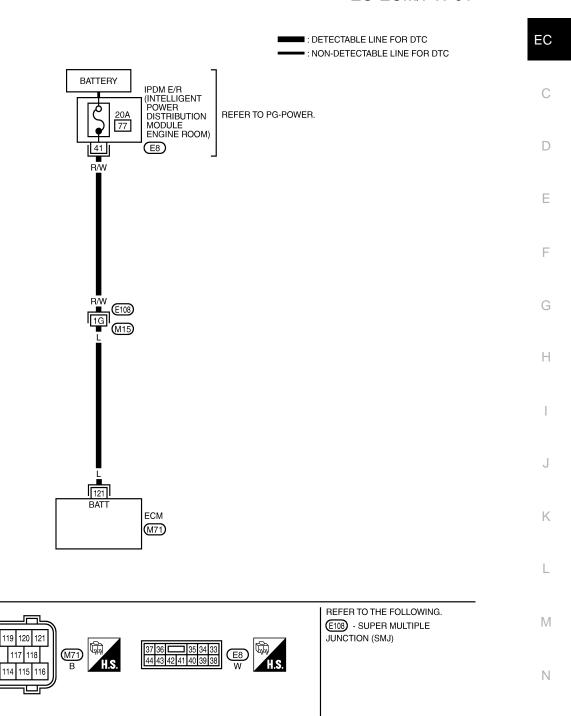
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Wiring Diagram INFOID:0000000005354267

# EC-ECM/PW-01



Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

119 120

Never 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.

### < SERVICE INFORMATION >

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
121	L	Power supply for ECM (Back up)	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)

# Diagnosis Procedure

INFOID:0000000005354268

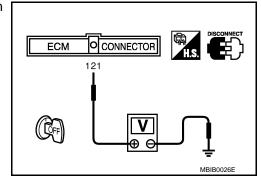
# 1. CHECK ECM POWER SUPPLY

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check voltage between ECM terminal 121 and ground with CONSULT-III or tester.

## Voltage: Battery voltage

#### OK or NG

OK >> GO TO 3. NG >> GO TO 2.



# 2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- 20 A fuse
- IPDM E/R harness connector E8
- Harness for open or short between ECM and battery

>> Repair or replace harness or connectors.

# 3.check intermittent incident

Refer to EC-822, "Diagnosis Procedure".

### OK or NG

OK >> GO TO 4.

NG >> Repair or replace harness or connectors.

# 4. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- Erase DTC.
- Perform DTC Confirmation Procedure.
   See <u>EC-1114</u>, "<u>DTC Confirmation Procedure</u>".
- 4. Is the 1st trip DTC P0603 displayed again?

### Yes or No

Yes >> GO TO 5.

No >> INSPECTION END

# **5.**REPLACE ECM

- 1. Replace ECM.
- 2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to BL-224, "ECM Re-Communicating Function".
- 3. Perform EC-764, "VIN Registration".
- 4. Perform EC-764, "Accelerator Pedal Released Position Learning".
- 5. Perform EC-764, "Throttle Valve Closed Position Learning".
- Perform <u>EC-765</u>, "Idle Air Volume Learning".

## **DTC P0603 ECM POWER SUPPLY**

< SERVICE INFORMATION > [VK45DE]

>> INSPECTION END

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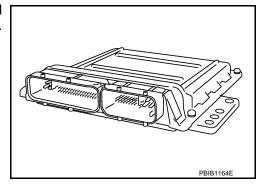
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## DTC P0605 ECM

## Component Description

INFOID:0000000005354269

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



## On Board Diagnosis Logic

INFOID:0000000005354270

This self-diagnosis has one or two trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
D000F		Α	ECM calculation function is malfunctioning.	
P0605 0605	Engine control module	В	ECM EEP-ROM system is malfunctioning.	• ECM
		С	ECM self shut-off function is malfunctioning.	

#### **FAIL-SAFE MODE**

ECM enters fail-safe mode when the malfunction A is detected.

Detected items	Engine operation condition in fail-safe mode	
Malfunction A	<ul> <li>ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</li> <li>ECM deactivates ASCD operation.</li> </ul>	

## **DTC Confirmation Procedure**

INFOID:0000000005354271

Perform PROCEDURE FOR MALFUNCTION A first. If the 1st trip DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B. If there is no malfunction on PROCEDURE FOR MALFUNCTION B, perform PROCEDURE FOR MALFUNCTION C.

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

#### PROCEDURE FOR MALFUNCTION A

- 1. Turn ignition switch ON.
- Check 1st trip DTC.
- 3. If 1st trip DTC is detected, go to EC-1119, "Diagnosis Procedure".

#### PROCEDURE FOR MALFUNCTION B

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Turn ignition switch OFF, wait at least 10 seconds and then turn it ON.
- 3. Check 1st trip DTC.
- If 1st trip DTC is detected, go to <u>EC-1119</u>, "<u>Diagnosis Procedure</u>".

#### PROCEDURE FOR MALFUNCTION C

Turn ignition switch ON and wait at least 1 second.

## **DTC P0605 ECM**

[VK45DE] < SERVICE INFORMATION > Turn ignition switch OFF, wait at least 10 seconds and then turn it ON. Α 3. Repeat step 3 for 32 times. Check 1st trip DTC. 5. If 1st trip DTC is detected, go to EC-1119, "Diagnosis Procedure". EC Diagnosis Procedure INFOID:0000000005354272 1. INSPECTION START Turn ignition switch ON. 2. Erase DTC. 3. Perform DTC Confirmation Procedure. D See EC-1118, "DTC Confirmation Procedure". 4. Is the 1st trip DTC P0605 displayed again? Yes or No Е Yes >> GO TO 2. >> INSPECTION END No 2.REPLACE ECM F 1. Replace ECM. 2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to BL-224, "ECM Re-Communicating Function". Perform <u>EC-764</u>, "VIN Registration".
 Perform <u>EC-764</u>, "Accelerator Pedal Released Position Learning". 5. Perform EC-764, "Throttle Valve Closed Position Learning". Н 6. Perform EC-765, "Idle Air Volume Learning". >> INSPECTION END K L Ν Р

Revision: 2009 June **EC-1119** 2010 M35/M45

## DTC P0607 ECM

Description INFOID:0000000005354273

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.

## On Board Diagnosis Logic

INFOID:0000000005354274

## This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0607 0607	CAN communication bus	When detecting error during the initial diagnosis of CAN controller of ECM.	• ECM

## **DTC Confirmation Procedure**

INFOID:0000000005354275

- Turn ignition switch ON.
- 2. Check DTC.
- 3. If DTC is detected, go to EC-1120, "Diagnosis Procedure".

## Diagnosis Procedure

INFOID:0000000005354276

## 1. INSPECTION START

- 1. Turn ignition switch ON.
- Erase DTC.
- 3. Perform DTC Confirmation Procedure.

See EC-1120, "DTC Confirmation Procedure".

- Check DTC.
- 5. Is DTC P0607 displayed again?

## Yes or No

Yes >> GO TO 2.

No >> INSPECTION END

# 2.REPLACE ECM

- 1. Replace ECM.
- 2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to BL-224. "ECM Re-Communicating Function".
- 3. Perform EC-764, "VIN Registration".
- 4. Perform EC-764, "Accelerator Pedal Released Position Learning".
- 5. Perform EC-764, "Throttle Valve Closed Position Learning".
- 6. Perform EC-765, "Idle Air Volume Learning".

#### >> INSPECTION END

## **DTC P0643 SENSOR POWER SUPPLY**

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[VK45DE]

## DTC P0643 SENSOR POWER SUPPLY

## On Board Diagnosis Logic

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## This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0643 0643	Sensor power supply circuit short	ECM detects the voltage of power source for sensor is excessively low or high.	Harness or connectors     (APP sensor 1 circuit is shorted.)     (EVAP control system pressure sensor is shorted.)     (Refrigerant pressure sensor circuit is shorted.)     (PSP sensor circuit is shorted.)     (Battery current sensor circuit is shorted.)      Accelerator pedal position sensor     EVAP control system pressure sensor     Refrigerant pressure sensor     Power steering pressure sensor     Battery current sensor

#### **FAIL-SAFE MODE**

When the malfunction is detected, ECM enters fail-safe mode and the MIL illuminates.

Engine operation condition in fail-safe mode

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

## **DTC Confirmation Procedure**

INFOID:0000000005354278

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

- 1. Start engine and let it idle for 1 second.
- Check DTC.
- If DTC is detected, go to <u>EC-1123</u>, "<u>Diagnosis Procedure</u>".

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Revision: 2009 June **EC-1121** 2010 M35/M45

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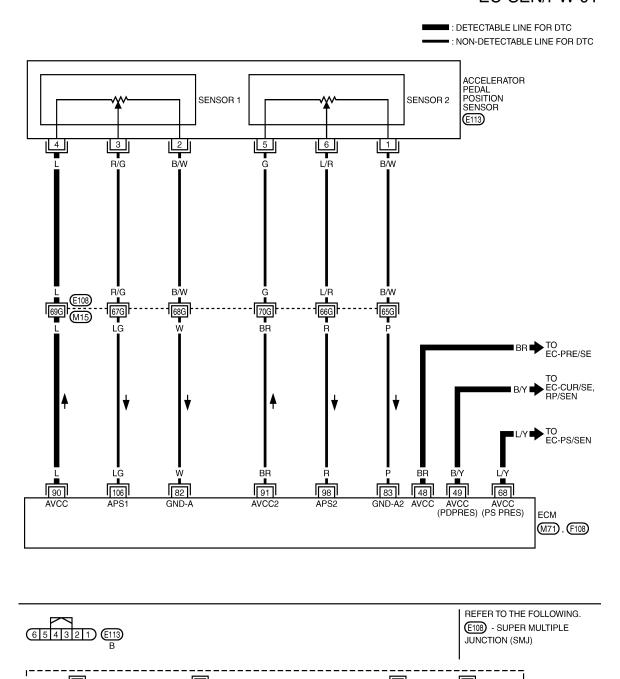
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Wiring Diagram

NEOID:0000000005354279

## EC-SEN/PW-01



Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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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(M71)

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## < SERVICE INFORMATION >

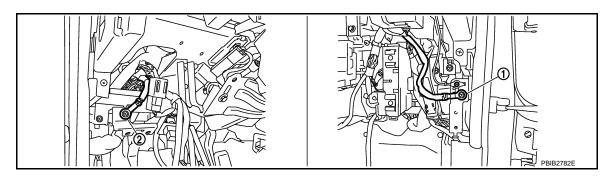
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	_[
48	BR	Sensor power supply (EVAP control system pressure sensor)	[Ignition switch: ON]	Approximately 5 V	
49	В/Ү	Sensor power supply (Refrigerant pressure sensor, Battery current sensor)	[Ignition switch: ON]	Approximately 5 V	
68	L/Y	Sensor power supply (Power steering pressure sensor)	[Ignition switch: ON]	Approximately 5 V	
82	W	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V	
83	Р	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V	
90	L	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5 V	
91	BR	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5 V	
00	D	Accelerator pedal position	[Ignition switch: ON]  • Engine stopped  • Accelerator pedal: Fully released	0.20 - 0.55 V	
98 R sensor 2	sensor 2  [Ignition switch: ON]  • Engine: Stopped  • Accelerator pedal: Fully depressed	Engine: Stopped	1.85 - 2.40 V		
400	10	Accelerator pedal position	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.4 - 1.1 V	
106	106 LG Accelerator pedal position sensor 1		[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	3.7 - 4.8 V	

# Diagnosis Procedure

# 1. CHECK GROUND CONNECTIONS

Turn ignition switch OFF.

Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>. "Ground Inspection".



1. Body ground M70

2. Body ground M16

## OK or NG

OK >> GO TO 2.

EC-1123 Revision: 2009 June 2010 M35/M45

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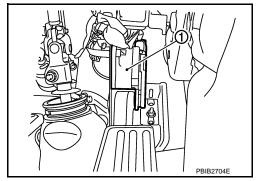
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#### < SERVICE INFORMATION >

NG >> Repair or replace ground connections.

# 2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

- Disconnect accelerator pedal position (APP) sensor (1) harness connector.
- 2. Turn ignition switch ON.

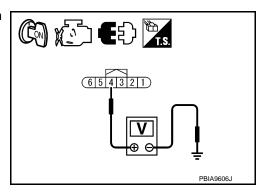


Check voltage between APP sensor terminal 4 and ground with CONSULT-III or tester.

## **Voltage: Approximately 5 V**

## OK or NG

OK >> GO TO 5. NG >> GO TO 3.



## 3. CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
90	APP sensor terminal 4	EC-1122, "Wiring Diagram"
48	EVAP control system pressure sensor terminal 3	EC-1072, "Wiring Diagram"
49	Refrigerant pressure sensor terminal 1	EC-1319, "Wiring Diagram"
43	Battery current sensor terminal 1	EC-1166, "Wiring Diagram"
68	PSP sensor terminal 1	EC-1110, "Wiring Diagram"

#### OK or NG

OK >> GO TO 4.

NG >> Repair short to ground or short to power in harness or connectors.

## 4. CHECK COMPONENTS

#### Check the following.

- EVAP control system pressure sensor (Refer to EC-1075, "Component Inspection".)
- Refrigerant pressure sensor (Refer to <u>EC-1320, "Diagnosis Procedure".</u>)
- Battery current sensor (Refer to EC-1169, "Component Inspection".)
- Power steering pressure sensor (Refer to EC-1113, "Component Inspection".)

### OK or NG

OK >> GO TO 7.

NG >> Replace malfunctioning component.

## 5. CHECK APP SENSOR

Refer to EC-1252, "Component Inspection".

#### OK or NG

OK >> GO TO 7. NG >> GO TO 6.

**DTC P0643 SENSOR POWER SUPPLY** [VK45DE] < SERVICE INFORMATION > 6. REPLACE ACCELERATOR PEDAL ASSEMBLY Replace accelerator pedal assembly. Perform <u>EC-764</u>, "Accelerator <u>Pedal Released Position Learning</u>".
 Perform <u>EC-764</u>, "Throttle Valve <u>Closed Position Learning</u>".
 Perform <u>EC-765</u>, "Idle <u>Air Volume Learning</u>". EC >> INSPECTION END 7. CHECK INTERMITTENT INCIDENT Refer to EC-822, "Diagnosis Procedure". D >> INSPECTION END Е F Н K L M Ν 0

Revision: 2009 June **EC-1125** 2010 M35/M45

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## DTC P0850 PNP SWITCH

## Component Description

INFOID:0000000005354281

When the selector lever position is P or N, park/neutral position (PNP) signal is sent to ECM from TCM via the "unified meter and A/C amp".

## CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354282

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	Ignition switch: ON	Selector lever position: P or N	ON
1 / N 1 O 31 O W	Ignition switch: ON	Selector lever position: Except above	OFF

## On Board Diagnosis Logic

INFOID:0000000005354283

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0850 0850	Park/neutral position switch	The park/neutral position (PNP) signal does not change during driving after the engine is started.	

## **DTC Confirmation Procedure**

INFOID:0000000005354284

#### **CAUTION:**

#### Always drive vehicle at a safe speed.

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

## (II) WITH CONSULT-III

- 1. Turn ignition switch ON.
- Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-III. Then check the "P/N POSI SW" indication under the following conditions.

Selector lever position	Known-good signal	
N or P position	ON	
Except above position	OFF	

If NG, go to EC-1129, "Diagnosis Procedure".

If OK, go to the following step.

- 3. Start engine and warm it up to normal operating temperature.
- 4. Maintain the following conditions for at least 50 consecutive seconds.

ENG SPEED	1,300 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.0 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever position	Suitable position

5. Check 1st trip DTC.

[VK45DE]

If 1st trip DTC is detected, go to <u>EC-1129</u>. "<u>Diagnosis Procedure</u>".

## **Overall Function Check**

INFOID:0000000005354285

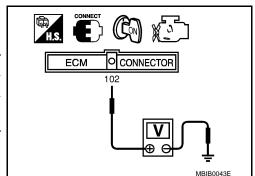
Use this procedure to check the overall function of the park/neutral position (PNP) signal circuit. During this check, a 1st trip DTC might not be confirmed.

## **WITH GST**

- 1. Turn ignition switch ON.
- 2. Check voltage between ECM terminal 102 (PNP switch signal) and ground under the following conditions.

Selector lever position	Voltage (Known-good data)	
P or N position	Approx. 0 V	
Except above position	BATTERY VOLTAGE (11 - 14 V)	





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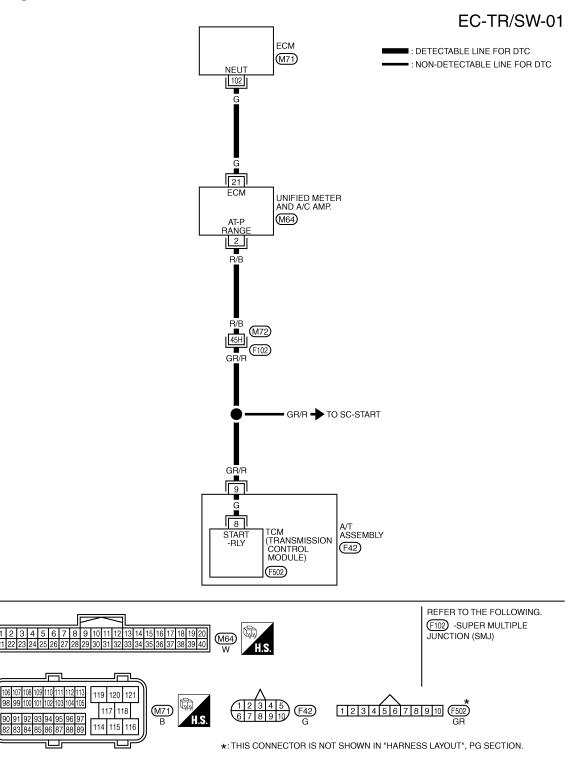
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Revision: 2009 June **EC-1127** 2010 M35/M45

Wiring Diagram



TBWT1052E

Specification data are reference values and are measured between each terminal and ground.

## **CAUTION:**

Never 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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#### < SERVICE INFORMATION >

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
100 0		Tourseite	[Ignition switch: ON] • Selector lever position: P or N	Approximately 0 V
102	G	Transmission range switch	[Ignition switch: ON] • Selector lever position: Except above	BATTERY VOLTAGE (11 - 14 V)

Diagnosis Procedure

INFOID:0000000005354287

## 1. CHECK DTC WITH TCM

Refer to AT-47, "OBD-II Diagnostic Trouble Code (DTC)".

#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace malfunctioning part.

## 2.CHECK STARTING SYSTEM

Turn ignition switch OFF, then turn it to START.

#### Does starter motor operate?

#### Yes or No

Yes >> GO TO 3.

No >> Refer to SC-10, "Trouble Diagnosis with Starting/Charging System Tester (Starting)".

# 3.CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

- 1. Turn ignition switch OFF.
- 2. Disconnect A/T assembly harness connector.
- Disconnect "unified meter and A/C amp." harness connector.
- 4. Check harness continuity between A/T assembly terminal 9 and "unified meter and A/C amp." terminal 2. Refer to Wiring Diagram.

#### Continuity should exist.

5. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 5.

NG >> GO TO 4.

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## 4. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors M72, F102
- Harness for open or short between A/T assembly and "unified meter and A/C amp."

>> Repair open circuit or short to ground or short to power in harness or connectors.

# 5.check pnp switch input signal circuit for open and short-ii

- Disconnect ECM harness connector.
- Check harness continuity between ECM terminal 102 and "unified meter and A/C amp." terminal 21. Refer to Wiring Diagram.

#### Continuity should exist.

3. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 6.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

 $oldsymbol{6}$  .CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-III

Revision: 2009 June **EC-1129** 2010 M35/M45

## DTC P0850 PNP SWITCH

#### < SERVICE INFORMATION >

[VK45DE]

 Check harness continuity between A/T assembly terminal 9 and TCM terminal 8. Refer to <u>AT-107</u>, "<u>Diagnosis Procedure</u>".

#### Continuity should exist.

2. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 7.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

# 7. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### OK or NG

OK >> GO TO 8.

NG >> Repair or replace malfunctioning part.

8. REPLACE "UNIFIED METER AND A/C AMP."

Refer to DI-34, "Removal and Installation of Unified Meter and A/C Amp".

>> INSPECTION END

## DTC P1140, P1145 IVT CONTROL POSITION SENSOR

< SERVICE INFORMATION >

[VK45DE]

INFOID:0000000005354288

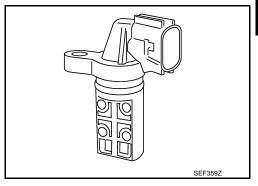
## DTC P1140, P1145 IVT CONTROL POSITION SENSOR

## Component Description

Intake valve timing control position sensors are located in the front of cylinder heads in both bank 1 and bank 2.

This sensor uses a Hall IC.

The cam position is determined by the intake primary cam sprocket concave (in four places). The ECM provides feedback to the intake valve timing control for appropriate target valve open-close timing according to drive conditions based on detected cam position.



## CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354289

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INITA/TIM/D4)	Engine: After warming up	Idle	–5 - 5°CA
INT/V TIM (B1) INT/V TIM (B2)	<ul><li>Selector lever position: P or N</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,000 rpm	Approx. 0 - 20°CA

## On Board Diagnosis Logic

INFOID:0000000005354290

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1140 1140 (Bank 1)			Harness or connectors     (Intake valve timing control position sensor circuit is open or shorted)	J
P1145 1145 (Bank 2)	Intake valve timing control position sensor circuit	An excessively high or low voltage from the sensor is sent to ECM.	<ul> <li>Intake valve timing control position sensor</li> <li>Crankshaft position sensor (POS)</li> <li>Camshaft position sensor (PHASE)</li> <li>Accumulation of debris to the signal pick-up portion of the camshaft sprocket</li> </ul>	K

## **DTC Confirmation Procedure**

INFOID:0000000005354291

- If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
- Turn ignition switch OFF and wait at least 10 seconds.
- b. Turn ignition switch ON.
- C. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start engine and let it idle for 10 seconds.
- 3. Check 1st trip DTC.
- If 1st trip DTC is detected, go to EC-1135, "Diagnosis Procedure".

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EC-1131 Revision: 2009 June 2010 M35/M45

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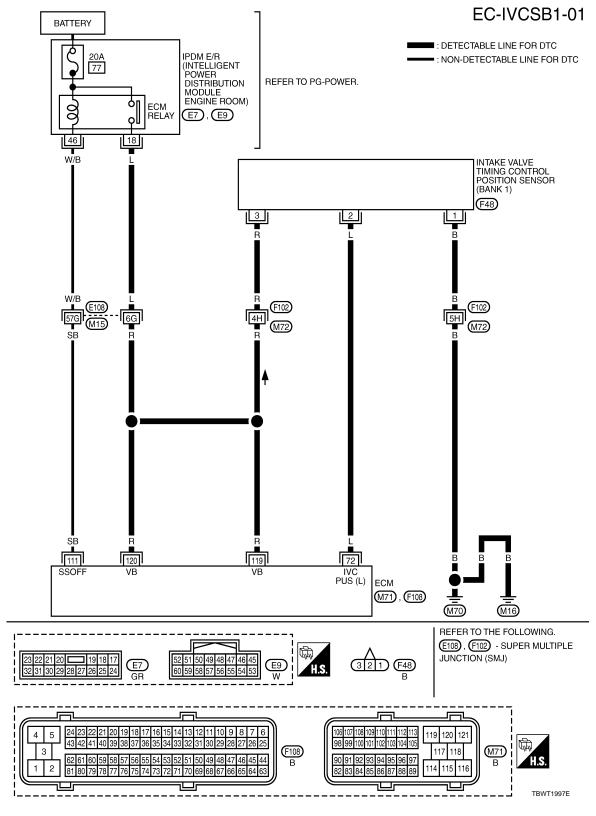
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[VK45DE]

## Wiring Diagram

INFOID:0000000005354292

## BANK 1



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III. CAUTION:

## DTC P1140, P1145 IVT CONTROL POSITION SENSOR

< SERVICE INFORMATION >

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Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
72		Intake valve timing control	[Engine is running] • Warm-up condition • Idle speed	0 - 1.0 V★
72	L	position sensor (bank 1)	[Engine is running] • Engine speed: 2,000 rpm	0 - 1.0 V*
111	111 SB ECM relay (Self shut-off)		[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5 V
		(Jen Shuron)	[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
119 120	R R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

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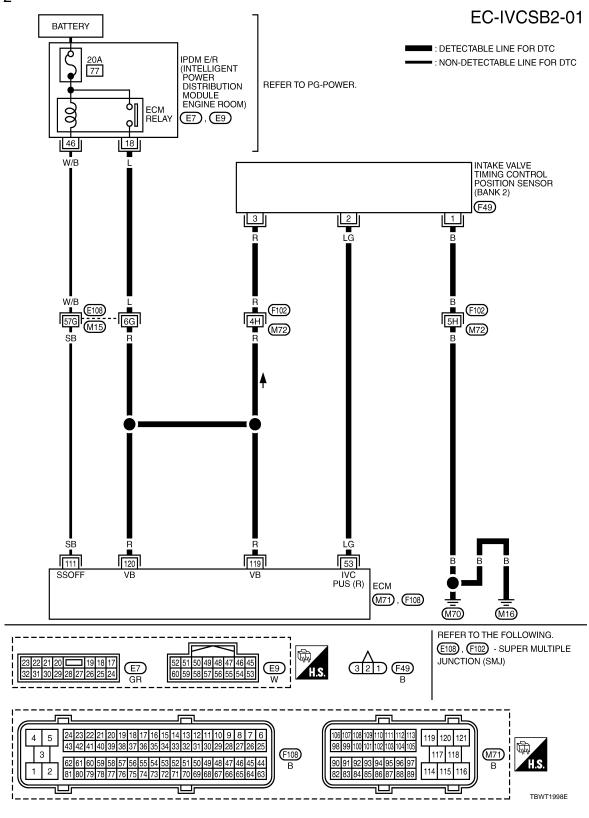
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[VK45DE]

BANK 2



Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

#### **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 P1140, P1145 IVT CONTROL POSITION SENSOR

< SERVICE INFORMATION >

[VK45DE]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
<b>-</b>	10	Intake valve timing control	[Engine is running] • Warm-up condition • Idle speed	0 - 1.0V★
53	LG	position sensor (bank 2)	[Engine is running] • Engine speed: 2,000 rpm	0 - 1.0V★
111	111 SB ECM relay (Self shut-off)	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5V	
		(Seil Stint-Oil)	[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

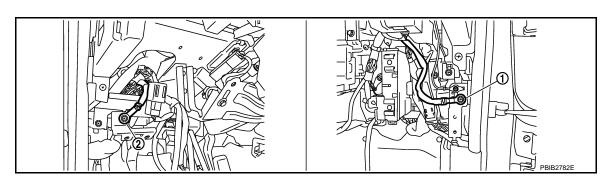
<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# Diagnosis Procedure

1. CHECK GROUND CONNECTIONS

Turn ignition switch OFF.
 Loosen and retighten ground screws on the body.

Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

## OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

# 2.CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect intake valve timing control position sensor harness connector.

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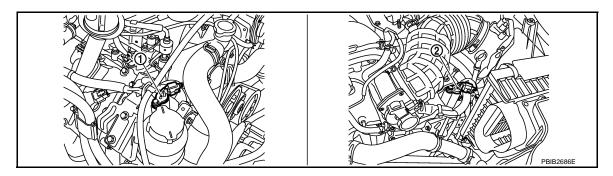
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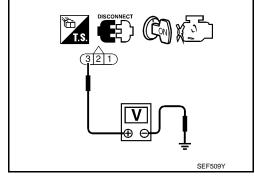


- 1. Intake valve timing control position sensor (bank 2)
- 2. Intake valve timing control position sensor (bank 1)
- 2. Turn ignition switch ON.
- 3. Check voltage between intake valve timing control position sensor terminal 3 and ground with CONSULT-III or tester.

#### Voltage: Battery voltage

#### OK or NG

OK >> GO TO 4. NG >> GO TO 3.



## 3.DETECT MALFUNCTIONING PART

## Check the following.

- Harness connectors E108, M15
- Harness connectors F102, M72
- Harness for open or short between intake valve timing control position sensor and IPDM E/R
- Harness for open or short between intake valve timing control position sensor and ECM
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

# 4. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Check harness continuity between intake valve timing control position sensor terminal 1 and ground. Refer to Wiring Diagram.

#### Continuity should exist.

3. Also check harness for short to power.

#### OK or NG

OK >> GO TO 6. NG >> GO TO 5.

## 5.DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors F102, M72
- Harness for open or short between intake valve timing control position sensor and ground
  - >> Repair open circuit or short to power in harness or connectors.

# 6.CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Disconnect ECM harness connector.

# DTC P1140, P1145 IVT CONTROL POSITION SENSOR

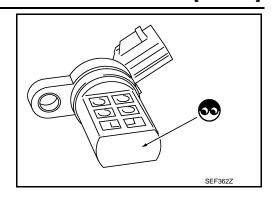
< SERVICE INFORMATION >	[VK45DE]
<ol> <li>Check harness continuity between the following;</li> <li>ECM terminal 72 and intake valve timing control position sensor (bank 1) terminal 2 or</li> <li>ECM terminal 53 and intake valve timing control position sensor (bank 2) terminal 2.</li> <li>Refer to Wiring Diagram.</li> </ol>	А
Continuity should exist.	EC
Also check harness for short to ground and short to power.	
OK or NG	С
OK >> GO TO 7.  NG >> Repair open circuit or short to ground or short to power in harness or connectors.	
7. CHECK INTAKE VALVE TIMING CONTROL POSITION SENSOR	D
Refer to EC-1137, "Component Inspection".	·
OK or NG	E
OK >> GO TO 8.	_
NG >> Replace intake valve timing control position sensor.  8. CHECK CRANKSHAFT POSITION SENSOR (POS)	
Refer to EC-1018, "Component Inspection".	F
OK or NG	
OK >> GO TO 9.	G
NG >> Replace crankshaft position sensor (POS).	
9.CHECK CAMSHAFT POSITION SENSOR (PHASE)	Н
Refer to EC-1024, "Component Inspection".  OK or NG	
OK >> GO TO 10.	I
NG >> Replace camshaft position sensor (PHASE).	
10.check camshaft sprocket	
Check accumulation of debris to the signal pick-up portion of the camshaft sprocket.  Refer to EM-211, "Component".	J
OK or NG	
OK >> GO TO 11.	K
NG >> Remove debris and clean the signal pick-up cutout of camshaft sprocket.	
11. CHECK INTERMITTENT INCIDENT	L
Refer to EC-822, "Diagnosis Procedure".	
>> INSPECTION END	M
Component Inspection	NFOID:00000000005354294
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INTAKE VALVE TIMING CONTROL POSITION SENSOR  1. Disconnect intake valve timing control position sensor barness connector.	
<ol> <li>Disconnect intake valve timing control position sensor harness connector.</li> <li>Loosen the fixing bolt of the sensor.</li> <li>Remove the sensor.</li> </ol>	0
o. Remove the sensor.	
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# DTC P1140, P1145 IVT CONTROL POSITION SENSOR

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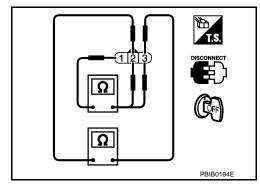
4. Visually check the sensor for chipping.



5. Check resistance as shown below.

Terminal No. (Polarity)	Resistance [at 25°C (77°F)]
3 (+) - 1 (-)	
2 (+) - 1 (-)	Except 0 or $\infty \Omega$
3 (+) - 2 (-)	

6. If NG, replace intake valve timing control position sensor.



INFOID:0000000005354295

## Removal and Installation

INTAKE VALVE TIMING CONTROL POSITION SENSOR Refer to EM-199, "Component".

## DTC P1148, P1168 CLOSED LOOP CONTROL

< SERVICE INFORMATION >

[VK45DE]

# DTC P1148, P1168 CLOSED LOOP CONTROL

## On Board Diagnosis Logic

INFOID:0000000005354296

## These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1148 1148 (Bank 1)	Closed loop control	The closed loop control function for bank 1 does not operate even when vehicle is being driven in the specified condition.	Harness or connectors     (The A/F sensor 1 circuit is open or shorted.)
P1168 1168 (Bank 2)	function	The closed loop control function for bank 2 does not operate even when vehicle is being driven in the specified condition.	<ul><li>A/F sensor 1</li><li>A/F sensor 1 heater</li></ul>

#### NOTE:

DTC P1148 or P1168 is displayed with another DTC for A/F sensor 1. Perform the trouble diagnosis for the corresponding DTC.

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## **DTC P1211 TCS CONTROL UNIT**

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[VK45DE]

## DTC P1211 TCS CONTROL UNIT

Description INFOID.000000005354297

The malfunction information related to TCS is transferred via the CAN communication line from "ABS actuator and electric unit (control unit)" to ECM.

Always erase the malfunction information such as DTC not only for "ABS actuator and electric unit (control unit)" but also for ECM after TCS related repair.

## On Board Diagnosis Logic

INFOID:0000000005354298

Freeze frame data is not stored in the ECM for this self-diagnosis. The MIL will not illuminate for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1211 1211	TCS control unit	ECM receives a malfunction information from "ABS actuator electric unit (control unit)"	ABS actuator and electric unit (control unit)     TCS related parts

## **DTC Confirmation Procedure**

INFOID:0000000005354299

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

- 1. Start engine and let it idle for at least 60 seconds.
- Check 1st trip DTC.
- 3. If 1st trip DTC is detected, go to <a href="EC-1140">EC-1140</a>, "Diagnosis Procedure".

## Diagnosis Procedure

INFOID:0000000005354300

Go to BRC-30, "CONSULT-III Function (ABS)".

#### DTC P1212 TCS COMMUNICATION LINE

< SERVICE INFORMATION >

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## DTC P1212 TCS COMMUNICATION LINE

Description INFOID:0000000005354301

#### NOTE:

- If DTC P1212 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1212 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-1120</u>, "<u>DTC Confirmation Procedure</u>".

The CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and "ABS actuator and electric unit (control unit)".

Always erase the malfunction information such as DTC not only for "ABS actuator and electric unit (control unit)" but also for ECM after TCS related repair.

## On Board Diagnosis Logic

INFOID:0000000005354302

Freeze frame data is not stored in the ECM for this self-diagnosis. The MIL will not illuminate for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1212 1212	TCS communication line	ECM cannot receive the information from "ABS actuator and electric unit (control unit)" continuously.	Harness or connectors     (The CAN communication line is open or shorted.)     ABS actuator and electric unit (control unit)     Dead (Weak) battery

## **DTC Confirmation Procedure**

INFOID:0000000005354303

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

- 1. Start engine and let it idle for at least 10 seconds.
- 2. Check 1st trip DTC.
- If 1st trip DTC is detected, go to <u>EC-1141, "Diagnosis Procedure"</u>.

## Diagnosis Procedure

INFOID:0000000005354304

Go to BRC-30, "CONSULT-III Function (ABS)".

EC-1141

Revision: 2009 June

2010 M35/M45

[VK45DE]

## DTC P1217 ENGINE OVER TEMPERATURE

**Description** 

#### SYSTEM DESCRIPTION

#### 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-1120</u>, "<u>DTC Confirmation Procedure</u>".

#### Cooling Fan Control

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1		
Battery	Battery voltage*1		
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner ON signal*2	Cooling fan control	<ul><li>IPDM E/R</li><li>Cooling fan relay</li></ul>
Refrigerant pressure sensor	Refrigerant pressure		Cooling fan control module
	Target A/C evaporator temperature*2		
Unified meter and A/C amp.	Vehicle speed* <sup>2</sup>		
	A/C evaporator temperature*2		

<sup>\*1:</sup> The ECM determines the start signal status by the signals of engine speed and battery voltage.

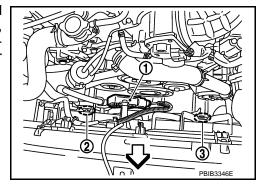
ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, air conditioner ON signal, refrigerant pressure, target A/C evaporator temperature and A/C evaporator temperature. Cooling fan control signal is sent to IPDM E/R from ECM via the CAN communication line. Then, IPDM 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.

#### COMPONENT DESCRIPTION

#### Cooling Fan Control Module

Cooling fan control module (1) 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.

- <□: Vehicle front</li>
- Cooling fan motor-2 (2)
- Cooling fan motor-1 (3)



Cooling Fan Motor

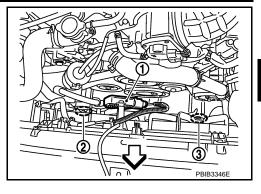
<sup>\*2:</sup> This signal is sent to ECM via the CAN communication line.

#### < SERVICE INFORMATION >

[VK45DE]

Cooling fan motor receives cooling fan motor operating voltage from cooling fan control module (1). The revolution speed of cooling fan motor is controlled by duty cycle of the voltage.

- <□: Vehicle front</li>
- Cooling fan motor-2 (2)
- Cooling fan motor-1 (3)



## CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354306

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FAN DUTY	Engine: Running	0 - 100%

## On Board Diagnosis Logic

INFOID:0000000005354307

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217 1217	Engine over tempera- ture (Overheat)	<ul> <li>Cooling fan does not operate properly (Overheat).</li> <li>Cooling fan system does not operate properly (Overheat).</li> <li>Engine coolant was not added to the system using the proper filling method.</li> <li>Engine coolant is not within the specified range.</li> </ul>	Harness or connectors     (The cooling fan circuit is open or shorted.)     IPDM E/R     Cooling fan control module     Cooling fan motor     Radiator hose     Radiator     Radiator cap     Water pump     Thermostat     Water control valve For more information, refer to EC-1150,     "Main 13 Causes of Overheating".

#### **CAUTION:**

When a malfunction is indicated, always replace the coolant. Refer to CO-36, "Changing Engine Coolant". Also, replace the engine oil. Refer to LU-25, "Changing Engine Oil".

- Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Always use coolant with the proper mixture ratio. Refer to MA-10, "Anti-Freeze Coolant Mixture Ratio".
- After refilling coolant, run engine to check that no water-flow noise is emitted.

#### Overall Function Check

INFOID:0000000005354308

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

#### 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.

(P) WITH CONSULT-III

EC-1143 Revision: 2009 June 2010 M35/M45

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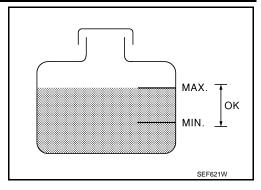
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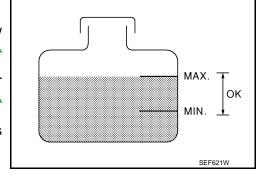
[VK45DE]

- Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to <u>EC-1146</u>. "Diagnosis Procedure".
- 2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to <a href="EC-1146">EC-1146</a>, <a href=""">"Diagnosis Procedure"</a>.
- 3. Turn ignition switch ON.
- 4. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT-III.
- 5. Check that cooling fan speed varies according to the percent.
- 6. If the results are NG, go to EC-1146, "Diagnosis Procedure".

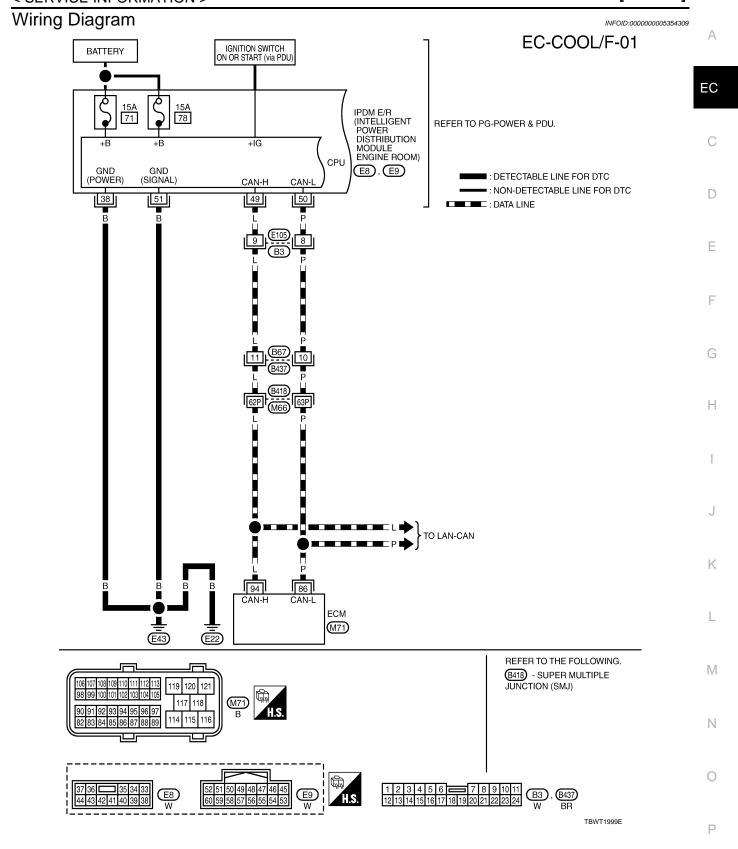
## WITH GST

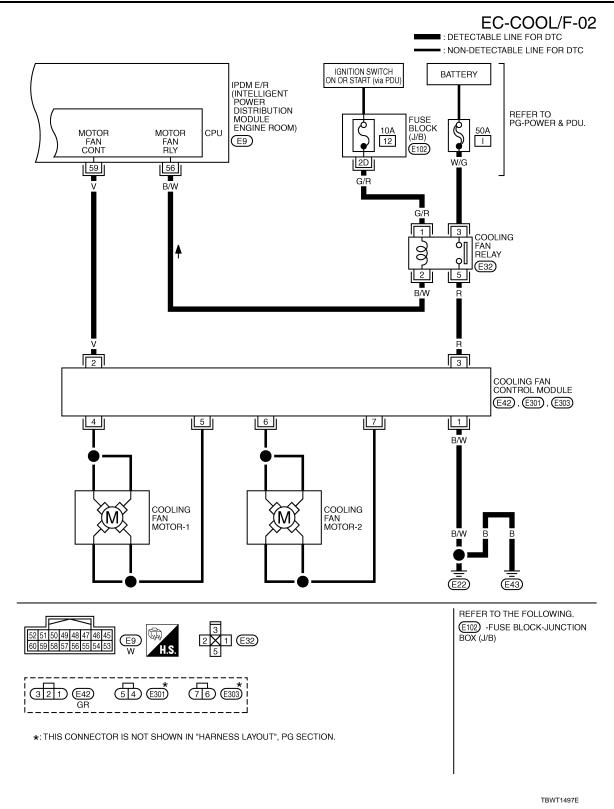
- Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to <a href="EC-1146">EC-1146</a>. <a href=""EC-1146">"Diagnosis Procedure"</a>.
- Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to <u>EC-1146</u>, <u>"Diagnosis Procedure"</u>.
- 3. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to <u>PG-22</u>, "Auto Active Test".
- 4. If NG, go to EC-1146, "Diagnosis Procedure".





[VK45DE]





## Diagnosis Procedure

INFOID:0000000005354310

# 1. Check cooling fan operation

## (III) With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT-III.
- Check that cooling fan speed varies according to the percent.

[VK45DE] < SERVICE INFORMATION >

## **Without CONSULT-III**

- Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PG-22, "Auto Active
- 2. Check that cooling fan operates.

#### OK or NG

OK >> GO TO 2. NG >> GO TO 6.

## 2.CHECK COOLING SYSTEM FOR LEAKAGE

Apply pressure to the cooling system with a tester, and check if the pressure drops.

#### **CAUTION:**

Higher than the specified pressure may cause radiator damage.

Testing pressure: 157 kPa (1.6 kg/cm<sup>2</sup>, 23 psi)

#### Pressure should not drop.

#### OK or NG

OK

>> GO TO 3. NG

>> Check the following for leakage. Refer to CO-36. "Inspection".

- Hose
- Radiator
- Water pump

## 3.CHECK RADIATOR CAP

Apply pressure to cap with a tester.

## Radiator cap relief pressure:

59 - 98 kPa (0.6 - 1.0 kg/cm<sup>2</sup>, 9 - 14 psi)

#### OK or NG

>> GO TO 4. OK

NG >> Replace radiator cap.

# EG17650301 (J33984-A)

## f 4 . CHECK THERMOSTAT

Check the following.

- Thermostat. (Refer to CO-51, "Removal and Installation".)
- Water control valve. (Refer to CO-51, "Removal and Installation".)
- Engine coolant temperature sensor. (Refer to EC-892, "Component Inspection".)

## OK or NG

OK >> GO TO 5.

NG >> Replace malfunctioning component.

## 5. CHECK MAIN 13 CAUSES

If the cause cannot be isolated, go to EC-1150, "Main 13 Causes of Overheating".

#### >> INSPECTION END

## 6.CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-I

Turn ignition switch OFF.

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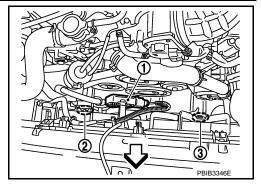
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EC-1147 Revision: 2009 June 2010 M35/M45

#### < SERVICE INFORMATION >

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- Disconnect cooling fan control module (1) harness connector E42.
- <=: Vehicle front
- Cooling fan motor-2 (2)
- Cooling fan motor-1 (3)
- 3. Turn ignition switch ON.

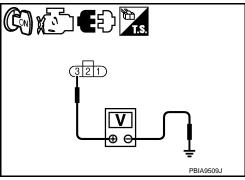


4. Check voltage between cooling fan control module terminal 3 and ground with CONSULT-III or tester.

## Voltage: Battery voltage

#### OK or NG

OK >> GO TO 7. NG >> GO TO 12.



## 7.CHECK COOLING FAN CONTROL MODULE GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Check harness continuity between cooling fan control module terminal 1 and ground. Refer to wiring diagram.

#### Continuity should exist.

3. Also check harness for short to power.

#### OK or NG

OK >> GO TO 8.

NG >> Repair open circuit or short to power in harness or connectors.

## 8.CHECK IPDM E/R GROUND CIRCUIT

- 1. Disconnect IPDM E/R harness connector E8, E9.
- Check harness continuity between IPDM E/R terminal 38, 51 and ground. Refer to wiring diagram.

## Continuity should exist.

3. Also check harness for short to power.

#### OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to power in harness or connectors.

## 9.CHECK COOLING FAN CONTROL SIGNAL CIRCUIT

 Check harness continuity between IPDM E/R terminal 59 and cooling fan control module terminal 2. Refer to wiring diagram.

#### Continuity should exist.

2. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 10.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK COOLING FAN CONTROL MODULE OUTPUT SIGNAL CIRCUIT

## < SERVICE INFORMATION >

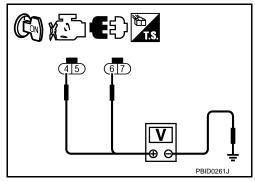
- Reconnect all harness connectors disconnected.
- Disconnect cooling fan control module harness connectors E301, E303.
- 3. Turn ignition switch ON.
- 4. Check voltage between cooling fan control module terminals 4, 6 and ground with CONSULT-III or tester.

## Voltage: Battery voltage

## OK or NG

OK >> GO TO 11.

NG >> Replace cooling fan control module.



# 11. CHECK COOLING FAN MOTORS -1 AND -2

Refer to EC-1150, "Component Inspection".

#### OK or NG

OK >> GO TO 16.

NG >> Replace cooling fan motor.

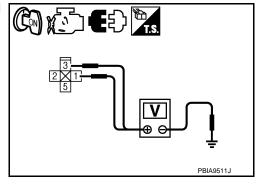
# 12. CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-II

- Turn ignition switch OFF.
- Disconnect cooling fan relay.
- 3. Turn ignition switch ON.
- 4. Check voltage between cooling fan relay terminals 1, 3 and ground with CONSULT-III or tester.

## Voltage: Battery voltage

#### OK or NG

OK >> GO TO 14. NG >> GO TO 13.



# 13. DETECT MALFUNCTIONING PART

Check the following.

- 10 A fuse
- Fuse block (J/B) connector E102
- 50 A fusible link
- Harness for open or short between cooling fan relay and fuse
- Harness for open or short between cooling fan relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

# 14. CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-III

- Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector E9.
- Check harness continuity between the following; Cooling fan relay terminal 2 and IPDM E/R terminal 56, Cooling fan relay terminal 5 and cooling fan control module terminal 3. Refer to wiring diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

## OK or NG

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OK >> GO TO 15.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

# 15. CHECK COOLING FAN RELAY

Refer to EC-1150, "Component Inspection".

#### OK or NG

OK >> GO TO 16.

NG >> Replace cooling fan relay.

# 16. CHECK INTERMITTENT INCIDENT

Perform EC-822, "Diagnosis Procedure".

#### OK or NG

OK >> Replace IPDM E/R. Refer to PG-27, "Removal and Installation of IPDM E/R".

NG >> Repair or replace harness connectors.

## Main 13 Causes of Overheating

INFOID:0000000005354311

[VK45DE]

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	Blocked radiator     Blocked condenser     Blocked radiator grille     Blocked bumper	Visual	No blocking	_
	Coolant mixture     Coolant teste		Coolant tester	MA-10, "Anti-Freeze Coolant Mixture Ratio"x	
	3	Coolant level	Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-36, "Inspection"
	4	Radiator cap	Pressure tester	CO-41, "Checking Radiator Cap"	
ON*2	5	Coolant leakage	Visual	No leakage	CO-36, "Inspection"
ON* <sup>2</sup>	6	Thermostat	Touch the upper and lower radiator hoses	Both hoses should be hot	CO-51, "Removal and Installation"
ON* <sup>1</sup>	7	Cooling fan	CONSULT-III	Operating	See trouble diagnosis for DTC P1217 (EC-1142).
OFF	8	Combustion gas leak- age	Color checker chemical tester 4 Gas analyzer	Negative	_
ON*3	9	Coolant temperature gauge	Visual	Gauge less than 3/4 when driving	_
		Coolant overflow to reservoir tank	Visual	No overflow during driving and idling	CO-36, "Changing Engine Coolant"
OFF* <sup>4</sup>	10	Coolant return from reservoir tank to radiator	Visual	Should be initial level in reservoir tank	CO-36, "Changing Engine Coolant"
OFF	11	Water control valve	Remove and inspect the valve	Within the specified value	CO-51, "Removal and Installation"
OFF	12	Cylinder head	Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-233, "Inspection After Disassembly"
	13	Cylinder block and pistons	Visual	No scuffing on cylinder walls or piston	EM-247, "Disassembly and Assembly"

<sup>\*1:</sup> Turn the ignition switch ON.

For more information, refer to CO-33, "Troubleshooting Chart".

## Component Inspection

INFOID:0000000005354312

COOLING FAN MOTORS -1 AND -2

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<sup>\*2:</sup> Engine running at 3,000 rpm for 10 minutes.

<sup>\*3:</sup> Drive at 90 km/h (56 MPH) for 30 minutes and then let idle for 10 minutes.

<sup>\*4:</sup> After 60 minutes of cool down time.

## < SERVICE INFORMATION >

[VK45DE]

- 1. Disconnect cooling fan control module harness connectors.
- 2. Supply cooling fan control motor terminals with battery voltage and check operation.

Cooling fan motor	Term	ninals
Cooling lan motor	(+)	(-)
1	4	5
2	6	7

Check that cooling fan operates.

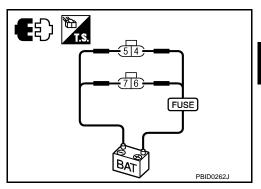
If NG, replace cooling fan motor.

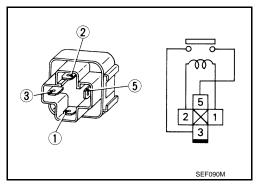
## **COOLING FAN RELAY**

- 1. Disconnect cooling fan relay harness connector.
- Check continuity between terminals 3 and 5 under the following conditions.

Conditions	Continuity
12 V direct current supply between terminals 1 and 2	Yes
No current supply	No

If NG, replace cooling fan relay.





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## DTC P1220 FUEL PUMP CONTROL MODULE (FPCM)

Description INFOID:0000000005354313

#### SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control (FPCM)	Fuel pump control module
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		(I I Civi)
Battery	Battery voltage*		

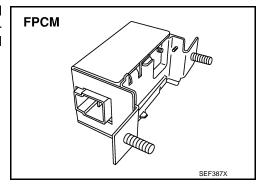
<sup>\*:</sup> ECM determines the start signal status by the signals of engine speed and battery voltage.

This system controls the fuel pump operation. The amount of fuel flow delivered from the fuel pump is altered between two flow rates by the FPCM operation. The FPCM determines the voltage supplied to the fuel pump (and therefore fuel flow) according to the following conditions.

Conditions	Amount of fuel flow	Supplied voltage
<ul> <li>Engine cranking</li> <li>Engine coolant temperature is below 10°C (50°F).</li> <li>Engine is running under heavy load and high speed conditions</li> </ul>	high	Battery voltage (11 - 14 V)
Except the above	low	Approximately 8 V

#### COMPONENT DESCRIPTION

The FPCM adjusts the voltage supplied to the fuel pump to control the amount of fuel flow. When the FPCM increases the voltage supplied to the fuel pump, the fuel flow is increased. When the FPCM decreases the voltage, the fuel flow is decreased.



## CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354314

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
	Engine: Cranking	HI
FPCM	<ul> <li>Engine: Idle</li> <li>Engine coolant temperature: More than 10°C (50°F)</li> </ul>	LOW

## On Board Diagnosis Logic

INFOID:0000000005354315

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1220 1220	Fuel pump control module (FPCM)	An improper voltage signal from the FPCM, which is supplied to a point between the fuel pump and the dropping resistor, is detected by ECM.	<ul><li>Harness or connectors (FPCM circuit is shorted.)</li><li>Dropping resistor</li><li>FPCM</li></ul>

## **DTC Confirmation Procedure**

INFOID:0000000005354316

#### **CAUTION:**

# < SERVICE INFORMATION >

Always drive vehicle at a safe speed.

### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 11 V with ignition switch ON.

### (P) WITH CONSULT-III

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Check that "COOLAN TEMP/S" indication is less than 70°C (158°F). If not, cool down the engine.
- Start engine.
- 4. Hold vehicle under the following conditions for 12 seconds.

ENG SPEED	1,375 - 3,475 rpm
VHCL SPEED SE	More than 70 km/h (43 MPH)
B/FUEL SCHDL	1.5 - 23.0 msec
Selector lever position	Suitable position

- Check 1st trip DTC.
- If 1st trip DTC is detected, go to EC-1155, "Diagnosis Procedure".

### **WITH GST**

Follow the procedure "WITH CONSULT-III" above.

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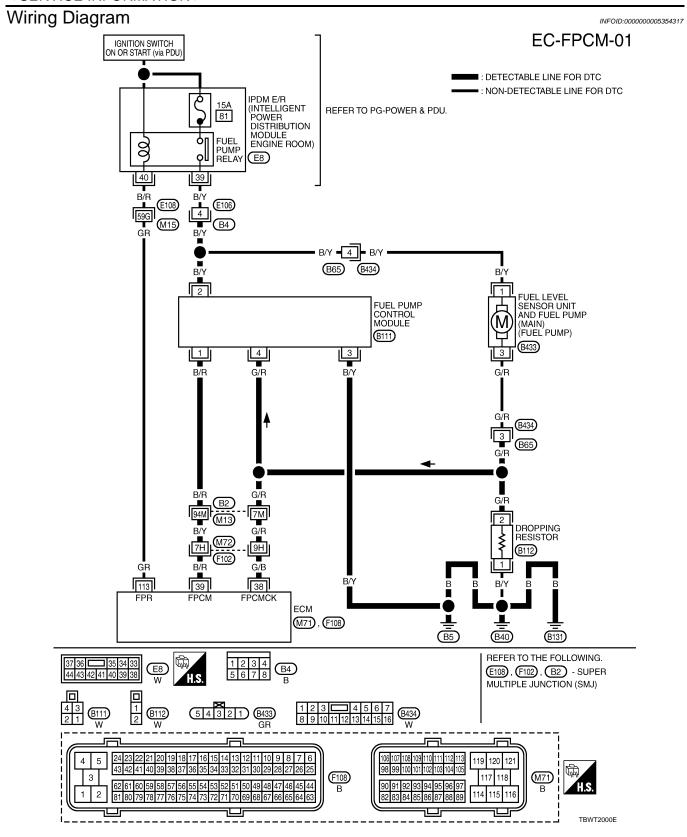
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Specification data are reference values and are measured between each terminal and ground. **CAUTION**:

Never 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.

### < SERVICE INFORMATION >

[VK45DE]

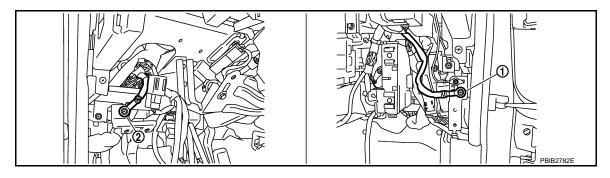
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
38	G/B	Fuel pump control module (FPCM) check	[When cranking engine]  [Engine is running]  • Warm-up condition  • Idle speed	Approximately 0 V 4 - 6 V
39	B/R	Fuel pump control module (FPCM)	[When cranking engine]  [Engine is running]  • Warm-up condition  • Idle speed	0 - 0.5 V 8 - 12 V
442	CB	Fuel nump relay	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.5 V
113 GR	GR Fuel pump relay	[Ignition switch: ON]  • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)	

# Diagnosis Procedure

# 1. CHECK GROUND CONNECTIONS

Turn ignition switch OFF.

Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

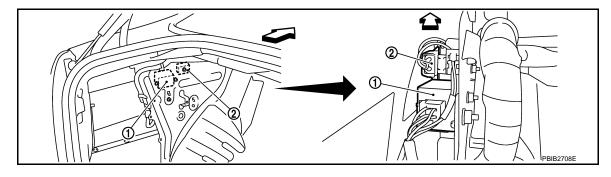
### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

# 2.CHECK FPCM POWER SUPPLY CIRCUIT

Disconnect fuel pump control module (FPCM) harness connector.



1. FPCM

2. Dropping resistor

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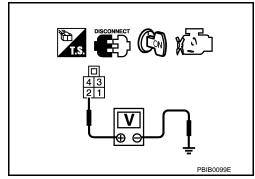
# < SERVICE INFORMATION >

- Turn ignition switch ON.
- 3. Check voltage between FPCM terminal 2 and ground with CON-SULT-III or tester.

### Voltage: Battery voltage

### OK or NG

OK >> GO TO 4. NG >> GO TO 3.



[VK45DE]

# 3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, B4
- Harness for open or short between FPCM and harness connector B4
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

# 4. CHECK FPCM GROUND CIRCUIT FOR OPEN AND SHORT-I

- 1. Turn ignition switch OFF.
- Check harness continuity between FPCM terminal 3 and ground. Refer to Wiring Diagram.

### Continuity should exist.

3. Also check harness for short to power.

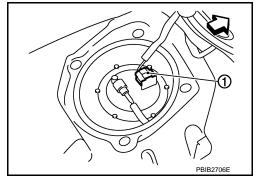
## OK or NG

OK >> GO TO 5.

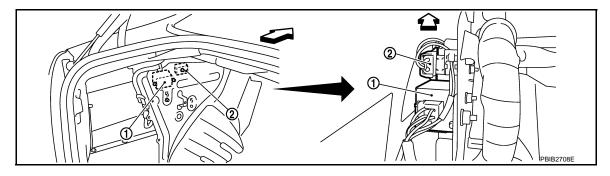
NG >> Repair open circuit or short to power in harness or connectors.

## 5. CHECK FPCM GROUND CIRCUIT FOR OPEN AND SHORT-II

- 1. Disconnect "fuel level sensor unit and fuel pump" harness connector (1).
- Illustration shows the view with rear seat cushion and inspection hole cover (RH) removed.
- <a>□: Vehicle front</a>



2. Disconnect dropping resistor harness connector.



FPCM
 Dropping resistor

OFDIVICE INFORMATION	[VK45DE]
< SERVICE INFORMATION >	[VK45DE]
<ol> <li>Check harness continuity between the following;</li> <li>"fuel level sensor unit and fuel pump" terminal 3 and dropping resistor terminal 2,</li> <li>FPCM terminal 4 and dropping resister terminal 2.</li> <li>Refer to Wiring Diagram.</li> </ol>	А
Refer to Willing Diagram.	
Continuity should exist.	EC
4. Check harness continuity between the following;	
"fuel level sensor and fuel pump" terminal 3 and ground,	С
FPCM terminal 4 and ground. Refer to Wiring Diagram.	
Nelei to Willing Diagnam.	
Continuity should not exist.	D
5. Also check harness for short to power.	
OK or NG	Е
OK >> GO TO 7.	
NG >> GO TO 6.	
6.DETECT MALFUNCTIONING PART	F
Check the following.	
<ul><li>Harness connectors B434, B65</li><li>Harness for open or short between "fuel level sensor unit and fuel pump" and dropping resistor</li></ul>	G
Harness for open or short between FPCM and dropping resistor	O
Harness for open or short between "fuel level sensor unit and fuel pump" and ground	
Harness for open or short between FPCM and ground	Н
>> Repair open circuit or short to ground or short to power in harness or connectors.	
7. CHECK FPCM INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	ı
<ol> <li>Disconnect ECM harness connector.</li> <li>Check harness continuity between ECM terminal 38 and FPCM terminal 4.</li> </ol>	
Refer to Wiring Diagram.	J
Continuity should exist.	
	K
<ol><li>Check harness continuity between ECM terminal 38 and ground.</li><li>Refer to Wiring Diagram.</li></ol>	
rtolor to mining Diagrams	
Continuity should not exist.	L
4. Also check harness for short to power.	
OK or NG	M
OK >> GO TO 9.	171
NG >> GO TO 8.	
8. DETECT MALFUNCTIONING PART	N
Check the following.	
<ul> <li>Harness connectors B2, M13</li> <li>Harness connectors M72, F102</li> </ul>	0
Harness for open or short between ECM and FPCM	O
>> Repair open circuit or short to ground or short to power in harness or connectors.	Р
9. CHECK FPCM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
Check harness continuity between ECM terminal 39 and FPCM terminal 1.	
Refer to Wiring Diagram.	
Continuity should exist	

Continuity should exist.

2. Also check harness for short to ground and short to power.

Revision: 2009 June **EC-1157** 2010 M35/M45

### < SERVICE INFORMATION >

[VK45DE]

### OK or NG

OK >> GO TO 11.

NG >> GO TO 10.

# 10. DETECT MALFUNCTIONING PART

## Check the following.

- Harness connectors B2, M13
- Harness connectors M72, F102
- Harness for open or short between ECM and FPCM

>> Repair open circuit or short to ground or short to power in harness or connectors.

# 11.CHECK FPCM

Refer to EC-1158, "Component Inspection".

### OK or NG

OK >> GO TO 12.

NG >> Replace FPCM.

# 12. CHECK INTERMITTENT INCIDENT

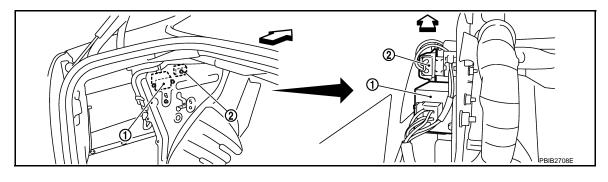
Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

## Component Inspection

INFOID:0000000005354319

### FUEL PUMP CONTROL MODULE



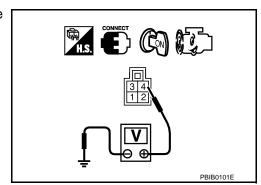
⟨□ : Vehicle front

1. FPCM

- 2. Dropping resistor
- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Check voltage between FPCM terminal 4 and ground under the following conditions.

Condition	Voltage
When engine cranking	Approx. 0 V
After starting engine	Approx. 5 V

4. If NG, replace fuel pump control module.



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INFOID:0000000005354322

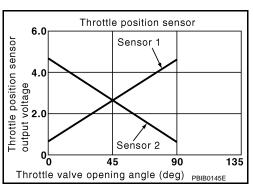
INFOID:0000000005354323

## DTC P1225 TP SENSOR

## Component 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 the two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving condition via the throttle control motor.



## On Board Diagnosis Logic

The MIL will not illuminate for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225 1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	Electric throttle control actuator (TP sensor 1 and 2)

## **DTC Confirmation Procedure**

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

- Turn ignition switch ON. 1.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- Check 1st trip DTC.
- If 1st trip DTC is detected, go to EC-1159, "Diagnosis Procedure".

# Diagnosis Procedure

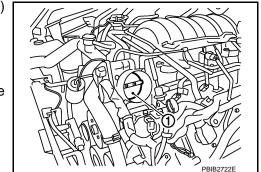
# ${f 1}$ .CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- Turn ignition switch OFF.
- Remove the intake air duct. 2.
- Check if foreign matter is caught between the throttle valve (1) and the housing.
- This illustration shows the view with intake air duct removed.

### OK or NG

OK >> GO TO 2.

NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



# 2.replace electric throttle control actuator

EC-1159 Revision: 2009 June 2010 M35/M45

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## **DTC P1225 TP SENSOR**

[VK45DE] < SERVICE INFORMATION >

- Replace the electric throttle control actuator.
- Perform <u>EC-764</u>, "<u>Throttle Valve Closed Position Learning</u>".
   Perform <u>EC-765</u>, "<u>Idle Air Volume Learning</u>".

### >> INSPECTION END

Removal and Installation

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ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-174, "Component".

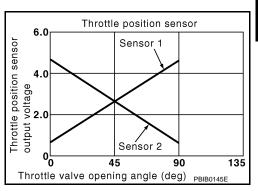
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## DTC P1226 TP SENSOR

## Component 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 the two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving condition via the throttle control motor.



## On Board Diagnosis Logic

The MIL will not illuminate for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226 1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	Electric throttle control actuator (TP sensor 1 and 2)

## **DTC Confirmation Procedure**

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

- 1. Turn ignition switch ON.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 4. Repeat steps 2 and 3 for 32 times.
- 5. Check 1st trip DTC.
- 6. If 1st trip DTC is detected, go to EC-1161, "Diagnosis Procedure".

## Diagnosis Procedure

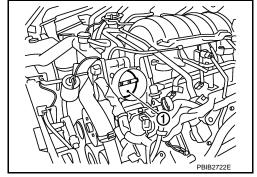
# ${f 1}$ .CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- Turn ignition switch OFF.
- Remove the intake air duct.
- 3. Check if foreign matter is caught between the throttle valve (1) and the housing.
- This illustration shows the view with intake air duct removed.

### OK or NG

OK >> GO TO 2.

NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



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## **DTC P1226 TP SENSOR**

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# $\overline{2}$ .REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- Replace the electric throttle control actuator.
- Perform <u>EC-764</u>, "Throttle Valve Closed Position Learning". Perform <u>EC-765</u>, "Idle Air Volume Learning".

### >> INSPECTION END

Removal and Installation

INFOID:0000000005354329

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-174, "Component".

### DTC P1421 COLD START CONTROL

< SERVICE INFORMATION > [VK45DE]

## DTC P1421 COLD START CONTROL

Description INFOID:0000000005354330

ECM controls ignition timing and engine idle speed when engine is started with prewarming up condition. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

## On Board Diagnosis Logic

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DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1421 1421	Cold start emission reduction strategy monitoring	ECM does not control ignition timing and engine idle speed properly when engine is started with prewarming up condition.	<ul><li>Lack of intake air volume</li><li>Fuel injection system</li><li>ECM</li></ul>

## **DTC Confirmation Procedure**

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### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

### WITH CONSULT-III

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-III.
- 4. Check that the "COOLAN TEMP/S" indication is between 5°C (41°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.
- 5. Start engine and let it idle for 5 minutes.
- Check 1st trip DTC.
- 7. If 1st trip DTC is detected, go to <a href="EC-1163">EC-1163</a>, "Diagnosis Procedure".

#### WITH GST

Follow the procedure "WITH CONSULT-III" above.

## Diagnosis Procedure

1. PERFORM IDLE AIR VOLUME LEARNING

Perform <u>EC-765</u>, "Idle Air Volume Learning". Is Idle Air Volume Learning carried out successfully?

#### Yes or No

Yes >> GO TO 2.

No >> Follow the instructions of Idle Air Volume Learning.

# 2.CHECK INTAKE SYSTEM

Check for the cause of intake air volume lacking. Refer to the following.

- Crushed intake air passage
- Intake air passage clogging

## OK or NG

OK >> GO TO 3.

NG >> Repair or replace malfunctioning part.

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## DTC P1421 COLD START CONTROL

#### < SERVICE INFORMATION >

[VK45DE]

# 3.check fuel injection system function

Perform EC-970, "DTC Confirmation Procedure" for DTC P0171, P0174 FUEL INJECTION SYSTEM FUNC-TION.

#### OK or NG

OK >> GO TO 4.

NG >> Go to EC-975, "Diagnosis Procedure".

# 4.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- 2. Erase DTC.
- Perform DTC Confirmation Procedure. See EC-1163, "DTC Confirmation Procedure".
- 4. Is the 1st trip DTC P1421 displayed again?

### Yes or No

Yes >> GO TO 5.

>> INSPECTION END No

### 5.REPLACE ECM

- Replace ECM.
- 2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to BL-224, "ECM Re-Communicating Function".
- Perform EC-764, "VIN Registration".
- 4. Perform EC-764, "Accelerator Pedal Released Position Learning".
- Perform <u>EC-764</u>, "<u>Throttle Valve Closed Position Learning</u>".
   Perform <u>EC-765</u>, "<u>Idle Air Volume Learning</u>".

#### >> INSPECTION END

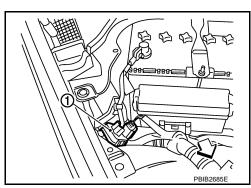
[VK45DE]

INFOID:0000000005354334

## DTC P1550 BATTERY CURRENT SENSOR

# Component Description

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor (1) is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to SC section.



• <=: Vehicle front

#### **CAUTION:**

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then the battery discharge may occur.

### CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
BAT CUR SEN	<ul> <li>Engine speed: Idle</li> <li>Battery: Fully charged*</li> <li>Selector lever position: P or N</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	Approx. 2,600 - 3,500 mV

<sup>\*:</sup> Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to SC-4, "How to Handle Battery".

# On Board Diagnosis Logic

The MIL will not illuminate for this diagnosis.

NOTE:

If DTC P1550 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1121, "DTC Confirmation Procedure".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1550 1550	Battery current sensor circuit range/performance	The output voltage of the battery current sensor remains within the specified range while engine is running.	Harness or connectors     (The sensor circuit is open or shorted.)     Battery current sensor

### **DTC Confirmation Procedure**

NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

- 1. Start engine and wait at least 10 seconds.
- 2. Check 1st trip DTC.
- If 1st trip DTC is detected, go to <u>EC-1167</u>, "<u>Diagnosis Procedure</u>".

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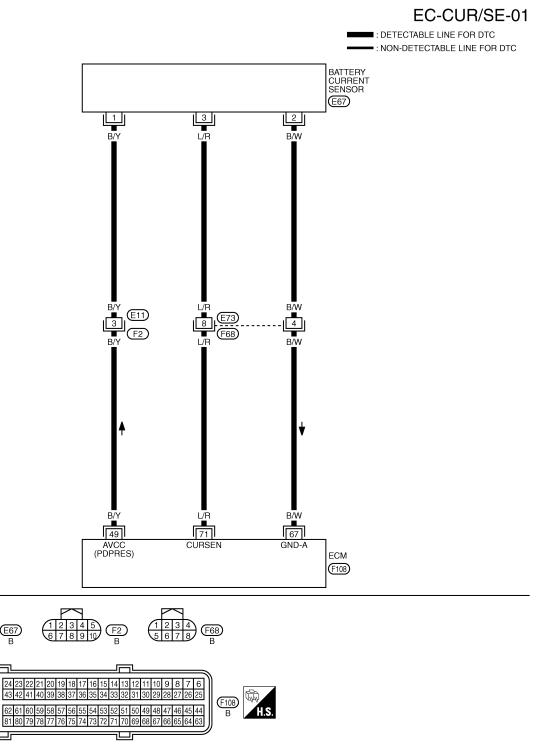
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EC-1165 Revision: 2009 June 2010 M35/M45

[VK45DE]

Wiring Diagram



TBWT1064E

Specification data are reference values and are measured between each terminal and ground.

## **CAUTION:**

Never 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.

< SERVICE INFORMATION >

[VK45DE]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	B/Y	Sensor power supply (Battery current sensor)	[Ignition switch: ON]	Approximately 5 V
67	B/W	Sensor ground (Battery current sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
71	L/R	Battery current sensor	[Engine is running] • Battery: Fully charged* • Idle speed	Approximately 2.6 - 3.5 V

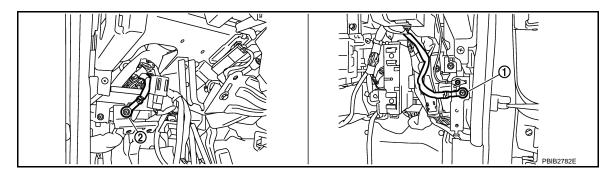
<sup>\*:</sup> Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to SC-4, "How to Handle Battery".

# Diagnosis Procedure

# 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

2. Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "<u>Ground Inspection</u>".



1. Body ground M70

2. Body ground M16

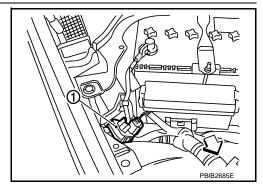
## OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

# 2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect battery current sensor (1) harness connector.
- Turn ignition switch ON.



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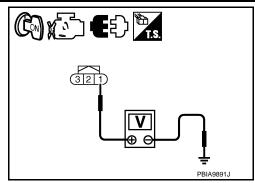
[VK45DE]

Check voltage between battery current sensor terminal 1 and ground with CONSULT-III or tester.

### **Voltage: Approximately 5 V**

### OK or NG

OK >> GO TO 4. NG >> GO TO 3.



# 3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E11, F2
- Harness for open or short between battery current sensor and ECM
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

# 4. CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check harness continuity between battery current sensor terminal 2 and ECM terminal 67. Refer to Wiring Diagram.

## Continuity should exist.

4. Also check harness for short to ground and short to power.

### OK or NG

OK >> GO TO 6. NG >> GO TO 5.

# 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E73, F68
- Harness for open or short between battery current sensor and ECM
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

## 6. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check harness continuity between battery current sensor terminal 3 and ECM terminal 71. Refer to Wiring Diagram.

### Continuity should exist.

2. Also check harness for short to ground and short to power.

### OK or NG

OK >> GO TO 8. NG >> GO TO 7.

# 7. DETECT MALFUNCTIONING PART

## Check the following.

- Harness connectors E73, F68
- Harness for open or short between battery current sensor and ECM
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

# 8. CHECK BATTERY CURRENT SENSOR

Refer to EC-1169, "Component Inspection".

Revision: 2009 June **EC-1168** 2010 M35/M45

< SERVICE INFORMATION > [VK45DE]

OK or NG

OK >> GO TO 9.

NG >> Replace battery negative cable assembly.

9. CHECK INTERMITTENT INCIDENT

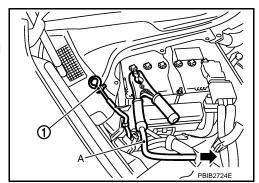
Refer to EC-822, "Diagnosis Procedure".

>> INSPECTION END

## Component Inspection

### BATTERY CURRENT SENSOR

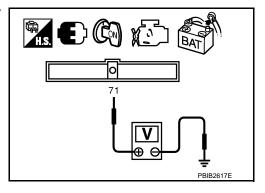
- 1. Reconnect harness connectors disconnected.
- 2. Disconnect battery negative cable (1).
  - **-**: To body ground
- Install jumper cable A between battery negative terminal and body ground.
- 4. Turn ignition switch ON.



Check voltage between ECM terminal 71 (battery current sensor signal) and ground.

## Voltage: Approximately 2.5 V

6. If NG, replace battery negative cable assembly.



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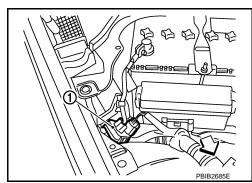
[VK45DE]

INFOID:0000000005354341

## DTC P1551, P1552 BATTERY CURRENT SENSOR

## Component Description

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor (1) is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to SC section.



• <: Vehicle front

#### **CAUTION:**

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then the battery discharge may occur.

### CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354342

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
BAT CUR SEN	<ul> <li>Engine speed: Idle</li> <li>Battery: Fully charged*</li> <li>Selector lever position: P or N</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	Approx. 2,600 - 3,500 mV

<sup>\*:</sup> Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to SC-4, "How to Handle Battery".

# On Board Diagnosis Logic

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The MIL will not illuminate for thes diagnoses.

NOTE:

If DTC P1551 or P1552 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1121, "DTC Confirmation Procedure".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1551 1551	Battery current sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors     (The sensor circuit is open or shorted.
P1552 1552	Battery current sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Battery current sensor

### **DTC Confirmation Procedure**

INFOID:0000000005354344

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

## **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 8 V with ignition switch ON

- Turn ignition switch ON and wait at least 10 seconds.
- Check 1st trip DTC.

< SERVICE INFORMATION >

[VK45DE]

TBWT1064E

3. If 1st trip DTC is detected, go to EC-1172, "Diagnosis Procedure".

Α Wiring Diagram INFOID:0000000005354345 EC-CUR/SE-01 ■: DETECTABLE LINE FOR DTC EC : NON-DETECTABLE LINE FOR DTC BATTERY CURRENT SENSOR **E**67 D Е F Н K 49 71 67 AVCC (PDPRES) ECM (F108) 3 2 1 E67 B M Ν 0 Р

Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

### < SERVICE INFORMATION >

[VK45DE]

Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	В/Ү	Sensor power supply (Battery current sensor)	[Ignition switch: ON]	Approximately 5 V
67	B/W	Sensor ground (Battery current sensor)	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Approximately 0 V
71	L/R	Battery current sensor	[Engine is running] • Battery: Fully charged* • Idle speed	Approximately 2.6 - 3.5 V

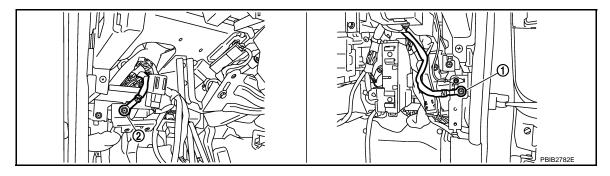
<sup>\*:</sup> Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to SC-4, "How to Handle Battery".

# Diagnosis Procedure

INFOID:0000000005354346

# 1. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".



1. Body ground M70

2. Body ground M16

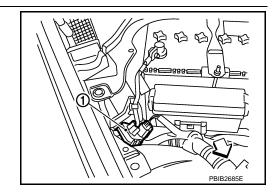
#### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

# 2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect battery current sensor (1) harness connector.
- 2. Turn ignition switch ON.



### < SERVICE INFORMATION >

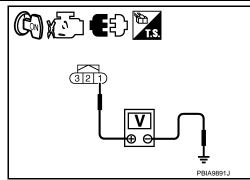
[VK45DE]

Check voltage between battery current sensor terminal 1 and ground with CONSULT-III or tester.

## Voltage: Approximately 5 V

### OK or NG

OK >> GO TO 4. NG >> GO TO 3.



# 3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E11, F2
- Harness for open or short between battery current sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

## f 4.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check harness continuity between battery current sensor terminal 2 and ECM terminal 67. Refer to Wiring Diagram.

### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 6. NG >> GO TO 5.

# ${f 5.}$ DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E73, F68
- Harness for open or short between battery current sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

# $oldsymbol{6}$ .CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check harness continuity between battery current sensor terminal 3 and ECM terminal 71. Refer to Wiring Diagram.

### Continuity should exist.

2. Also check harness for short to ground and short to power.

### OK or NG

OK >> GO TO 8. NG >> GO TO 7.

## 7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E73, F68
- Harness for open or short between battery current sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 8.CHECK BATTERY CURRENT SENSOR

Refer to EC-1174, "Component Inspection".

EC-1173 Revision: 2009 June 2010 M35/M45

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### OK or NG

OK >> GO TO 9.

NG >> Replace battery negative cable assembly.

# 9. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

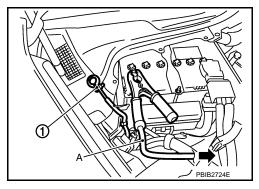
### >> INSPECTION END

## Component Inspection

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### BATTERY CURRENT SENSOR

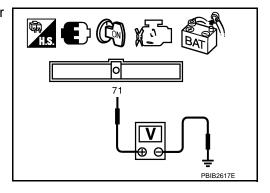
- 1. Reconnect harness connectors disconnected.
- 2. Disconnect battery negative cable (1).
  - ←: To body ground
- 3. Install jumper cable A between battery negative terminal and body ground.
- 4. Turn ignition switch ON.



Check voltage between ECM terminal 71 (battery current sensor signal) and ground.

## **Voltage: Approximately 2.5 V**

6. If NG, replace battery negative cable assembly.



[VK45DE]

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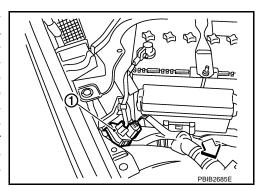
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# DTC P1553 BATTERY CURRENT SENSOR

# Component Description

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor (1) is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to SC section.



• <=: Vehicle front

#### **CAUTION:**

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then the battery discharge may occur.

## CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM CONDITION		SPECIFICATION
BAT CUR SEN	<ul> <li>Engine speed: Idle</li> <li>Battery: Fully charged*</li> <li>Selector lever position: P or N</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	Approx. 2,600 - 3,500 mV

<sup>\*:</sup> Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to SC-4, "How to Handle Battery".

# On Board Diagnosis Logic

The MIL will not illuminate for this diagnosis.

NOTE:

If DTC P1553 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1121, "DTC Confirmation Procedure".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1553 1553	Battery current sensor performance	The signal voltage transmitted from the sensor to ECM is higher than the amount of the maximum power generation.	Harness or connectors     (The sensor circuit is open or shorted.)     Battery current sensor

### **DTC Confirmation Procedure**

NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON. 2.
- Turn ignition switch OFF and wait at least 10 seconds.

### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

- Start engine and wait at least 10 seconds.
- 2. Check 1st trip DTC.
- If 1st trip DTC is detected, go to EC-1177, "Diagnosis Procedure".

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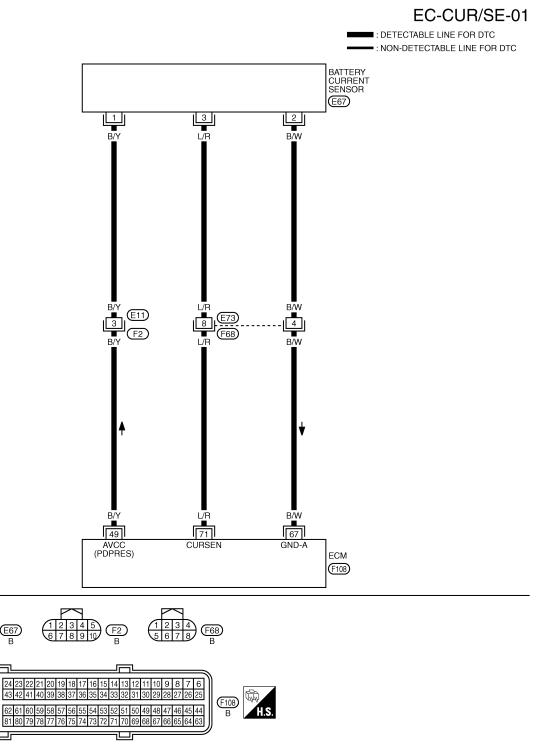
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[VK45DE]

Wiring Diagram



TBWT1064E

Specification data are reference values and are measured between each terminal and ground.

## **CAUTION:**

Never 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.

< SERVICE INFORMATION >

[VK45DE]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	B/Y	Sensor power supply (Battery current sensor)	[Ignition switch: ON]	Approximately 5 V
67	B/W	Sensor ground (Battery current sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
71	L/R	Battery current sensor	[Engine is running]  • Battery: Fully charged*  • Idle speed	Approximately 2.6 - 3.5 V

<sup>\*:</sup> Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to SC-4, "How to Handle Battery".

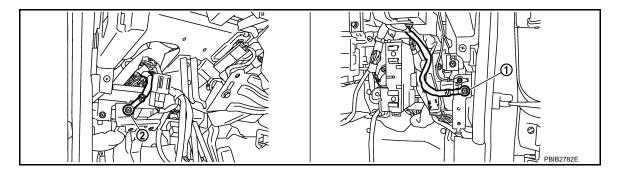
# Diagnosis Procedure

INFOID:0000000005354353

# 1. CHECK GROUND CONNECTIONS

Turn ignition switch OFF.

Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

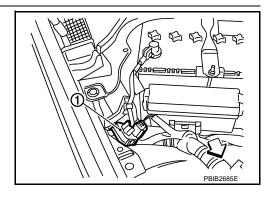
## OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

# 2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

- Disconnect battery current sensor (1) harness connector.
- Turn ignition switch ON.



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#### < SERVICE INFORMATION >

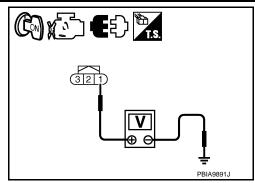
[VK45DE]

Check voltage between battery current sensor terminal 1 and ground with CONSULT-III or tester.

### **Voltage: Approximately 5 V**

### OK or NG

OK >> GO TO 4. NG >> GO TO 3.



# 3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E11, F2
- Harness for open or short between battery current sensor and ECM
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

# 4. CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check harness continuity between battery current sensor terminal 2 and ECM terminal 67. Refer to Wiring Diagram.

### Continuity should exist.

4. Also check harness for short to ground and short to power.

### OK or NG

OK >> GO TO 6. NG >> GO TO 5.

# 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E73, F68
- Harness for open or short between battery current sensor and ECM
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

# 6. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check harness continuity between battery current sensor terminal 3 and ECM terminal 71. Refer to Wiring Diagram.

### Continuity should exist.

2. Also check harness for short to ground and short to power.

### OK or NG

OK >> GO TO 8. NG >> GO TO 7.

# 7. DETECT MALFUNCTIONING PART

## Check the following.

- Harness connectors E73, F68
- Harness for open or short between battery current sensor and ECM
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

# 8. CHECK BATTERY CURRENT SENSOR

Refer to EC-1179, "Component Inspection".

< SERVICE INFORMATION > [VK45DE]

### OK or NG

OK >> GO TO 9.

NG >> Replace battery negative cable assembly.

# 9. CHECK INTERMITTENT INCIDENT

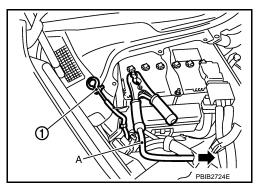
Refer to EC-822, "Diagnosis Procedure".

# >> INSPECTION END

## Component Inspection

### BATTERY CURRENT SENSOR

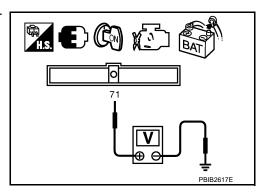
- 1. Reconnect harness connectors disconnected.
- 2. Disconnect battery negative cable (1).
  - **-**: To body ground
- Install jumper cable A between battery negative terminal and body ground.
- 4. Turn ignition switch ON.



Check voltage between ECM terminal 71 (battery current sensor signal) and ground.

## Voltage: Approximately 2.5 V

If NG, replace battery negative cable assembly.



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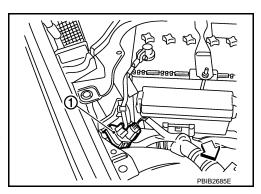
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INFOID:0000000005354355

## DTC P1554 BATTERY CURRENT SENSOR

## Component Description

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor (1) is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to SC section.



• <=: Vehicle front

#### **CAUTION:**

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then the battery discharge may occur.

### CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354356

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
BAT CUR SEN	<ul> <li>Engine speed: Idle</li> <li>Battery: Fully charged*</li> <li>Selector lever position: P or N</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	Approx. 2,600 - 3,500 mV

<sup>\*:</sup> Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to SC-4, "How to Handle Battery".

## On Board Diagnosis Logic

INFOID:0000000005354357

The MIL will not illuminate for this diagnosis. NOTE:

If DTC P1554 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1121, "DTC Confirmation Procedure".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1554 1554	Battery current sensor performance	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.	(The sensor circuit is open or shorted.)

### **Overall Function Check**

INFOID:0000000005354358

Use this procedure to check the overall function of the battery current sensor circuit. During this check, a 1st trip DTC might not be confirmed.

### **TESTING CONDITION:**

- Before performing the following procedure, confirm that battery voltage is more than 12.8 V at idle.
- Before performing the following procedure, confirm that all load switches and A/C switch are turned OFF.

#### (A) WITH CONSULT-III

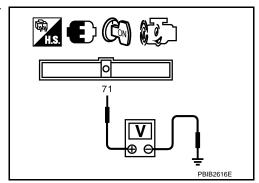
- 1. Start engine and let it idle.
- 2. Select "BAT CUR SEN" in "DATA MONITOR" mode with CONSULT-III.
- Check "BAT CUR SEN" indication for 10 seconds.
   "BAT CUR SEN" indication should be above 2,300 mV at least once.

< SERVICE INFORMATION > [VK45DE]

4. If NG, go to EC-1183, "Diagnosis Procedure".

### **WITH GST**

- 1. Start engine and let it idle.
- 2. Check voltage between ECM terminal 71 (battery current sensor signal) and ground for 10 seconds.
  - The voltage should be above 2.3 V at least once.
- 3. If NG, go to EC-1183, "Diagnosis Procedure".



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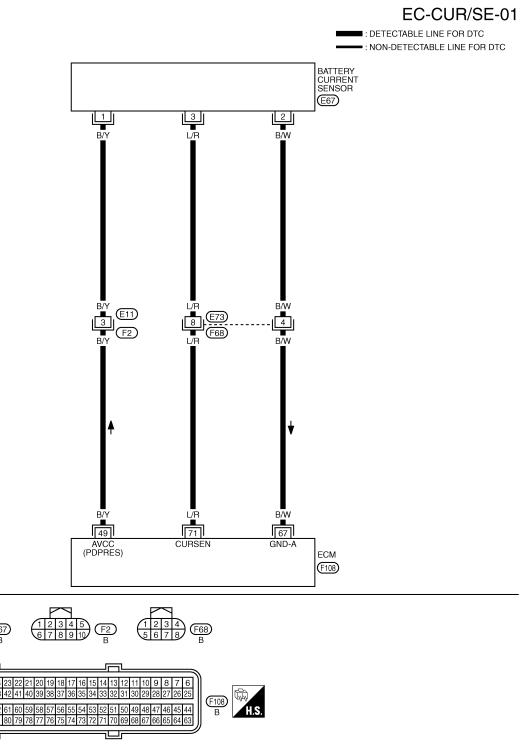
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[VK45DE]

Wiring Diagram



TBWT1064E

Specification data are reference values and are measured between each terminal and ground.

## **CAUTION:**

Never 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.

< SERVICE INFORMATION >

[VK45DE]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	B/Y	Sensor power supply (Battery current sensor)	[Ignition switch: ON]	Approximately 5 V
67	B/W	Sensor ground (Battery current sensor)	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Approximately 0 V
71	L/R	Battery current sensor	[Engine is running] • Battery: Fully charged* • Idle speed	Approximately 2.6 - 3.5 V

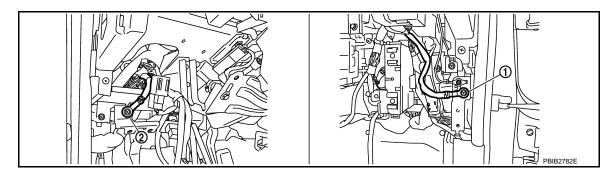
<sup>\*:</sup> Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to SC-4, "How to Handle Battery".

# Diagnosis Procedure

# 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

2. Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".



1. Body ground M70

2. Body ground M16

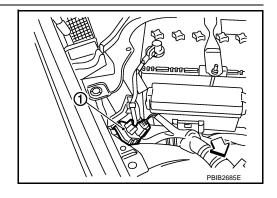
## OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

# 2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect battery current sensor (1) harness connector.
- 2. Turn ignition switch ON.



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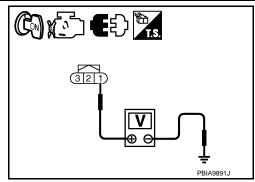
[VK45DE]

Check voltage between battery current sensor terminal 1 and ground with CONSULT-III or tester.

### **Voltage: Approximately 5 V**

### OK or NG

OK >> GO TO 4. NG >> GO TO 3.



# 3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E11, F2
- Harness for open or short between battery current sensor and ECM
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

# 4. CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check harness continuity between battery current sensor terminal 2 and ECM terminal 67. Refer to Wiring Diagram.

### Continuity should exist.

4. Also check harness for short to ground and short to power.

### OK or NG

OK >> GO TO 6. NG >> GO TO 5.

# 5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E73, F68
- Harness for open or short between battery current sensor and ECM
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

## 6. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check harness continuity between battery current sensor terminal 3 and ECM terminal 71. Refer to Wiring Diagram.

### Continuity should exist.

2. Also check harness for short to ground and short to power.

### OK or NG

OK >> GO TO 8. NG >> GO TO 7.

# 7. DETECT MALFUNCTIONING PART

## Check the following.

- Harness connectors E73, F68
- Harness for open or short between battery current sensor and ECM
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

# 8. CHECK BATTERY CURRENT SENSOR

Refer to EC-1185, "Component Inspection".

< SERVICE INFORMATION > [VK45DE]

### OK or NG

OK >> GO TO 9.

NG >> Replace battery negative cable assembly.

# 9. CHECK INTERMITTENT INCIDENT

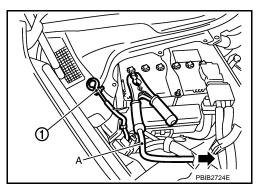
Refer to EC-822, "Diagnosis Procedure".

# >> INSPECTION END

## Component Inspection

### BATTERY CURRENT SENSOR

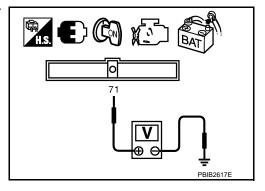
- 1. Reconnect harness connectors disconnected.
- 2. Disconnect battery negative cable (1).
  - **-**: To body ground
- Install jumper cable A between battery negative terminal and body ground.
- 4. Turn ignition switch ON.



Check voltage between ECM terminal 71 (battery current sensor signal) and ground.

## Voltage: Approximately 2.5 V

6. If NG, replace battery negative cable assembly.



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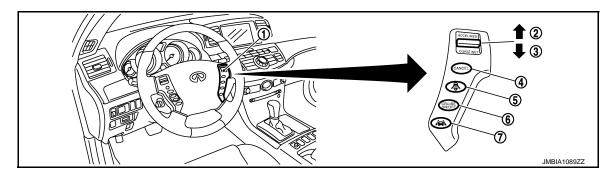
## DTC P1564 ICC STEERING SWITCH

## Component Description

INFOID:0000000005354362

ICC steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.

Refer to ACS-9, "Outline" for the ICC function.



- 1. ASCD steering switch
- 4. CANCEL switch
- CANCEL SWITCH
   LDP ON switch

- 2. RESUME/ACCELERATE switch
- 5. DISTANCE switch
- 3. SET/COAST switch
- 6. MAIN switch

## CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354363

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN SW	- Inviting position ON	MAIN switch: Pressed	ON
IVIAIN SVV	Ignition switch: ON	MAIN switch: Released	OFF
CANCEL CW	- Impition quitable ON	CANCEL switch: Pressed	ON
CANCEL SW	Ignition switch: ON	CANCEL switch: Released	OFF
DECLIME/ACC CW	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
RESUME/ACC SW		RESUME/ACCELERATE switch: Released	OFF
SET SW	a logition quitable ON	SET/COAST switch: Pressed	ON
SEISW	Ignition switch: ON	SET/COAST switch: Released	OFF
DICT CW	- Ignition quitable ON	DISTANCE switch: Pressed	ON
DIST SW	Ignition switch: ON	DISTANCE switch: Released	OFF

# On Board Diagnosis Logic

INFOID:0000000005354364

This self-diagnosis has the one trip detection logic.

The MIL will not illuminate for this diagnosis.

NOTE:

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-1118, "DTC Confirmation Procedure"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1564 1564	ICC steering switch	<ul> <li>An excessively high voltage signal from the ICC steering switch is sent to ECM.</li> <li>ECM detects that input signal from the ICC steering switch is out of the specified range.</li> <li>ECM detects that the ICC steering switch is stuck ON.</li> </ul>	Harness or connectors     (The switch circuit is open or shorted.)     ICC steering switch     ECM

## DTC P1564 ICC STEERING SWITCH

### < SERVICE INFORMATION >

[VK45DE]

## **DTC Confirmation Procedure**

INFOID:0000000005354365

- 1. If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON. b.
- Turn ignition switch OFF and wait at least 10 seconds. C.
- 2. Turn ignition switch ON and wait at least 10 seconds.
- Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 6. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 7. Press DISTANCE switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press LDP ON switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 9. Check DTC.
- 10. If DTC is detected, go to EC-1189, "Diagnosis Procedure".

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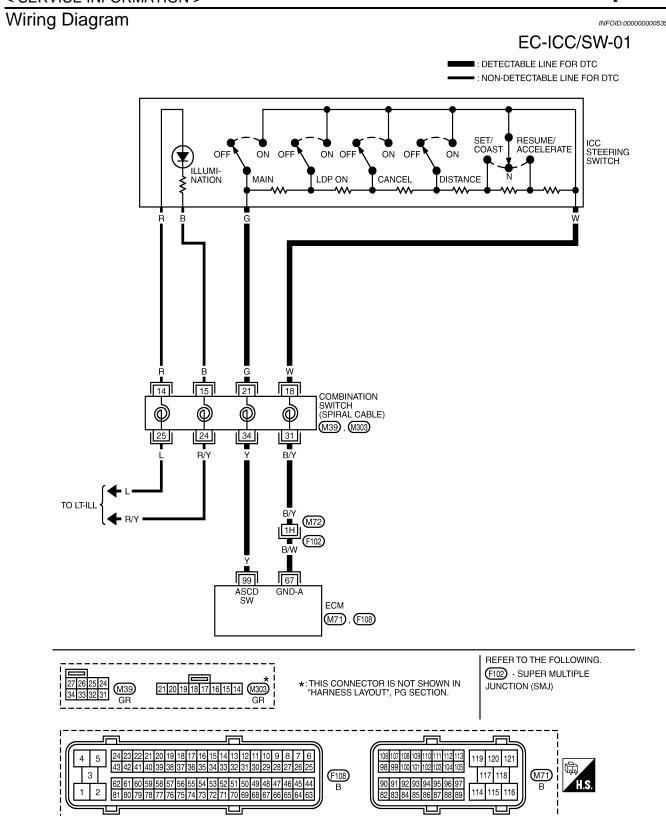
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Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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 P1564 ICC STEERING SWITCH

# < SERVICE INFORMATION >

[VK45DE]

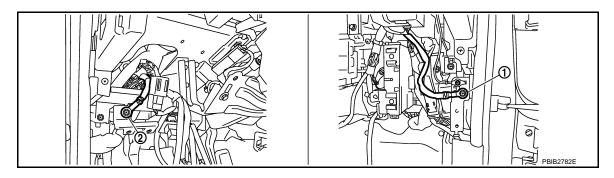
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
67	B/W	Sensor ground (ICC steering switch)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
			[Ignition switch: ON] • ICC steering switch: OFF	Approximately 4.3 V
99		Y ICC steering switch	[Ignition switch: ON] • MAIN switch: Pressed	Approximately 0 V
			[Ignition switch: ON] • CANCEL switch: Pressed	Approximately 1.9 V
	Υ		[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	Approximately 3.8 V
			[Ignition switch: ON] • SET/COAST switch: Pressed	Approximately 3.3 V
			[Ignition switch: ON] • DISTANCE switch: Pressed	Approximately 2.6 V
			[Ignition switch: ON] • LDP ON switch: Pressed	Approximately 1.1 V

# Diagnosis Procedure

# 1. CHECK GROUND CONNECTIONS

Turn ignition switch OFF.

Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

# OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

# 2. CHECK ICC STEERING SWITCH CIRCUIT

1. Turn ignition switch ON.

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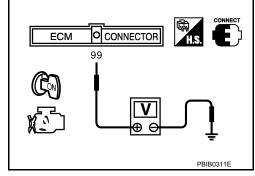
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#### < SERVICE INFORMATION >

Check voltage between ECM terminal 99 and ground with pressing each button.

Switch	Condition	Voltage (V)
MAIN switch	Pressed	Approx. 0
WAIN SWILOIT	Released	Approx. 4.3
CANCEL switch	Pressed	Approx. 1.9
CANCLE SWILCH	Released	Approx. 4.3
RESUME/ACCELERATE	Pressed	Approx. 3.8
switch	Released	Approx. 4.3
SET/COAST switch	Pressed	Approx. 3.3
SET/COAST SWITCH	Released	Approx. 4.3
DISTANCE switch	Pressed	Approx. 2.6
DISTANCE SWILCH	Released	Approx. 4.3
LDP ON switch	Pressed	Approx. 1.1
LDF ON SWILLI	Released	Approx. 4.3



#### OK or NG

OK >> GO TO 8. NG >> GO TO 3.

# 3.check icc steering switch ground circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Disconnect combination switch harness connector M303.
- Check harness continuity between combination switch terminal 18 and ECM terminal 67. Refer to Wiring Diagram.

#### Continuity should exist.

5. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 5. NG >> GO TO 4.

# 4. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors M72, F102
- 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.

# 5. CHECK ICC STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check harness continuity between ECM terminal 99 and combination switch terminal 21. Refer to Wiring Diagram.

#### Continuity should exist.

2. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 7. NG >> GO TO 6.

# 6. DETECT MALFUNCTIONING PART

Check the following.

# DTC P1564 ICC STEERING SWITCH

# < SERVICE INFORMATION >

- 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 ICC STEERING SWITCH

Refer to EC-1191, "Component Inspection".

#### OK or NG

OK >> GO TO 8.

NG >> Replace ICC steering switch.

# 8. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

# Component Inspection

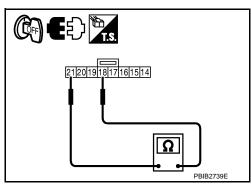
# ICC STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector M303.

 Check continuity between combination switch terminals 18 and 21 with pushing each switch.

Switch	Condition	Resistance (Ω)
MAIN switch	Pressed	Approx. 0
WAIN SWILCH	Released	Approx. 5,410
CANCEL switch	Pressed	Approx. 610
CANCEL SWILLI	Released	Approx. 5,410
RESUME/ACCELERATE	Pressed	Approx. 3,000
switch	Released	Approx. 5,410
SET/COAST switch	Pressed	Approx. 1,800
SET/COAST SWIICH	Released	Approx. 5,410
DISTANCE switch	Pressed	Approx. 1090
DISTANCE SWILLI	Released	Approx. 5,410
LDP ON switch	Pressed	Approx. 270
LDF ON SWILCH	Released	Approx. 5,410

If NG, replace ICC steering switch.



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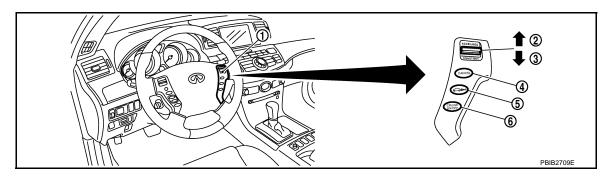
INFOID:0000000005354369

# DTC P1564 ASCD STEERING SWITCH

# Component 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-717, "System Description" for the ASCD function.



- 1. ASCD steering switch
- 2. RESUME/ACCELERATE switch
- 3. SET/COAST switch

4. CANCEL switch

5. DISTANCE switch (Models with ICC) 6. MAIN switch

# CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354370

Specification data are reference values.

MONITOR ITEM		CONDITION	SPECIFICATION
MAIN SW	• Ignition quitable ON	MAIN switch: Pressed	ON
IVIAIN SVV	Ignition switch: ON	MAIN switch: Released	OFF
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	ON
CANCEL SW	• Ignition switch. ON	CANCEL switch: Released	OFF
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
RESUME/ACC SW		RESUME/ACCELERATE switch: Released	OFF
SFT SW	Ignition switch: ON	SET/COAST switch: Pressed	ON
JL I JVV	19 Igrillion Switch. ON	SET/COAST switch: Released	OFF

# On Board Diagnosis Logic

INFOID:0000000005354371

This self-diagnosis has the one trip detection logic.

The MIL will not illuminate for this diagnosis.

NOTE:

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1118, "DTC Confirmation Procedure".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1564 1564	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>	Harness or connectors     (The switch circuit is open or shorted.)     ASCD steering switch     ECM

# **DTC Confirmation Procedure**

INFOID:0000000005354372

- If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
- Turn ignition switch OFF and wait at least 10 seconds.

# **DTC P1564 ASCD STEERING SWITCH**

< SERVICE INFORMATION > [VK45DE]

- b. Turn ignition switch ON.
- c. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON and wait at least 10 seconds.
- 3. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 4. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 5. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 6. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 7. Check DTC.
- 8. If DTC is detected, go to EC-1195, "Diagnosis Procedure".

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< SERVICE INFORMATION > Wiring Diagram INFOID:0000000005354373 EC-ASC/SW-01 : DETECTABLE LINE FOR DTC : NON-DETECTABLE LINE FOR DTC SET/ COAST RESUME/ ACCELERATE ASCD STEERING SWITCH ON ON OF ILLUMI-CANCEL MAIN NATION COMBINATION SWITCH (SPIRAL CABLE) (M39), (M303) TO LT-ILL 99 67 ASCD SW GND-A ECM M71), (F108) REFER TO THE FOLLOWING. (F102) - SUPER MULTIPLE \*: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT", PG SECTION. JUNCTION (SMJ) (M303) GR 120 121

Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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.

(F108)

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M71)

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# DTC P1564 ASCD STEERING SWITCH

#### < SERVICE INFORMATION >

[VK45DE	
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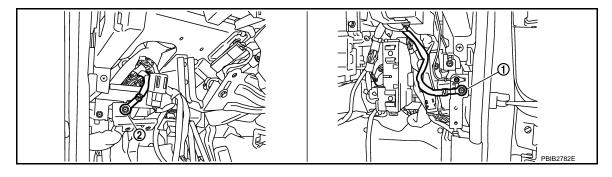
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	
67	B/W	Sensor ground (ASCD steering switch)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V	
99	Y	Y ASCD steering switch	[Ignition switch: ON]  • ASCD steering switch:	[Ignition switch: ON] • ASCD steering switch: OFF	Approximately 4 V
			[Ignition switch: ON] • MAIN switch: Pressed	Approximately 0 V	
			[Ignition switch: ON] • CANCEL switch: Pressed	Approximately 1 V	
			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	Approximately 3 V	
			[Ignition switch: ON] • SET/COAST switch: Pressed	Approximately 2 V	

# Diagnosis Procedure

INFOID:0000000005354374

# 1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

# OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

# 2.CHECK ASCD STEERING SWITCH CIRCUIT

# (P) With CONSULT-III

- Turn ignition switch ON.
- Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW" and "SET SW" in "DATA MONITOR" mode with CONSULT-III.
- Check each item indication under the following conditions.

Switch	Monitor item	Condition	Indication
MAIN switch	MAIN SW	Pressed	ON
WAIN SWILCH	WAIN SW	Released	OFF
CANCEL switch	CANCEL SW	Pressed	ON
CANOLL SWILLI	OANOLL SW	Released	OFF

EC-1195 Revision: 2009 June 2010 M35/M45

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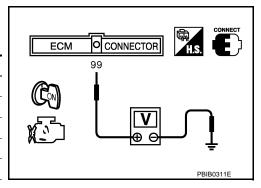
# < SERVICE INFORMATION >

Switch	Monitor item	Condition	Indication
RESUME/ACCELERATE	CELERATE RESUME/ACC SW		ON
switch	RESONE/ACC SW	Released	OFF
SET/COAST switch	SET SW	Pressed	ON
SE1700AS1 SWIGH	OLI OW	Released	OFF

#### (X) Without CONSULT-III

- 1. Turn ignition switch ON.
- 2. Check voltage between ECM terminal 99 and ground with pressing each button.

Switch	Condition	Voltage (V)
MAIN switch	Pressed	Approx. 0
WAIN SWILCH	Released	Approx. 4
CANCEL switch	Pressed	Approx. 1
CANCEL SWILCH	Released	Approx. 4
RESUME/ACCELERATE	Pressed	Approx. 3
switch	Released	Approx. 4
SET/COAST switch	Pressed	Approx. 2
3L1/COA31 SWILCH	Released	Approx. 4



#### OK or NG

OK >> GO TO 8. NG >> GO TO 3.

# ${f 3.}$ 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 M303.
- Check harness continuity between combination switch terminal 18 and ECM terminal 67. Refer to Wiring Diagram.

#### Continuity should exist.

5. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 5. NG >> GO TO 4.

# 4. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors M72, F102
- 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.

# 5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check harness continuity between ECM terminal 99 and combination switch terminal 21. Refer to Wiring Diagram.

#### Continuity should exist.

Also check harness for short to ground and short to power.

#### OK or NG

# **DTC P1564 ASCD STEERING SWITCH**

# < SERVICE INFORMATION > [VK45DE]

OK >> GO TO 7. NG >> GO TO 6.

# 6. DETECT MALFUNCTIONING PART

Check the following.

- · Combination switch (spiral cable)
- · Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

# 7. CHECK ASCD STEERING SWITCH

Refer to EC-1197, "Component Inspection".

#### OK or NG

OK >> GO TO 8.

NG >> Replace ASCD steering switch.

# 8. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

# >> INSPECTION END

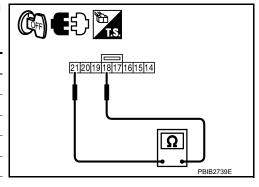
# Component Inspection

Disconnect combination switch (spiral cable) harness connector M303.

# ASCD STEERING SWITCH

Check continuity between combination switch terminals 18 and 21 with pushing each switch.

Switch	Condition	Resistance (Ω)
		,
MAIN switch	Pressed	Approx. 0
W/ W OWNO	Released	Approx. 4,000
CANCEL switch	Pressed	Approx. 250
CANOLL SWITCH	Released	Approx. 4,000
RESUME/ACCELERATE	Pressed	Approx. 1,480
switch	Released	Approx. 4,000
SET/COAST switch	Pressed	Approx. 660
3L1/COAS1 SWILLI	Released	Approx. 4,000



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Revision: 2009 June **EC-1197** 2010 M35/M45

# DTC P1568 ICC FUNCTION

# On Board Diagnosis Logic

INFOID:0000000005354376

This self-diagnosis has the one trip detection logic.

The MIL will not illuminate for this diagnosis.

#### NOTE:

- If DTC P1568 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1568 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1118, "DTC Confirmation Procedure".
- If DTC P1568 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-1120</u>, "<u>DTC Confirmation Procedure"</u>.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1568 1568	ICC function	ECM detects a difference between signals from ICC unit is out of specified range.	Harness or connectors     (The CAN communication line is open or shorted.)     ICC sensor integrated unit     ECM

# **DTC Confirmation Procedure**

INFOID:0000000005354377

#### **CAUTION:**

Always drive vehicle at a safe speed.

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Step 3 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.

- Start engine (VDC switch OFF).
- 2. Press MAIN switch on ICC steering switch.
- 3. Drive the vehicle at more than 40 km/h (25 MPH).
- 4. Press SET/COAST switch.
- Check DTC.
- If DTC is detected, go to <u>EC-1198</u>, "<u>Diagnosis Procedure</u>".

# Diagnosis Procedure

INFOID:0000000005354378

# 1. REPLACE ICC SENSOR INTEGRATED UNIT

- Replace ICC sensor integrated unit.
- 2. Perform ACS-14, "ICC System Running Test".
- Check DTC of ICC sensor integrated unit. Refer to ACS-40, "Diagnostic Trouble Code (DTC) Chart".

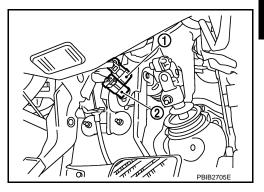
#### >> INSPECTION END

INFOID:0000000005354379

# DTC P1572 ICC BRAKE SWITCH

# Component Description

When the brake pedal is depressed, ICC brake switch (2) is turned OFF and stop lamp switch (1) is turned ON. ECM detects the state of the brake pedal by two kinds of input (ON/OFF signal). Refer to ACS-9, "Outline" for the ICC function.



# CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1	Ignition switch: ON	Brake pedal: Fully released	ON
(ICC brake switch)		Brake pedal: Slightly depressed	OFF
BRAKE SW2	Ignition switch: ON	Brake pedal: Fully released	OFF
(Stop lamp switch)	- Igililion switch. ON	Brake pedal: Slightly depressed	ON

# On Board Diagnosis Logic

This diagnosis has the one trip detection logic.

The MIL will not illuminate for this diagnosis.

# NOTE:

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1118, "DTC Confirmation Procedure".
- This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch is turned OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1572 1572	ICC brake switch	A)	When the vehicle speed is above 30 km/h (19MPH), ON signals from the stop lamp switch and the ICC brake switch are sent to ECM at the same time.	Harness or connectors     (The stop lamp switch circuit is shorted.     Harness or connectors     (The ICC brake switch circuit is shorted.)
		B)	ICC brake switch signal is not sent to ECM for extremely long time while the vehicle is being driven.	Stop lamp switch     ICC brake switch     ICC brake hold relay     Incorrect stop lamp switch installation     Incorrect ICC brake switch installation     ECM

# **DTC Confirmation Procedure**

INFOID:0000000005354382

#### **CAUTION:**

Always drive vehicle at a safe speed.

- 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.
- If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

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# **DTC P1572 ICC BRAKE SWITCH**

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[VK45DE]

- Turn ignition 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:**

Steps 3 to 6 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.

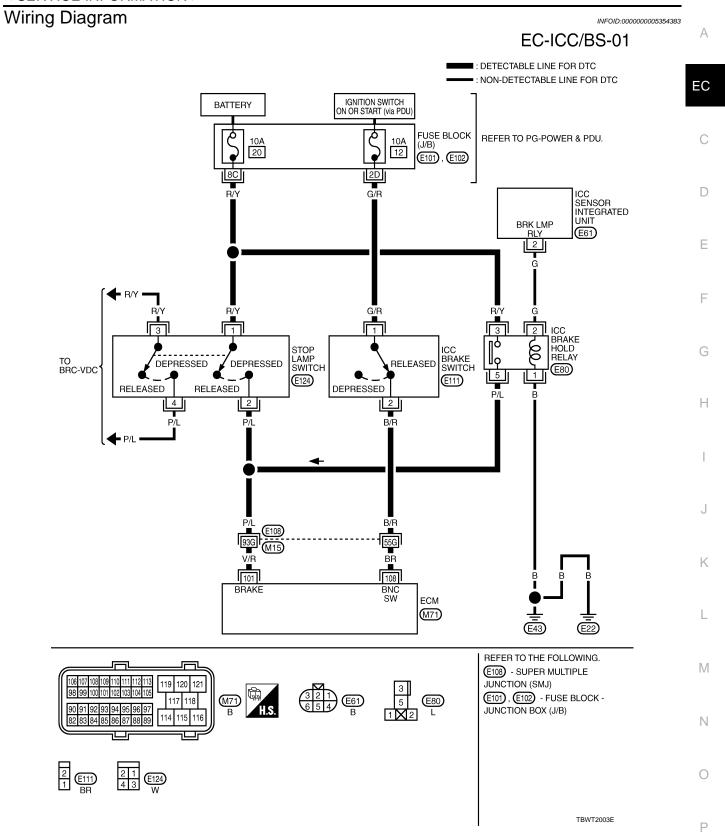
- 1. Start engine (VDC switch OFF).
- 2. Press MAIN switch and check that CRUISE lamp illuminates.
- 3. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

Vehicle speed	More than 30 km/h (19 MPH)
Selector lever	Suitable position

- 4. Check 1st trip DTC.
- 5. If 1st trip DTC is detected, go to <u>EC-1202</u>, "<u>Diagnosis Procedure</u>". If 1st trip DTC is not detected, go to the following step.
- 6. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

Vehicle speed	More than 30 km/h (19 MPH)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than 5 seconds so as not to come off from the above-mentioned vehicle speed.

- 7. Check 1st trip DTC.
- If 1st trip DTC is detected, go to <u>EC-1202, "Diagnosis Procedure"</u>.



Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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.

#### < SERVICE INFORMATION >

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	V/R	Stan Jama switch	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0 V
101	101 V/R Stop lamp switch	Stop ramp switch	[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)
108	BR	ICC brake switch	[Ignition switch: ON] • Brake pedal: Slightly depressed	Approximately 0 V
100 BK	ICC DIAKE SWITCH	[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)	

# Diagnosis Procedure

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# 1. CHECK OVERALL FUNCTION-I

# (I) With CONSULT-III

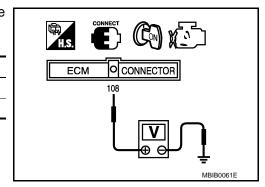
- 1. Turn ignition switch ON.
- 2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "BRAKE SW1" indication under the following conditions.

CONDITION	INDICATION
Brake pedal: Fully released	ON
Brake pedal: Slightly depressed	OFF

# **⊗** Without CONSULT-III

- 1. Turn ignition switch ON.
- Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Battery voltage
Brake pedal: Slightly depressed	Approximately 0 V



# OK or NG

OK >> GO TO 2. NG >> GO TO 3.

# 2. CHECK OVERALL FUNCTION-II

# (P) With CONSULT-III

Check "BRAKE SW2" indication in "DATA MONITOR" mode.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

# **⊗** Without CONSULT-III

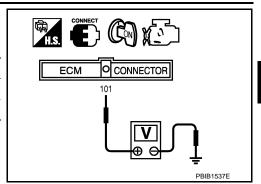
# DTC P1572 ICC BRAKE SWITCH

# < SERVICE INFORMATION >

[VK45DE]

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0 V
Brake pedal: Slightly depressed	Battery voltage

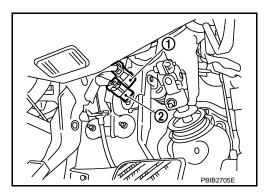


#### OK or NG

OK >> GO TO 15. NG >> GO TO 8.

# 3.CHECK ICC BRAKE SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ICC brake switch (2) harness connector.
- Stop lamp switch (1)
- 3. Turn ignition switch ON.

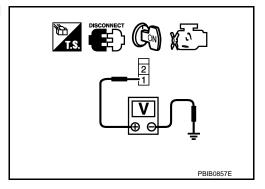


4. Check voltage between ICC brake switch terminal 1 and ground with CONSULT-III or tester.

# **Voltage: Battery voltage**

#### OK or NG

OK >> GO TO 5. NG >> GO TO 4.



# 4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E102
- 10 A fuse
- · Harness for open or short between ICC brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

# ${f 5.}$ CHECK ICC BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check harness continuity between ICC brake switch terminal 2 and ECM terminal 108. Refer Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

# OK or NG

OK >> GO TO 7. NG >> GO TO 6.

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# 6. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E108, M15
- · Harness for open or short between ICC brake switch and ECM
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

# 7. CHECK ICC BRAKE SWITCH

Refer to EC-1206, "Component Inspection".

#### OK or NG

OK >> GO TO 15.

NG >> Replace ICC brake switch.

# 8. CHECK DTC WITH ICC SENSOR INTEGRATED UNIT

Refer to ACS-35, "Self-Diagnostic Function".

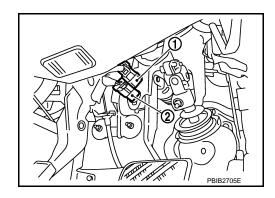
# OK or NG

OK >> GO TO 9.

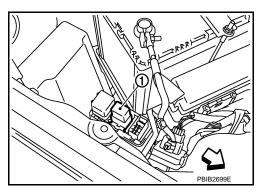
NG >> Repair or replace malfunctioning part.

# 9. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch (1) harness connector.
- ICC brake switch (2)

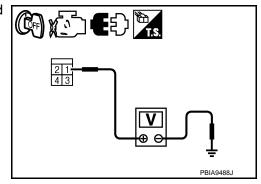


- 3. Disconnect ICC brake hold relay (1) harness connector.
- <□: Vehicle front</li>



 Check voltage between stop lamp switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage



# DTC P1572 ICC BRAKE SWITCH

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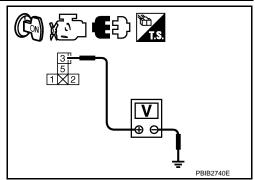
[VK45DE]

Check voltage between ICC brake hold relay terminal 3 and ground with CONSULT-III or tester.

# Voltage: Battery voltage

# OK or NG

OK >> GO TO 11. NG >> GO TO 10.



# 10. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E101
- 10 A fuse
- · Harness for open or short between battery and stop lamp switch
- Harness for open or short between battery and ICC brake hold relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

# 11. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Disconnect ECM harness connector.
- Check harness continuity between the following; ECM terminal 101 and stop lamp switch terminal 2, ECM terminal 101 and ICC brake hold relay terminal 5. Refer to Wiring Diagram.

# Continuity should exist.

3. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 13. NG >> GO TO 12.

# 12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and stop lamp switch
- Harness for open or short between ECM and ICC brake hold relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

EC-1205

# 13. CHECK STOP LAMP SWITCH

Refer to EC-1206, "Component Inspection".

# OK or NG

OK >> GO TO 14.

NG >> Replace stop lamp switch.

# 14. CHECK ICC BRAKE HOLD RELAY

Refer to EC-1206, "Component Inspection".

OK >> GO TO 15.

NG >> Replace ICC brake hold relay.

# 15. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

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#### >> INSPECTION END

# Component Inspection

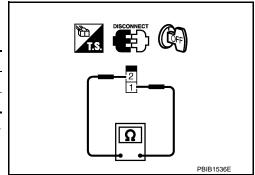
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#### ICC BRAKE SWITCH

- 1. Turn ignition switch OFF.
- Disconnect ICC brake switch harness connector.
- 3. Check continuity between ICC brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

 If NG, adjust ICC brake switch installation, refer to <u>BR-6</u>. "Inspection and Adjustment", and perform step 3 again.

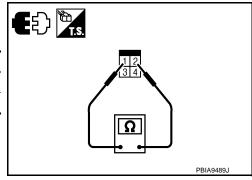


#### STOP LAMP SWITCH

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- 3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

4. If NG, adjust stop lamp switch installation, refer to <u>BR-6</u>, "Inspection and Adjustment", and perform step 3 again.

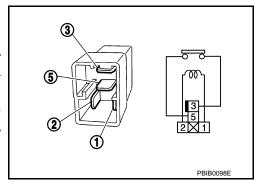


#### ICC BRAKE HOLD RELAY

1. Check continuity between ICC brake hold relay terminals 3 and 5 under the following conditions.

Condition	Continuity
12 V direct current supply between terminals 1 and 2	Should not exist
No current supply	Should exist

2. If NG, replace ICC brake hold relay.

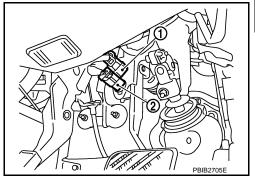


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# DTC P1572 ASCD BRAKE SWITCH

# Component Description

When the brake pedal is depressed, ASCD brake switch (2) is turned OFF and stop lamp switch (1) is turned ON. ECM detects the state of the brake pedal by two kinds of input (ON/OFF signal). Refer to EC-717, "System Description" for the ASCD function.



# CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1	Ignition switch: ON	Brake pedal: Fully released	ON
(ASCD brake switch)	· ignition switch. ON	Brake pedal: Slightly depressed	OFF
BRAKE SW2	Ignition switch: ON	Brake pedal: Fully released	OFF
(Stop lamp switch)	· ignition switch. ON	Brake pedal: Slightly depressed ON	ON

# On Board Diagnosis Logic

This self-diagnosis has the one trip detection logic.

The MIL will not illuminate for this diagnosis.

#### NOTE:

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1118, "DTC Confirmation Procedure".
- This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch is turned OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1572		А	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to the ECM at the same time.	Harness or connectors     (The stop lamp switch circuit is shorted.)     Harness or connectors     (The ASCD brake switch circuit is shorted.)
1572	ASCD brake switch	В	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is being driven.	<ul> <li>Stop lamp switch</li> <li>ASCD brake switch</li> <li>Incorrect stop lamp switch installation</li> <li>Incorrect ASCD brake switch installation</li> <li>ECM</li> </ul>

#### **DTC Confirmation Procedure**

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#### **CAUTION:**

Always drive vehicle at a safe speed.

- 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
- If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

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# DTC P1572 ASCD BRAKE SWITCH

[VK45DE]

DIGITISTE AGGD BRAKE GWITC

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.

< SERVICE INFORMATION >

3. Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Steps 4 to 6 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.

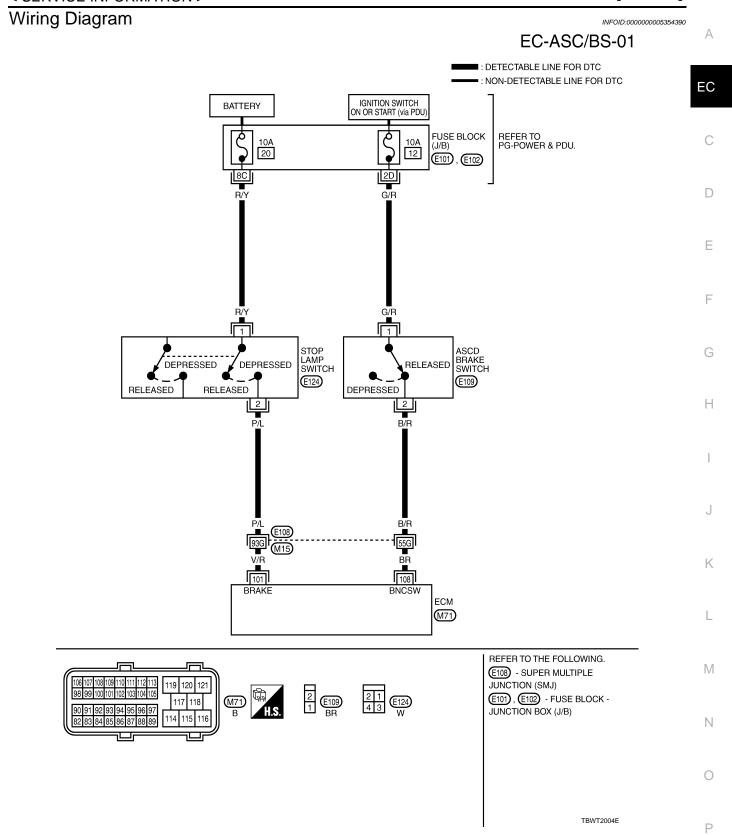
- Start engine (VDC switch OFF).
- 2. Press MAIN switch and check that CRUISE lamp illuminate.
- 3. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

Vehicle speed	More than 30 km/h (19 MPH)
Selector lever	Suitable position

- 4. Check 1st trip DTC.
- If 1st trip DTC is detected, go to <u>EC-1210, "Diagnosis Procedure"</u>.
   If 1st trip DTC is not detected, go to the following step.
- 6. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

Vehicle speed	More than 30 km/h (19 MPH)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than 5 seconds so as not to come off from the above-mentioned vehicle speed.

- Check 1st trip DTC.
- If 1st trip DTC is detected, go to <u>EC-1210, "Diagnosis Procedure"</u>.



Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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.

#### < SERVICE INFORMATION >

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	V/R	Stan Jama switch	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0 V
101	101 V/R Stop lamp switch	[Ignition switch: O	[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)
400 BB		R ASCD brake switch	[Ignition switch: ON] • Brake pedal: Slightly depressed	Approximately 0 V
108 BR	[Ignition switch: ON] • Brake pedal: Fully released		BATTERY VOLTAGE (11 - 14 V)	

# Diagnosis Procedure

INFOID:0000000005354391

# 1. CHECK OVERALL FUNCTION-I

# (I) With CONSULT-III

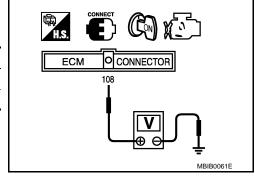
- 1. Turn ignition switch ON.
- 2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "BRAKE SW1" indication under the following conditions.

CONDITION	INDICATION
Brake pedal: Fully released	ON
Brake pedal: Slightly depressed	OFF

# **Without CONSULT-III**

- 1. Turn ignition switch ON.
- 2. Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Battery voltage
Brake pedal: Slightly depressed	Approximately 0 V



# OK or NG

OK >> GO TO 2. NG >> GO TO 3.

# 2. CHECK OVERALL FUNCTION-II

# (P) With CONSULT-III

Check "BRAKE SW2" indication in "DATA MONITOR" mode.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

# **⊗** Without CONSULT-III

Check voltage between ECM terminal 101 and ground under the following conditions.

#### DTC P1572 ASCD BRAKE SWITCH

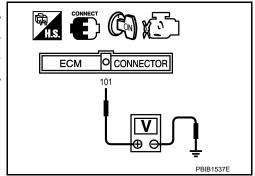
# < SERVICE INFORMATION >

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	CONNECT	Ī

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0 V
Brake pedal: Slightly depressed	Battery voltage

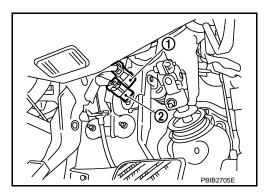
OK or NG

OK >> GO TO 13. NG >> GO TO 8.



# 3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch (2) harness connector.
- Stop lamp switch (1)
- Turn ignition switch ON.

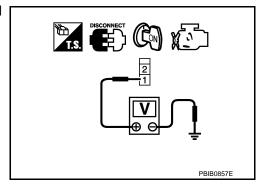


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-III or tester.

# Voltage: Battery voltage

#### OK or NG

>> GO TO 5. OK NG >> GO TO 4.



# 4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E102
- 10 A fuse
- 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

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 7. NG >> GO TO 6.

EC-1211 Revision: 2009 June 2010 M35/M45

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#### < SERVICE INFORMATION >

# 6. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and ASCD brake switch
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

# 7. CHECK ASCD BRAKE SWITCH

# Refer to EC-1213, "Component Inspection"

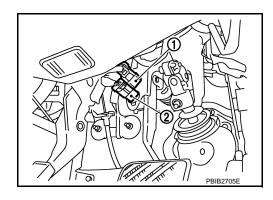
#### OK or NG

OK >> GO TO 13.

NG >> Replace ASCD brake switch.

# 8. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch (1) harness connector.
- ASCD brake switch (2)

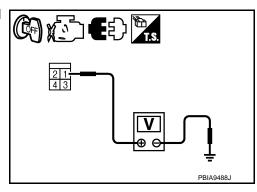


Check voltage between stop lamp switch terminal 1 and ground with CONSULT -III or tester.

#### **Voltage: Battery voltage**

#### OK or NG

OK >> GO TO 10. NG >> GO TO 9.



# 9. DETECT MALFUNCTIONING PART

#### Check the following.

- Fuse block (J/B) connector E101
- 10 A fuse
- 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 harness continuity between ECM terminal 101 and stop lamp switch terminal 2. Refer to Wiring Diagram.

#### Continuity should exist.

3. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 12.

Revision: 2009 June **EC-1212** 2010 M35/M45

# **DTC P1572 ASCD BRAKE SWITCH**

# < SERVICE INFORMATION >

[VK45DE]

NG >> GO TO 11.

# 11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- · 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.

# 12. CHECK STOP LAMP SWITCH

Refer to EC-1213, "Component Inspection"

#### OK or NG

OK >> GO TO 13.

NG >> Replace stop lamp switch.

# 13. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

# >> INSPECTION END

# Component Inspection

#### ASCD BRAKE SWITCH

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch harness connector.
- 3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

4. If NG, adjust ASCD brake switch installation, refer to <u>BR-6</u>, <u>"Inspection and Adjustment"</u>, and perform step 3 again.

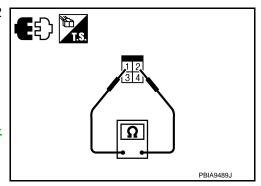
# DISCONNECT CFF

#### STOP LAMP SWITCH

- 1. Turn ignition switch OFF.
- Disconnect stop lamp switch harness connector.
- 3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

4. If NG, adjust stop lamp switch installation, refer to <u>BR-6</u>, "Inspection and Adjustment", and perform step 3 again.



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# DTC P1574 ICC VEHICLE SPEED SENSOR

# Component Description

INFOID:0000000005354393

The ECM receives two vehicle speed signals via the CAN communication line. One is sent from "unified meter and A/C amp.", and the other is from TCM (Transmission control module). The ECM uses these signals for ICC control. Refer to ACS-9, "Outline" for ICC functions.

# On Board Diagnosis Logic

INFOID:0000000005354394

This self-diagnosis has the one trip detection logic.

The MIL will not illuminate for this diagnosis.

#### 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-1103</u>, "<u>DTC Confirmation Procedure"</u>.
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1118, "DTC Confirmation Procedure".
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1120, "DTC Confirmation Procedure".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1574 1574	ICC vehicle speed sensor	Thethe difference between two vehicle speed signals is out of the specified range.	Harness or connectors     (The CAN communication line is open or shorted.)     Unified meter and A/C amp.     ABS actuator and electric unit (control unit)     Wheel sensor     TCM     ECM

# **DTC Confirmation Procedure**

INFOID:0000000005354395

#### **CAUTION:**

Always drive vehicle at a safe speed.

#### **NOTE**

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Step 2 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.

- Start engine (VDC switch OFF).
- Drive the vehicle at more than 40 km/h (25MPH).
- Check DTC.
- 4. If DTC is detected, go to EC-1214, "Diagnosis Procedure".

# Diagnosis Procedure

INFOID:0000000005354396

# 1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-47, "OBD-II Diagnostic Trouble Code (DTC)".

#### OK or NG

OK >> GO TO 2.

NG >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

Refer to BRC-30, "CONSULT-III Function (ABS)".

#### OK or NG

DTC P1574 ICC VEHICLE SPEED SENSOR [VK45DE] < SERVICE INFORMATION > OK >> GO TO 3. NG >> Repair or replace malfunctioning part. Α  ${\bf 3.}$  CHECK DTC WITH "UNIFIED METER AND A/C AMP." Refer to DI-28, "CONSULT-III Function (METER/M&A)". EC >> INSPECTION END С D Е F G Н

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Revision: 2009 June **EC-1215** 2010 M35/M45

INFOID:000000005354397

# DTC P1574 ASCD VEHICLE SPEED SENSOR

# Component Description

The ECM receives two vehicle speed sensor signals via the CAN communication line. One is sent from "unified meter and A/C amp.", and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to <u>EC-717</u>, "<u>System Description</u>" for ASCD functions.

# On Board Diagnosis Logic

INFOID:0000000005354398

This self-diagnosis has the one trip detection logic.

The MIL will not illuminate for this diagnosis.

#### 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-1103</u>, "<u>DTC Confirmation Procedure"</u>.
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1118, "DTC Confirmation Procedure".
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1120, "DTC Confirmation Procedure".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1574 1574	ASCD vehicle speed sensor	The difference between the two vehicle speed signals is out of the specified range.	Harness or connectors     (The CAN communication line is open or shorted.)     Unified meter and A/C amp.     ABS actuator and electric unit (control unit)     Wheel sensor     TCM     ECM

# **DTC Confirmation Procedure**

INFOID:0000000005354399

#### **CAUTION:**

Always drive vehicle at a safe speed.

#### NOTE

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Step 2 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.

- 1. Start engine (VDC switch OFF).
- 2. Drive the vehicle at more than 40 km/h (25 MPH).
- Check DTC.
- 4. If DTC is detected, go to EC-1216, "Diagnosis Procedure".

# Diagnosis Procedure

INFOID:0000000005354400

# 1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-47, "OBD-II Diagnostic Trouble Code (DTC)".

# OK or NG

OK >> GO TO 2.

NG >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

Refer to BRC-30, "CONSULT-III Function (ABS)".

# OK or NG

Revision: 2009 June **EC-1216** 2010 M35/M45

**DTC P1574 ASCD VEHICLE SPEED SENSOR** [VK45DE] < SERVICE INFORMATION > OK >> GO TO 3. NG >> Repair or replace malfunctioning part. Α  ${\bf 3.}$  CHECK DTC WITH "UNIFIED METER AND A/C AMP." Refer to DI-28, "CONSULT-III Function (METER/M&A)". EC >> INSPECTION END D Е F G Н J K

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# DTC P1715 INPUT SPEED SENSOR

Description INFOID:000000005354401

ECM receives input speed sensor signal from TCM via the CAN communication line. ECM uses this signal for engine control.

# CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354402

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
I/P PULLY SPD	Vehicle speed: More than 20 km/h (12 MPH)	Almost the same speed as the tachometer indication

# On Board Diagnosis Logic

INFOID:0000000005354403

# NOTE:

- If DTC P1715 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-1014, "DTC Confirmation Procedure".
- If DTC P1715 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to EC-1020, "DTC Confirmation Procedure".
- If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1118, "DTC Confirmation Procedure".
- If DTC P1715 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1120, "DTC Confirmation Procedure".

The MIL will not illuminate for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715 1715	Input speed sensor (TCM output)	Input speed sensor signal is different from the theoretical value calculated by ECM from output shaft revolution signal and engine rpm signal.	Harness or connectors     (The CAN communication line is open or shorted)     Harness or connectors     (Input speed sensor circuit is open or shorted)     TCM

# Diagnosis Procedure

INFOID:0000000005354404

# 1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-47, "OBD-II Diagnostic Trouble Code (DTC)".

#### OK or NG

OK >> GO TO 2.

NG >> Perform trouble shooting relevant to DTC indicated.

# 2.replace ${\sf TCM}$

Replace TCM.

#### >> INSPECTION END

# DTC P1800 VIAS CONTROL SOLENOID VALVE

< SERVICE INFORMATION >

[VK45DE]

INFOID:0000000005354405

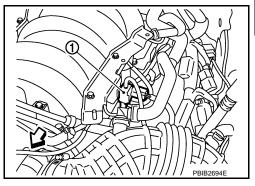
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# DTC P1800 VIAS CONTROL SOLENOID VALVE

# Component Description

The VIAS control solenoid valve (1) cuts the intake manifold vacuum signal for power valve actuator. It responds to ON/OFF signals from the ECM. When the solenoid is off, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and sends the vacuum signal to the power valve actuator.

← : Vehicle front



# CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION SPECIFICATION	
	Selector lever position: P or N	ON
VIAS S/V-1	Engine speed: More than 5,000 rpm	
	Selector lever position: Except P or N     Engine speed: Less than 5,000 rpm	OFF

# On Board Diagnosis Logic

The MIL will not illuminate for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1800 1800	VIAS control solenoid valve circuit	An excessively low or high voltage signal is sent to ECM through the valve	<ul> <li>Harness or connectors         (The solenoid valve circuit is open or shorted.)     </li> <li>VIAS control solenoid valve</li> </ul>

#### **DTC Confirmation Procedure**

INFOID:0000000005354408

INFOID:0000000005354407

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is between 11 V at idle.

- Start engine and let it idle for at least 5 seconds.
- 2. Check 1st trip DTC.
- If 1st trip DTC is detected, go to EC-1221, "Diagnosis Procedure".

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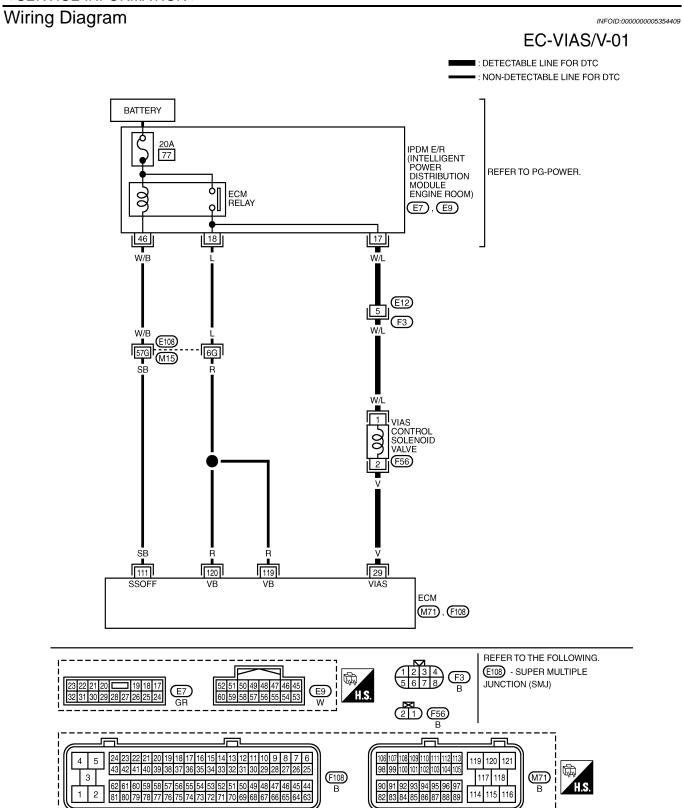
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Specification data are reference values and are measured between each terminal and ground.

#### **CAUTION:**

Never 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 P1800 VIAS CONTROL SOLENOID VALVE

#### < SERVICE INFORMATION >

[VK45DE]

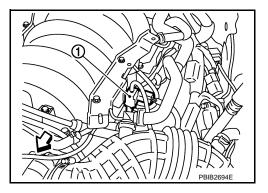
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
			[Engine is running] • Selector lever position: P or N	0 - 1.0 V
29	V	VIAS control solenoid valve	<ul><li>[Engine is running]</li><li>Selector lever position: D</li><li>Engine speed: Below 5,000 rpm</li></ul>	BATTERY VOLTAGE (11 - 14 V)
			[Engine is running] • Engine speed: Above 5,000 rpm	0 - 1.0 V
111 SB		ECM relay	[Engine is running] [Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0 - 1.5 V
		(Self shut-off)	[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
119 120	R R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

# Diagnosis Procedure

INFOID:0000000005354410

# 1. CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect VIAS control solenoid (1) valve harness connector.
- <□: Vehicle front</li>
- Turn ignition switch ON.

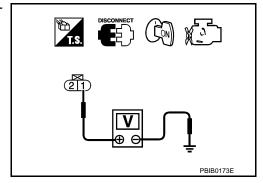


4. Check voltage between terminal 1 and ground with CONSULT-III or tester.

# Voltage: Battery voltage

# OK or NG

OK >> GO TO 3. NG >> GO TO 2.



# 2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- Harness for open or short between VIAS control solenoid valve and IPDM E/R
  - >> Repair or replace harness or connectors.

# 3.check vias control solenoid valve output signal circuit for open and short

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- Disconnect ECM harness connector.
- 3. Check harness continuity between ECM terminal 29 and VIAS control solenoid valve terminal 2. Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

# 4. CHECK VIAS CONTROL SOLENOID VALVE

Refer to EC-1222, "Component Inspection".

# OK or NG

OK >> GO TO 5.

NG >> Replace VIAS control solenoid valve.

# 5. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

# Component Inspection

INFOID:0000000005354411

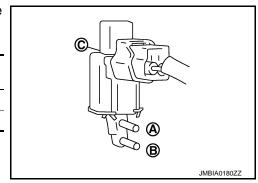
[VK45DE]

#### VIAS CONTROL SOLENOID VALVE

- (II) With CONSULT-III
- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VIAS S/V-1" in "ACTIVE TEST" mode.
- 4. Check air passage continuity and operation delay time under the following conditions.

Condition VIAS S/V-1	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
ON	Yes	No
OFF	No	Yes





#### ₩ Without CONSULT-III

Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12 V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

#### Operation takes less than 1 second.

# BATTERY SEF313Q

# Removal and Installation

INFOID:0000000005354412

VIAS CONTROL SOLENOID VALVE

# **DTC P1800 VIAS CONTROL SOLENOID VALVE**

< SERVICE INFORMATION >

[VK45DE]

Refer to EM-174, "Component".

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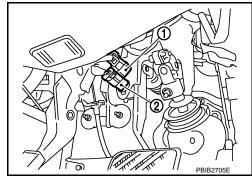
INFOID:0000000005354413

# DTC P1805 BRAKE SWITCH

# Component Description

Brake switch signal is applied to the ECM through the stop lamp switch (1) when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is being

- ICC brake switch (models with ICC) (2)
- ASCD brake switch (models with ASCD) (2)



# CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354414

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	OFF
DIVARLE OW	• Ignition switch: ON	Brake pedal: Slightly depressed	ON

# On Board Diagnosis Logic

INFOID:0000000005354415

# The MIL will not illuminate for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805 1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is being driven.	<ul> <li>Harness or connectors (Stop lamp switch circuit is open or shorted.)</li> <li>Stop lamp switch</li> </ul>

#### **FAIL-SAFE MODE**

When the malfunction is detected, ECM enters fail-safe mode.

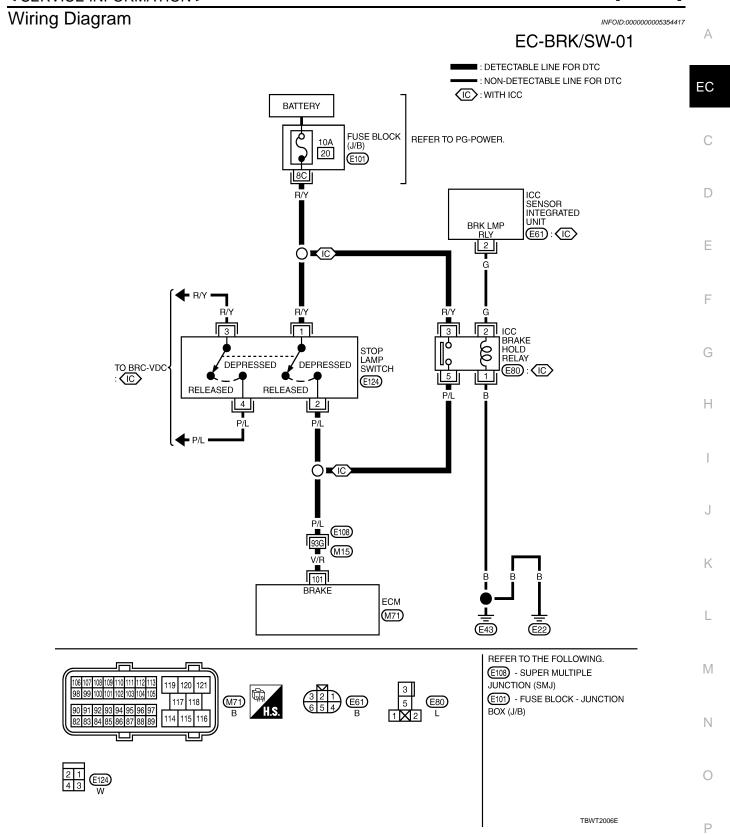
Engine operating condition in fail-safe mode		
ECM controls the electric throttle control actuator by regulating the throttle opening to a small range.  Therefore, acceleration will be poor.		
Vehicle condition Driving condition		
When engine is idling Normal		
When accelerating Poor acceleration		

# **DTC Confirmation Procedure**

INFOID:0000000005354416

- 1. Turn ignition switch ON.
- 2. Fully depress the brake pedal for at least 5 seconds.
- 3. Erase the DTC.
- 4. Check 1st trip DTC.
- If 1st trip DTC is detected, go to <u>EC-1226, "Diagnosis Procedure"</u>.

[VK45DE]



Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	V/R	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0 V
101	V/IX	Stop famp switch	[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)

## Diagnosis Procedure

INFOID:0000000005354418

### **ICC MODELS**

## 1.check dtc with icc sensor integrated unit

Refer to ACS-35, "Self-Diagnostic Function".

### OK or NG

OK >> GO TO 2.

NG >> Repair or replace malfunctioning part.

## 2.CHECK STOP LAMP SWITCH CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Check the stop lamp when depressing and releasing the brake pedal.

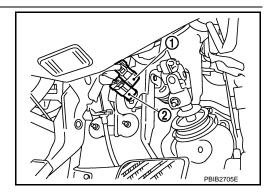
Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

### OK or NG

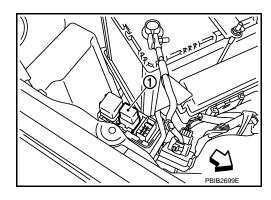
OK >> GO TO 5. NG >> GO TO 3.

## 3. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- 1. Disconnect stop lamp switch (1) harness connector.
- ICC brake switch (2)



- 2. Disconnect ICC brake hold relay (1) harness connector.
- <: Vehicle front



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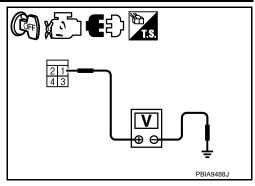
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Check voltage between stop lamp switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

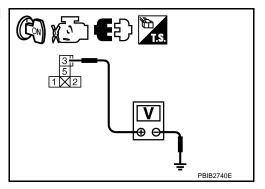


4. Check voltage between ICC brake hold relay terminal 3 and ground with CONSULT-III or tester.

### **Voltage: Battery voltage**

### OK or NG

OK >> GO TO 5. NG >> GO TO 4.



## 4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E101
- 10 A fuse
- Harness for open or short between battery and stop lamp switch
- Harness for open or short between battery and ICC brake hold relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

## ${f 5.}$ CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect ECM harness connector.
- Check harness continuity between the following;
   ECM terminal 101 and stop lamp switch terminal 2,
   ECM terminal 101 and ICC brake hold relay terminal 5.
   Refer to Wiring Diagram.

### Continuity should exist.

3. Also check harness for short to ground and short to power.

### OK or NG

OK >> GO TO 7. NG >> GO TO 6.

### 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and stop lamp switch
- Harness for open or short between ECM and ICC brake hold relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 7. CHECK STOP LAMP SWITCH

Refer to EC-1229, "Component Inspection".

### OK or NG

OK >> GO TO 8.

Revision: 2009 June **EC-1227** 2010 M35/M45

### **DTC P1805 BRAKE SWITCH**

### < SERVICE INFORMATION >

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NG >> Replace stop lamp switch.

## 8. CHECK ICC BRAKE HOLD RELAY

Refer to EC-1229, "Component Inspection".

OK >> GO TO 9.

NG >> Replace ICC brake hold relay.

## 9. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

### >> INSPECTION END

### **ASCD MODELS**

## 1. CHECK STOP LAMP SWITCH CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Check the stop lamp when depressing and releasing the brake pedal.

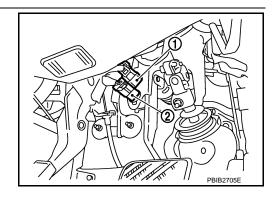
Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

### OK or NG

OK >> GO TO 4. NG >> GO TO 2.

## 2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- 1. Disconnect stop lamp switch (1) harness connector.
- ASCD brake switch (2)

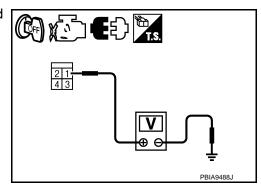


2. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-III or tester.

### Voltage: Battery voltage

### OK or NG

OK >> GO TO 4. NG >> GO TO 3.



## 3. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E101
- 10 A fuse
- Harness for open or short between stop lamp switch and battery

### **DTC P1805 BRAKE SWITCH**

< SERVICE INFORMATION > [VK45DE]

>> 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.
- Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2. Refer to Wiring Diagram.

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### Continuity should exist.

3. Also check harness for short to ground and short to power.

### OK or NG

OK >> GO TO 6. NG >> GO TO 5.

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## 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and stop lamp switch

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>> Repair open circuit or short to ground or short to power in harness or connectors.

### 6. CHECK STOP LAMP SWITCH

Refer to EC-1229, "Component Inspection".

### OK or NG

OK >> GO TO 7.

NG >> Replace stop lamp switch.

## 7. CHECK INTERMITTENT INCIDENT

Refer to EC-822. "Diagnosis Procedure".

### >> INSPECTION END

## Component Inspection

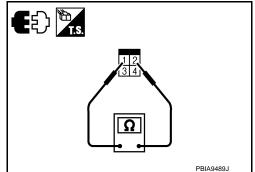
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### STOP LAMP SWITCH

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- 3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

If NG, adjust stop lamp switch installation, refer to <u>BR-6</u>, "Inspection and Adjustment", and perform step 3 again.



### ICC BRAKE HOLD RELAY

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### **DTC P1805 BRAKE SWITCH**

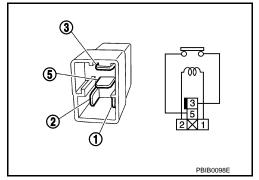
### < SERVICE INFORMATION >

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 Check continuity between ICC brake hold relay terminals 3 and 5 under the following conditions.

Condition	Continuity
12 V direct current supply between terminals 1 and 2	Should not exist
No current supply	Should exist





### DTC P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< SERVICE INFORMATION >

[VK45DE]

## DTC P2100, P2103 THROTTLE CONTROL MOTOR RELAY

## Component Description

INFOID:0000000005354420

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is controlled ON/OFF 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.

## CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354421

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	Ignition switch: ON	ON

## On Board Diagnosis Logic

INFOID:0000000005354422

### These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2100 2100	Throttle control motor relay circuit open	ECM detects that the voltage of power source for throttle control motor is excessively low.	Harness or connectors     (Throttle control motor relay circuit is open)     Throttle control motor relay
P2103 2103	Throttle control motor relay circuit short	ECM detects that the throttle control motor relay is stuck ON.	Harness or connectors     (Throttle control motor relay circuit is shorted)     Throttle control motor relay

### **FAIL-SAFE MODE**

When the malfunction is detected, ECM enters fail-safe mode and the MIL illuminates.

Engine operating condition in fail-safe mode

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

### **DTC Confirmation Procedure**

INFOID:0000000005354423

### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

#### PROCEDURE FOR DTC P2100

- Turn ignition switch ON and wait at least 2 seconds.
- 2. Start engine and let it idle for 5 seconds.
- Check DTC.
- 4. If DTC is detected, go to EC-1233, "Diagnosis Procedure".

### PROCEDURE FOR DTC P2103

### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 8 V.

- Turn ignition switch ON and wait at least 1 second.
- 2. Check DTC.
- If DTC is detected, go to <u>EC-1233</u>, "<u>Diagnosis Procedure</u>".

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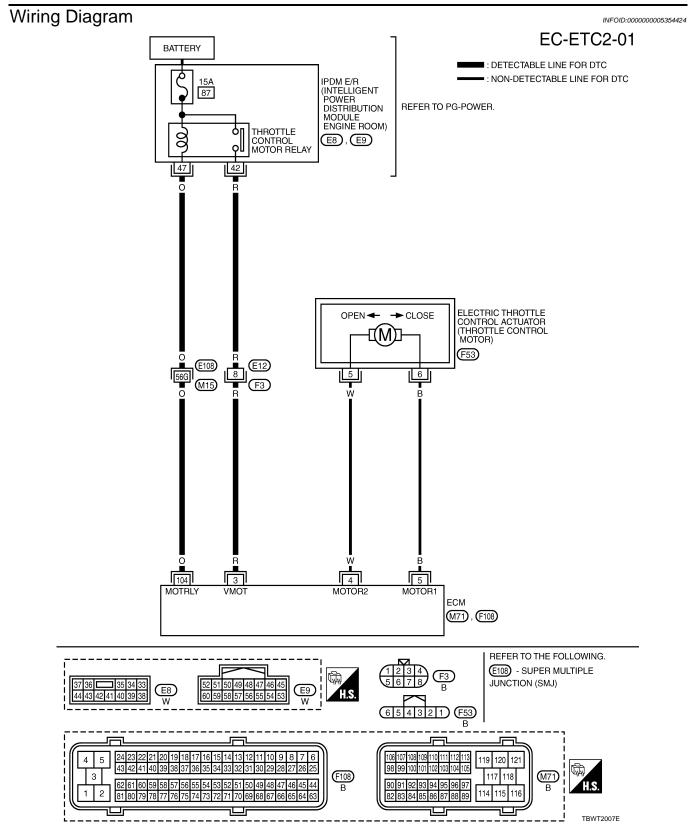
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Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

CAUTION:

Never 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 P2100, P2103 THROTTLE CONTROL MOTOR RELAY

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TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	
3	R	Throttle control motor relay power supply	Hanition Switch, OM		
4	W	Throttle control motor (Close)	[Ignition switch: ON]  • Engine: Stopped  • Selector lever position: D  • Accelerator pedal: Released	0 - 14 V★	
5	В	Throttle control motor (Open)	[Ignition switch: ON]  • Engine: Stopped  • Selector lever position: D  • Accelerator pedal: Fully depressed	0 - 14 V★	
104	0	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)	
				[Ignition switch: ON]	0 - 1.0 V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

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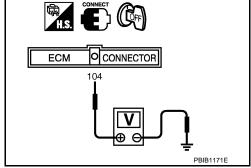
# 1.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF.
- 2. Check voltage between ECM terminal 104 and ground with CONSULT-III or tester.

### Voltage: Battery voltage

### OK or NG

OK >> GO TO 5. NG >> GO TO 2.



## 2.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

- Disconnect ECM harness connector.
- 2. Disconnect IPDM E/R harness connector E9.
- 3. Check continuity between ECM terminal 104 and IPDM E/R terminal 47. Refer to Wiring Diagram.

### **Continuity should exist.**

4. Also check harness for short to ground and short to power.

### OK or NG

OK >> GO TO 4. NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

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### DTC P2100, P2103 THROTTLE CONTROL MOTOR RELAY

Check the following.

Harness connectors E108, M15

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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.

## 4.CHECK FUSE

- Disconnect 15 A fuse.
- Check if 15 A fuse is blown.

### OK or NG

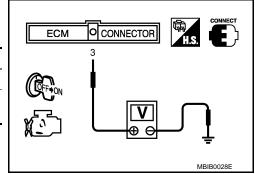
OK >> GO TO 8.

NG >> Replace 15 A fuse.

## 5.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-III or tester.

Ignition switch	Voltage
OFF	Approximately 0 V
ON	Battery voltage (11 - 14 V)



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### OK or NG

OK >> GO TO 8. NG >> GO TO 6.

## 6.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Disconnect IPDM E/R harness connector E8.
- 4. Check continuity between ECM terminal 3 and IPDM E/R terminal 42. Refer to Wiring Diagram.

### Continuity should exist.

5. Also check harness for short to ground and short to power.

### OK or NG

OK >> GO TO 8.

NG >> GO TO 7.

## 7.DETECT MALFUNCTIONING PART

### Check the following.

- Harness connectors E12, F3
- 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.

## 8. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

### OK or NG

OK >> Replace IPDM E/R. Refer to PG-27, "Removal and Installation of IPDM E/R".

NG >> Repair or replace harness or connectors.

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## DTC P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description INFOID:0000000005354426

#### NOTE:

- If DTC P2101 is displayed with DTC P2100, first perform the trouble diagnosis for DTC P2100. Refer to <a href="EC-1231">EC-1231</a>, "DTC Confirmation Procedure".
- If DTC P2101 is displayed with DTC P2119, first perform the trouble diagnosis for DTC P2119. Refer to EC-1246, "DTC Confirmation Procedure".

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. The throttle position sensor provides feedback to the ECM, when opens/closes the throttle valve in response to driving conditions via the throttle control motor.

## On Board Diagnosis Logic

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2101 2101	Electric throttle control performance	Electric throttle control function does not operate properly.	Harness or connectors     (Throttle control motor circuit is open or shorted)     Electric throttle control actuator

### FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL illuminates.

Engine operating condition in fail-safe mode

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

### **DTC Confirmation Procedure**

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#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running.

- Turn ignition switch ON and wait at least 2 seconds.
- Start engine and let it idle for 5 seconds.
- Check DTC.
- If DTC is detected, go to <u>EC-1237</u>, "<u>Diagnosis Procedure</u>".

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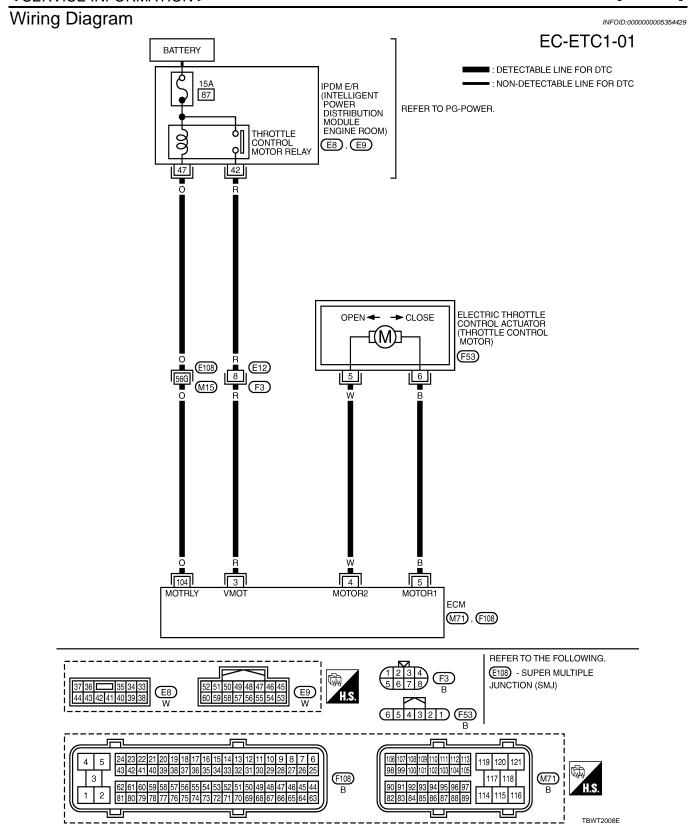
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Revision: 2009 June **EC-1235** 2010 M35/M45

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Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

CAUTION:

### < SERVICE INFORMATION >

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Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	EC
3	R	Throttle control motor relay power supply	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	С
4	w	Throttle control motor (Close)	[Ignition switch: ON]  • Engine: Stopped  • Selector lever position: D  • Accelerator pedal: Released	0 - 14 V*	D E
5	В	Throttle control motor (Open)	[Ignition switch: ON]  • Engine: Stopped  • Selector lever position: D  • Accelerator pedal: Fully depressed	0 - 14 V★  >> 5 V/Div 1 ms/Div I  PBIB1105E	F G
104	0	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)	,
			[Ignition switch: ON]	0 - 1.0 V	

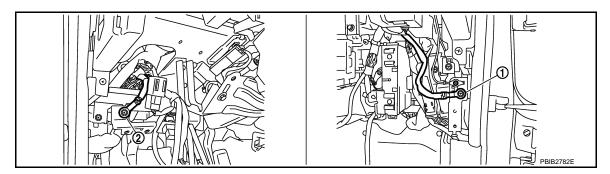
<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

## 1. CHECK GROUND CONNECTIONS

Turn ignition switch OFF.

Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

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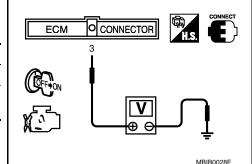
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### < SERVICE INFORMATION >

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Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-III or tester.

Ignition switch	Voltage
OFF	Approximately 0 V
ON	Battery voltage (11 - 14 V)



### OK or NG

OK >> GO TO 10. NG >> GO TO 3.

## 3.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Disconnect IPDM E/R harness connector E8.
- Check harness continuity between ECM terminal 3 and IPDM E/R terminal 42. Refer to Wiring Diagram.

### Continuity should exist.

5. Also check harness for short to ground and short to power.

### OK or NG

OK >> GO TO 5. NG >> GO TO 4.

## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- Harness for open or short between ECM and IPDM E/R
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

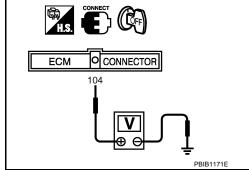
# 5. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

- 1. Reconnect all harness connectors disconnected.
- 2. Turn ignition switch OFF.
- Check voltage between ECM terminal 104 and ground with CONSULT-III or tester.

### Voltage: Battery voltage

### OK or NG

OK >> GO TO 9. NG >> GO TO 6.



## 6. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

- 1. Disconnect ECM harness connector.
- 2. Disconnect IPDM E/R harness connector E9.
- 3. Check harness continuity between ECM terminal 104 and IPDM E/R terminal 47. Refer to Wiring Diagram.

### Continuity should exist.

4. Also check harness for short to ground and short to power.

### OK or NG

OK >> GO TO 8.

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NG >> GO TO 7.

## 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- 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.

## 8. CHECK FUSE

- Disconnect 15 A fuse.
- 2. Check if 15 A fuse is blown.

### OK or NG

OK >> GO TO 9.

NG >> Replace 15 A fuse.

## 9. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

### OK or NG

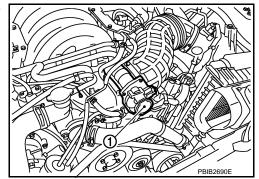
OK >> Replace IPDM E/R. Refer to PG-27, "Removal and Installation of IPDM E/R".

NG >> Repair or replace harness or connectors.

## 10.check throttle control motor output signal circuit for open or short

- Turn ignition switch OFF.
- Disconnect electric throttle control actuator (1) harness connector.
- Illustration shows the view with intake air duct removed.
- Disconnect ECM harness connector.
- 4. Check harness continuity between the following terminals. Refer to Wiring Diagram.

Electric throttle control actuator terminal	ECM terminal	Continuity
5	5	Should not exist.
5	4	Should exist.
6	5	Should exist.
	4	Should not exist.



5. Also check harness for short to ground and short to power.

### OK or NG

OK >> GO TO 11.

NG >> Repair or replace malfunctioning part.

## 11. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

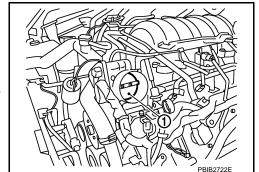
- Remove the intake air duct.
- 2. Check if foreign matter is caught between the throttle valve (1) and the housing.

This illustration shows the view with intake air removed.

### OK or NG

OK >> GO TO 12.

NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



## 12. CHECK THROTTLE CONTROL MOTOR

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Refer to EC-1240, "Component Inspection".

### OK or NG

OK >> GO TO 13. >> GO TO 14. NG

## 13. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

### OK or NG

OK >> GO TO 14.

NG >> Repair or replace harness or connectors.

## 14. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- Replace the electric throttle control actuator.
- Perform <u>EC-764</u>, "Throttle Valve Closed Position Learning". Perform <u>EC-765</u>, "Idle Air Volume Learning".

#### >> INSPECTION END

## Component Inspection

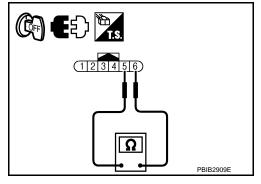
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### THROTTLE CONTROL MOTOR

- Disconnect electric throttle control actuator harness connector.
- Check resistance between terminals 5 and 6.

### Resistance: Approximately 1 - 15 $\Omega$ [at 25 °C (77°F)]

- If NG, replace electric throttle control actuator and go to next
- 4. Perform EC-764, "Throttle Valve Closed Position Learning".
- 5. Perform EC-765, "Idle Air Volume Learning".



### Removal and Installation

INFOID:0000000005354432

### ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-174, "Component".

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## DTC P2118 THROTTLE CONTROL MOTOR

## Component Description

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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. The throttle position sensor provides feedback to the ECM, when opens/closes the throttle valve in response to driving conditions via the throttle control motor.

## On Board Diagnosis Logic

INFOID:0000000005354434

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2118 2118	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	Harness or connectors     (Throttle control motor circuit is shorted.)     Electric throttle control actuator     (Throttle control motor)

### **FAIL-SAFE MODE**

When the malfunction is detected, ECM enters fail-safe mode and the MIL illuminates.

Engine operating condition in fail-safe mode

ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

### **DTC Confirmation Procedure**

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- 1. If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
- a. Turn ignition switch OFF and wait at least 10 seconds.
- b. Turn ignition switch ON.
- c. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON and wait at least 2 seconds.
- 3. Start engine and let it idle for 5 seconds.
- 4. Check DTC.
- 5. If DTC is detected, go to EC-1243, "Diagnosis Procedure".

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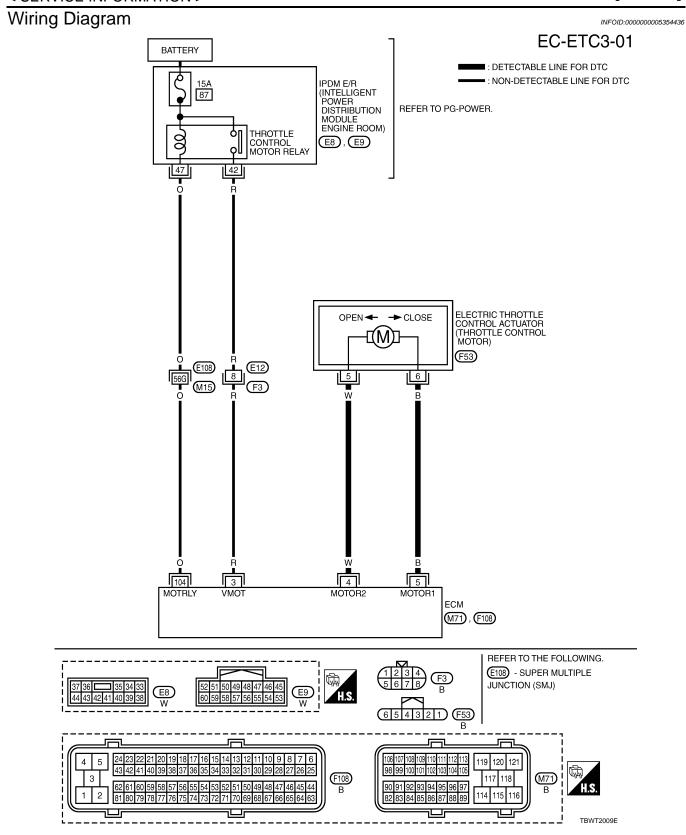
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Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

CAUTION:

### < SERVICE INFORMATION >

[VK45DE]

Never 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.

WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	EC
R	Throttle control motor relay power supply	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	С
w	Throttle control motor (Close)	[Ignition switch: ON]  • Engine: Stopped  • Selector lever position: D  • Accelerator pedal: Released	0 - 14 V*    SV/Div 1 ms/Div   T   PBIB1104E	D E
В	Throttle control motor (Open)	[Ignition switch: ON]  • Engine: Stopped  • Selector lever position: D  • Accelerator pedal: Fully depressed	0 - 14 V★  >> 5 V/Div 1 ms/Div T  PBIB1105E	F G
0	Throttle control motor relay	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)	ı
	R W	R Throttle control motor relay power supply  W Throttle control motor (Close)  B Throttle control motor (Open)	R Throttle control motor relay power supply  [Ignition switch: ON]  [Ignition switch: ON]  Engine: Stopped Selector lever position: D Accelerator pedal: Released  [Ignition switch: ON] Engine: Stopped Selector lever position: D Engine: Stopped Accelerator pedal: Released  [Ignition switch: ON] Engine: Stopped Selector lever position: D Accelerator pedal: Fully depressed  [Ignition switch: OFF]	R Throttle control motor relay power supply    Throttle control motor (Close)   Ilgnition switch: ON]   BATTERY VOLTAGE (11 - 14 V)

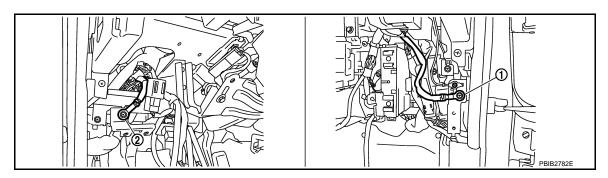
<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

## 1. CHECK GROUND CONNECTIONS

Turn ignition switch OFF.

Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

**EC-1243** Revision: 2009 June 2010 M35/M45

INFOID:0000000005354437

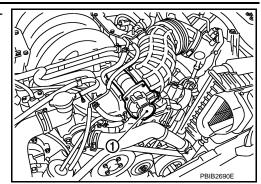
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### < SERVICE INFORMATION >

[VK45DE]

- Disconnect electric throttle control actuator (1) harness connector.
- Illustration shows the view with intake air duct removed.
- 2. Disconnect ECM harness connector.
- 3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

Electric throttle control actuator terminal	ECM terminal	Continuity
5	5	Should not exist.
	4	Should exist.
6	5	Should exist.
	4	Should not exist.



4. Also check harness for short to ground and short to power.

### OK or NG

OK >> GO TO 3.

NG >> Repair or replace malfunctioning part.

## 3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-1244, "Component Inspection".

### OK or NG

OK >> GO TO 4. NG >> GO TO 5.

## 4. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### OK or NG

OK >> GO TO 5.

NG >> Repair or replace harness or connectors.

## 5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace the electric throttle control actuator.
- 2. Perform EC-764, "Throttle Valve Closed Position Learning".
- 3. Perform EC-765, "Idle Air Volume Learning".

### >> INSPECTION END

## Component Inspection

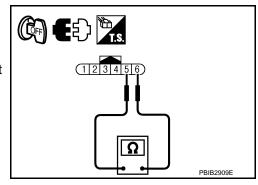
INFOID:0000000005354438

### THROTTLE CONTROL MOTOR

- Disconnect electric throttle control actuator harness connector.
- 2. Check resistance between terminals 5 and 6.

### Resistance: Approximately 1 - 15 $\Omega$ [at 25 °C (77°F)]

- 3. If NG, replace electric throttle control actuator and go to next step.
- 4. Perform EC-764, "Throttle Valve Closed Position Learning".
- Perform <u>EC-765</u>, "Idle Air Volume Learning".



Removal and Installation

ELECTRIC THROTTLE CONTROL ACTUATOR

Revision: 2009 June

< SERVICE INFORMATION >

[VK45DE]

Refer to EM-174, "Component".

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### DTC P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< SERVICE INFORMATION >

[VK45DE]

## DTC P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

## Component Description

INFOID:0000000005354440

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. The throttle position sensor provides feedback to the ECM, when opens/closes the throttle valve in response to driving conditions via the throttle control motor.

### On Board Diagnosis Logic

INFOID:0000000005354441

### This self-diagnosis has one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
DO110		Α	Electric throttle control actuator does not function properly due to the return spring malfunction.	
P2119 2119	Electric throttle control actuator	В	Throttle valve opening angle in fail-safe mode is not in specified range.	Electric throttle control actuator
	С	ECM detects that the throttle valve is stuck open.		

### **FAIL-SAFE MODE**

When the malfunction is detected, ECM enters fail-safe mode and the MIL illuminate.

Detected items	Detected items Engine operating condition in fail-safe mode	
Malfunction A  The ECM controls the electric throttle actuator by regulating the throttle opening around the idle process. The engine speed will not rise more than 2,000 rpm.		
Malfunction B ECM controls the electric throttle control actuator by regulating the throttle opening to 20 deg		
Malfunction C	While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in the N or P position, and engine speed will not exceed 1,000 rpm or more.	

### **DTC Confirmation Procedure**

INFOID:0000000005354442

#### NOTE:

- Perform PROCEDURE FOR MALFUNCTION A AND B first. If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION C.
- If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

### PROCEDURE FOR MALFUNCTION A AND B

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Shift selector lever to the D position and wait at least 3 seconds.
- 3. Shift selector lever to the P position.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON and wait at least 1 second.
- 6. Shift selector lever to the D position and wait at least 3 seconds.
- 7. Shift selector lever to the P position.
- 8. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- 9. Check DTC.
- 10. If DTC is detected, go to EC-1247, "Diagnosis Procedure".

#### PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.

### DTC P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< SERVICE INFORMATION > [VK45DE]

- 2. Shift selector lever to the D position and wait at least 3 seconds.
- 3. Shift selector lever to the P position.
- 4. Start engine and let it idle for 3 seconds.
- 5. Check DTC.
- 6. If DTC is detected, go to EC-1247, "Diagnosis Procedure".

### **Diagnosis Procedure**

### INFOID:0000000005354443

## 1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

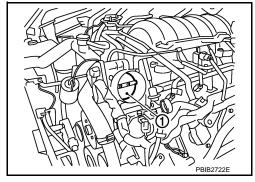
- 1. Remove the intake air duct.
- 2. Check if foreign matter is caught between the throttle valve (1) and the housing.
- This illustration shows the view with intake air removed.

### OK or NG

OK >> GO TO 2.

NG >> Remove the

>> Remove the foreign matter and clean the electric throttle control actuator inside.



# 2.replace electric throttle control actuator

- 1. Replace the electric throttle control actuator.
- 2. Perform EC-764, "Throttle Valve Closed Position Learning".
- 3. Perform EC-765, "Idle Air Volume Learning".

### >> INSPECTION END

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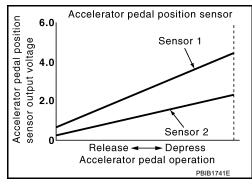
## DTC P2122, P2123 APP SENSOR

## Component Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle valve in response to driving conditions via the throttle control motor.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



### CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354445

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
S	Ignition switch: ON	Accelerator pedal: Fully released	0.4 - 1.1 V
	(Engine stopped)	Accelerator pedal: Fully depressed	3.7 - 4.8 V
CLSD THL POS	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

<sup>\*:</sup> Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

## On Board Diagnosis Logic

INFOID:0000000005354446

These self-diagnoses have the one trip detection logic. NOTE:

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-1121</u>, "<u>DTC Confirmation Procedure"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122 2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	Harness or connectors     (APP sensor 1 circuit is open or shorted.
P2123 2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	Accelerator pedal position sensor (APP sensor 1)

#### **FAIL-SAFE MODE**

When the malfunction is detected, ECM enters fail-safe mode and the MIL illuminate.

### Engine operating condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

### **DTC Confirmation Procedure**

INFOID:0000000005354447

### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

### **TESTING CONDITION:**

Revision: 2009 June **EC-1248** 2010 M35/M45

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### Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

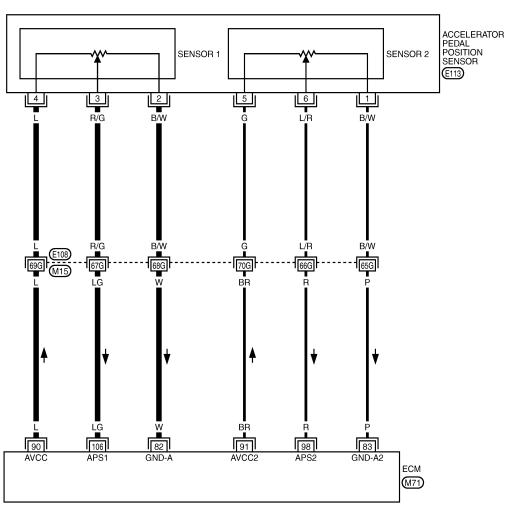
- Start engine and let it idle for 1 second.
- 2. Check DTC.
- 3. If DTC is detected, go to EC-1250. "Diagnosis Procedure".

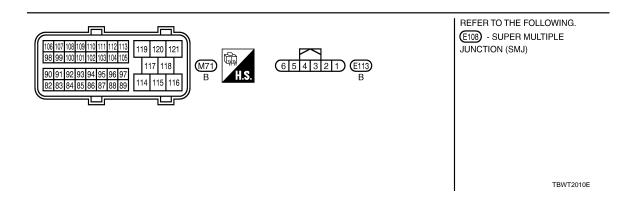
## Wiring Diagram

INFOID:0000000005354448

### EC-APPS1-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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.

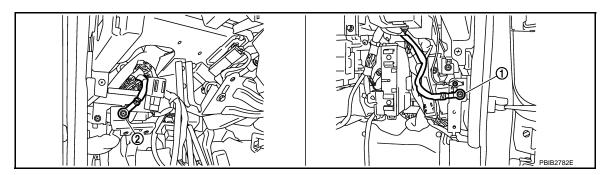
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	W	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
83	Р	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
90	L	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5 V
91	BR	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5 V
0.0	98 R Accelerator pedal position sensor 2	Accelerator pedal position	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.20 - 0.55 V
98		[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	1.85 - 2.40 V	
106 LG	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.4 - 1.1 V	
		[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	3.7 - 4.8 V	

## Diagnosis Procedure

INFOID:0000000005354449

## 1. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".



- 1. Body ground M70
- 2. Body ground M16

### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

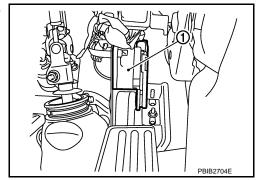
2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

### DTC P2122, P2123 APP SENSOR

### < SERVICE INFORMATION >

[VK45DE]

- Disconnect accelerator pedal position (APP) sensor (1) harness connector.
- 2. Turn ignition switch ON.

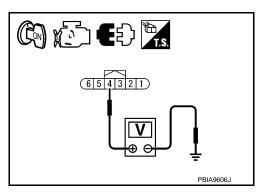


Check voltage between APP sensor terminal 4 and ground with CONSULT-III or tester.

### Voltage: Approximately 5 V

### OK or NG

OK >> GO TO 4. NG >> GO TO 3.



## 3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

## f 4.CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- Check harness continuity between APP sensor terminal 2 and ECM terminal 82. Refer to Wiring Diagram.

### Continuity should exist.

4. Also check harness for short to ground and short to power.

### OK or NG

OK >> GO TO 6. NG >> GO TO 5.

### ${f 5.}$ DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

### $oldsymbol{6}$ .CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check harness continuity between ECM terminal 106 and APP sensor terminal 3. Refer to Wiring Diagram.

### Continuity should exist.

Also check harness for short to ground and short to power.

### OK or NG

EC-1251 Revision: 2009 June 2010 M35/M45

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### [VK45DE]

### < SERVICE INFORMATION >

OK >> GO TO 8. NG >> GO TO 7.

## 7.DETECT MALFUNCTIONING PART

### Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and accelerator pedal position sensor
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

## 8.CHECK APP SENSOR

Refer to EC-1252, "Component Inspection".

#### OK or NG

OK >> GO TO 10. NG >> GO TO 9.

## 9. REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly.
- Perform <u>EC-764</u>, "Accelerator <u>Pedal Released Position Learning</u>".
- 3. Perform EC-764, "Throttle Valve Closed Position Learning".
- Perform <u>EC-765</u>, "Idle Air Volume Learning".

### >> INSPECTION END

## 10. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

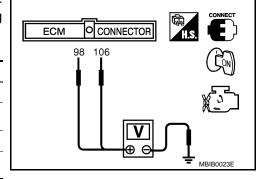
## Component Inspection

INFOID:0000000005354450

### ACCELERATOR PEDAL POSITION SENSOR

- 1. Reconnect all harness connectors disconnected.
- 2. Turn ignition switch ON.
- Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.4 - 1.1 V
	Fully depressed	3.7 - 4.8 V
98	Fully released	0.20 - 0.55 V
(Accelerator pedal position sensor 2)	Fully depressed	1.85 - 2.40 V



- 4. If NG, replace accelerator pedal assembly and go to next step.
- 5. Perform EC-764, "Accelerator Pedal Released Position Learning".
- 6. Perform EC-764, "Throttle Valve Closed Position Learning".
- 7. Perform EC-765, "Idle Air Volume Learning".

## Removal and Installation

INFOID:0000000005354451

### **ACCELERATOR PEDAL**

Refer to ACC-3, "Component".

[VK45DE]

INFOID:0000000005354452

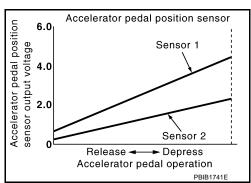
## DTC P2127, P2128 APP SENSOR

## Component Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle valve in response to driving conditions via the throttle control motor.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



INFOID:0000000005354453

### CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1 • Ignition switch: ON		Accelerator pedal: Fully released	0.4 - 1.1 V
ACCEL SEN 2*	(Engine stopped)	Accelerator pedal: Fully depressed	3.7 - 4.8 V
CLSD THL POS	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
CLOD THE POS		Accelerator pedal: Slightly depressed	OFF

<sup>\*:</sup> Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

## On Board Diagnosis Logic

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127 2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	Harness or connectors     (APP sensor 2 circuit is open or shorted.)
P2128 2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	<ul> <li>(TP sensor circuit is shorted.)</li> <li>Accelerator pedal position sensor (APP sensor 2)</li> <li>Electric throttle control actuator (TP sensor 1 and 2)</li> </ul>

### **FAIL-SAFE MODE**

When the malfunction is detected, ECM enters fail-safe mode and the MIL illuminates.

### Engine operating condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

### **DTC Confirmation Procedure**

IIIIIation Procedure INFOID:0000000005354455

### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

### **TESTING CONDITION:**

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Revision: 2009 June **EC-1253** 2010 M35/M45

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

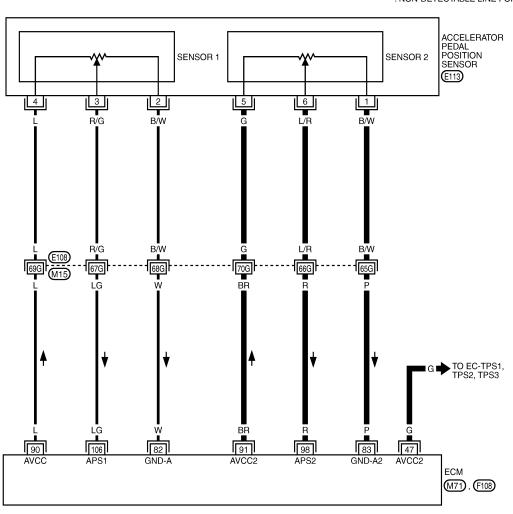
- 1. Start engine and let it idle for 1 second.
- 2. Check DTC.
- If DTC is detected, go to <u>EC-1255</u>, "<u>Diagnosis Procedure</u>".

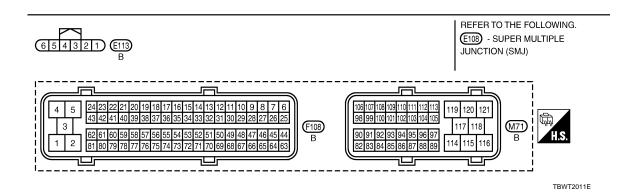
## Wiring Diagram

INFOID:0000000005354456

### EC-APPS2-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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.

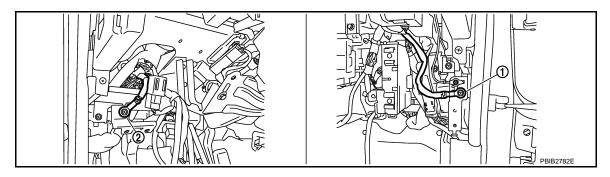
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	G	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5 V
82	W	Sensor ground (APP sensor 1)	[Engine is running]  • Warm-up condition  • Idle speed	Approximately 0 V
83	Р	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
90	L	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5 V
91	BR	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5 V
98	R	Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.20 - 0.55 V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	1.85 - 2.40 V
106	LG	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.4 - 1.1 V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	3.7 - 4.8 V

## Diagnosis Procedure

## 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

2. Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

### OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

Revision: 2009 June **EC-1255** 2010 M35/M45

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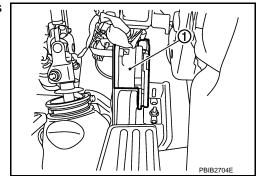
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- Disconnect accelerator pedal position (APP) sensor (1) harness connector.
- 2. Turn ignition switch ON.

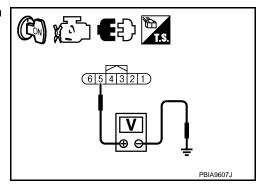


3. Check voltage between APP sensor terminal 5 and ground with CONSULT-III or tester.

### **Voltage: Approximately 5V**

### OK or NG

OK >> GO TO 8. NG >> GO TO 3.



# 3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check harness continuity between APP sensor terminal 5 and ECM terminal 91. Refer to Wiring Diagram.

### Continuity should exist.

### OK or NG

OK >> GO TO 5. NG >> GO TO 4.

## 4. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E108, M15
- · Harness for open or short between ECM and accelerator pedal position sensor

### >> Repair open circuit.

## 5. CHECK SENSOR2 POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
91	APP sensor terminal 5	EC-1254, "Wiring Diagram"
47	Electric throttle control actuator terminal 1	EC-1260, "Wiring Diagram"

### OK or NG

OK >> GO TO 6.

NG >> Repair short to ground or short to power in harness or connectors.

## 6.CHECK THROTTLE POSITION SENSOR

### Refer to EC-1263, "Component Inspection".

### OK or NG

OK >> GO TO 14.

## DTC P2127, P2128 APP SENSOR

NG >> GO TO 7.  7.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR  1. Replace the electric throttle control actuator. 2. Perform EC-764, "Throttle Valve Closed Position Learning". 3. Perform EC-765, "Idle Air Volume Learning".  >> INSPECTION END  8.CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT  1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between APP sensor terminal 1 and ECM terminal 83. Refer to Wiring Diagram.  Continuity should exist.  4. Also check harness for short to ground and short to power.  OK or NG  OK >> GO TO 10.  NG >> GO TO 9.  9.DETECT MALFUNCTIONING PART	
1. Replace the electric throttle control actuator. 2. Perform EC-764, "Throttle Valve Closed Position Learning". 3. Perform EC-765, "Idle Air Volume Learning".  >> INSPECTION END  8. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT  1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between APP sensor terminal 1 and ECM terminal 83. Refer to Wiring Diagram.  Continuity should exist.  4. Also check harness for short to ground and short to power.  OK or NG  OK >> GO TO 10.  NG >> GO TO 9.	
<ol> <li>Perform EC-764. "Throttle Valve Closed Position Learning".</li> <li>Perform EC-765. "Idle Air Volume Learning".</li> <li>&gt;&gt; INSPECTION END</li> <li>CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT</li> <li>Turn ignition switch OFF.</li> <li>Disconnect ECM harness connector.</li> <li>Check harness continuity between APP sensor terminal 1 and ECM terminal 83. Refer to Wiring Diagram.</li> <li>Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> <li>OK or NG</li> <li>OK &gt;&gt; GO TO 10.</li> <li>NG &gt;&gt; GO TO 9.</li> </ol>	
<ol> <li>CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT</li> <li>Turn ignition switch OFF.</li> <li>Disconnect ECM harness connector.</li> <li>Check harness continuity between APP sensor terminal 1 and ECM terminal 83.         Refer to Wiring Diagram.         Continuity should exist.     </li> <li>Also check harness for short to ground and short to power.</li> <li>OK or NG</li> <li>OK &gt;&gt; GO TO 10.</li> <li>NG &gt;&gt; GO TO 9.</li> </ol>	
<ol> <li>Turn ignition switch OFF.</li> <li>Disconnect ECM harness connector.</li> <li>Check harness continuity between APP sensor terminal 1 and ECM terminal 83.         Refer to Wiring Diagram.         Continuity should exist.     </li> <li>Also check harness for short to ground and short to power.</li> <li>OK or NG</li> <li>OK &gt;&gt; GO TO 10.</li> <li>NG &gt;&gt; GO TO 9.</li> </ol>	
<ol> <li>Disconnect ECM harness connector.</li> <li>Check harness continuity between APP sensor terminal 1 and ECM terminal 83. Refer to Wiring Diagram.</li> <li>Continuity should exist.</li> <li>Also check harness for short to ground and short to power.</li> <li>OK or NG</li> <li>OK &gt;&gt; GO TO 10.</li> <li>NG &gt;&gt; GO TO 9.</li> </ol>	
4. Also check harness for short to ground and short to power.  OK or NG  OK >> GO TO 10.  NG >> GO TO 9.	
4. Also check harness for short to ground and short to power.  OK or NG  OK >> GO TO 10.  NG >> GO TO 9.	
OK >> GO TO 10. NG >> GO TO 9.	
NG >> GO TO 9.	
JIDLILOI WALI UNUTIONING FANT	
Check the following.	
Harness connectors E108, M15 Harness for open or short between ECM and accelerator pedal position sensor	
Trainess for open or short between Eow and accelerator pedal position sensor	
>> Repair open circuit or short to ground or short to power in harness or connectors.	
10.check app sensor 2 input signal circuit for open and short	
Check harness continuity between ECM terminal 98 and APP sensor terminal 6.	
Refer to Wiring Diagram.	
Continuity should exist.	
2. Also check harness for short to ground and short to power.	
OK or NG	
OK >> GO TO 12. NG >> GO TO 11.	
1.DETECT MALFUNCTIONING PART	
Check the following.	—
Harness connectors E108, M15	
Harness for open or short between ECM and accelerator pedal position sensor	
>> Repair open circuit or short to ground or short to power in harness or connectors.	
2.CHECK APP SENSOR	
Refer to EC-1263, "Component Inspection".	—
OK or NG	
OK >> GO TO 14.	
NG >> GO TO 13.	
13. REPLACE ACCELERATOR PEDAL ASSEMBLY	
<ol> <li>Replace accelerator pedal assembly.</li> <li>Perform <u>EC-764</u>, "Accelerator Pedal Released Position Learning".</li> </ol>	
3. Perform EC-764, "Throttle Valve Closed Position Learning".	
4. Perform <u>EC-765, "Idle Air Volume Learning"</u> .	

### >> INSPECTION END

## 14. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

### >> INSPECTION END

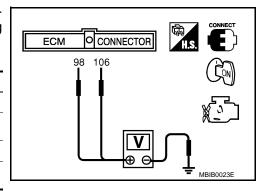
## Component Inspection

#### INFOID:0000000005354458

### ACCELERATOR PEDAL POSITION SENSOR

- 1. Reconnect all harness connectors disconnected.
- 2. Turn ignition switch ON.
- Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106	Fully released	0.4 - 1.1 V
(Accelerator pedal position sensor 1)	Fully depressed	3.7 - 4.8 V
98	Fully released	0.20 - 0.55 V
(Accelerator pedal position sensor 2)	Fully depressed	1.85 - 2.40 V



- 4. If NG, replace accelerator pedal assembly and go to next step.
- 5. Perform EC-764, "Accelerator Pedal Released Position Learning".
- 6. Perform EC-764, "Throttle Valve Closed Position Learning".
- 7. Perform EC-765, "Idle Air Volume Learning".

### Removal and Installation

INFOID:0000000005354459

### ACCELERATOR PEDAL

Refer to ACC-3, "Component".

[VK45DE]

INFOID:0000000005354460

INFOID:0000000005354461

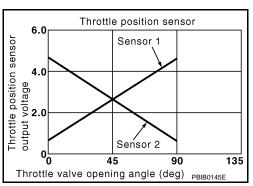
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### DTC P2135 TP SENSOR

## Component 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 the two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving condition via the throttle control motor.



### CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CO	NDITION	SPECIFICATION
TP SEN 1-B1	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36V
TP SEN 2-B1*	<ul><li>(Engine stopped)</li><li>Selector lever position: D</li></ul>	Accelerator pedal: Fully depressed	Less than 4.75V

<sup>\*:</sup> Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

## On Board Diagnosis Logic

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135 2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	,

### **FAIL-SAFE MODE**

When the malfunction is detected, ECM enters fail-safe mode and the MIL illuminate.

#### Engine operation condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

### DTC Confirmation Procedure

INFOID:0000000005354463

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

- Start engine and let it idle for 1 second.
- Check DTC.

EC-1259 Revision: 2009 June 2010 M35/M45

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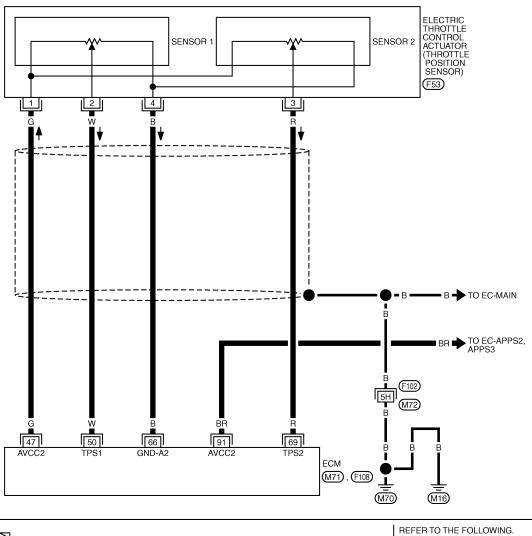
3. If DTC is detected, go to EC-1261, "Diagnosis Procedure".

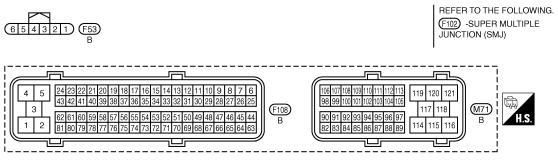
## Wiring Diagram

INFOID:0000000005354464

## EC-TPS3-01

: DETECTABLE LINE FOR DTC : NON-DETECTABLE LINE FOR DTC





TBWT1503E

Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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.

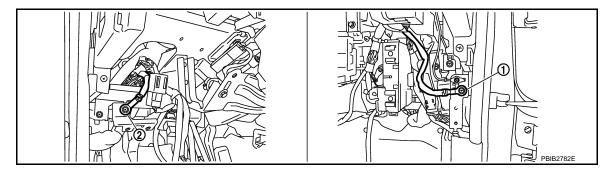
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	G	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5 V
50	W	Threshle nosition concerd	[Ignition switch: ON] • Engine: Stopped • Selector lever position: D • Accelerator pedal: Fully released	More than 0.36 V
50	VV	Throttle position sensor 1  [Ignition switch: ON]  • Engine: Stopped • Selector lever position: D • Accelerator pedal: Fully depressed	Less than 4.75 V	
66	В	Sensor ground (Throttle position sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
69	R	Throttle position sensor 2	[Ignition switch: ON]  • Engine: Stopped  • Selector lever position: D  • Accelerator pedal: Fully released	Less than 4.75 V
09	IX	THIOME POSIMON SENSON 2	[Ignition switch: ON]  • Engine: Stopped  • Selector lever position: D  • Accelerator pedal: Fully depressed	More than 0.36 V
91	BR	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5 V

# Diagnosis Procedure

INFOID:0000000005354465

# 1. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



- 1. Body ground M70
- 2. Body ground M16

# OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

EC-1261 Revision: 2009 June 2010 M35/M45

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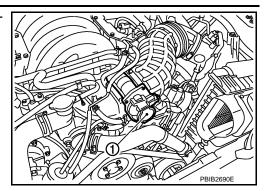
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#### < SERVICE INFORMATION >

- Disconnect electric throttle control actuator (1) harness connector.
- Illustration shows the view with intake air duct removed.
- 2. Turn ignition switch ON.

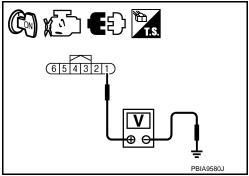


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-III or tester.

## **Voltage: Approximately 5 V**

#### OK or NG

OK >> GO TO 7. NG >> GO TO 3.



# $\overline{\mathbf{3}}$ .check throttle position sensor power supply circuit-ii

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.

#### Continuity should exist.

#### OK or NG

OK >> GO TO 4.

NG >> Repair open circuit.

# 4. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 1	EC-1260, "Wiring Diagram"
91	APP sensor terminal 5	EC-1266, "Wiring Diagram"

## OK or NG

OK >> GO TO 5.

NG >> Repair short to ground or short to power in harness or connectors.

# 5. CHECK APP SENSOR

Refer to EC-1270, "Component Inspection".

#### OK or NG

OK >> GO TO 11. NG >> GO TO 6.

# **6.**REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly.
- 2. Perform EC-764, "Accelerator Pedal Released Position Learning".
- 3. Perform EC-764, "Throttle Valve Closed Position Learning".
- 4. Perform EC-765, "Idle Air Volume Learning".

## **DTC P2135 TP SENSOR**

< SERVICE INFORMATION > [VK45DE]

Α >> INSPECTION END 7.check throttle position sensor ground circuit for open and short Turn ignition switch OFF. EC Disconnect ECM harness connector. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 66. Refer to Wiring Diagram. Continuity should exist. Also check harness for short to ground and short to power. D OK or NG OK >> GO TO 8. NG >> Repair open circuit or short to ground or short to power in harness or connectors. Е 8.CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT Check harness continuity between ECM terminal 50 and electric throttle control actuator terminal 2, ECM terminal 69 and electric throttle control actuator terminal 3. F Refer to Wiring Diagram. Continuity should exist. 2. Also check harness for short to ground and short to power. OK or NG OK NG >> Repair open circuit or short to ground or short to power in harness or connectors. 9. CHECK THROTTLE POSITION SENSOR Refer to EC-1263, "Component Inspection". OK or NG OK >> GO TO 11. NG >> GO TO 10. 10.replace electric throttle control actuator Replace the electric throttle control actuator. Perform EC-764, "Throttle Valve Closed Position Learning". Perform EC-765, "Idle Air Volume Learning". >> INSPECTION END 11. CHECK INTERMITTENT INCIDENT Refer to EC-822, "Diagnosis Procedure". >> INSPECTION END N Component Inspection INFOID:0000000005354466 THROTTLE POSITION SENSOR Reconnect all harness connectors disconnected. Perform EC-764, "Throttle Valve Closed Position Learning". Р Turn ignition switch ON. 4. Set selector lever to the D position.

Revision: 2009 June **EC-1263** 2010 M35/M45

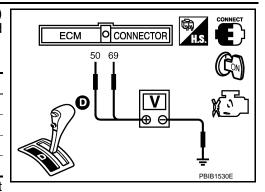
# **DTC P2135 TP SENSOR**

## < SERVICE INFORMATION >

[VK45DE]

 Check voltage between ECM terminal 50 (TP sensor 1 signal) and ground, ECM terminal 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50	Fully released	More than 0.36 V
(Throttle position sensor 1)	Fully depressed	Less than 4.75 V
69	Fully released	Less than 4.75 V
(Throttle position sensor 2)	Fully depressed	More than 0.36 V



- If NG, replace electric throttle control actuator and go to the next step.
- 7. Perform EC-764, "Throttle Valve Closed Position Learning".
- 8. Perform EC-765, "Idle Air Volume Learning".

# Removal and Installation

INFOID:0000000005354467

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-174, "Component".

INFOID:0000000005354468

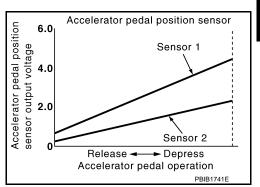
# DTC P2138 APP SENSOR

# Component Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle valve in response to driving conditions via the throttle control motor.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



#### INFOID:0000000005354469

INFOID:0000000005354470

## CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1	Ignition switch: ON	Accelerator pedal: Fully released	0.4 - 1.1 V
ACCEL SEN 2*	(Engine stopped)	Accelerator pedal: Fully depressed	3.7 - 4.8 V
CLSD THL POS	Ignition switch: ON     (Engine stopped)	Accelerator pedal: Fully released	ON
CLSD THE POS		Accelerator pedal: Slightly depressed	OFF

<sup>\*:</sup> Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

# On Board Diagnosis Logic

This self-diagnosis has the one trip detection logic. NOTE:

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1121, "DTC Confirmation Procedure".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138 2138	Accelerator pedal position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	Harness or connector     (APP sensor 1 or 2 circuit is open or shorted.)     (TP sensor circuit is shorted.)     Accelerator pedal position sensor     (APP sensor 1 or 2)     Electric throttle control actuator     (TP sensor 1 or 2)

#### FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL illuminates.

## Engine operating condition in fail-safe mode

The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10

The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.

So, the acceleration will be poor.

# DTC Confirmation Procedure

INFOID:000000000535447

#### NOTE:

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

Turn ignition switch OFF and wait at least 10 seconds.

EC-1265 Revision: 2009 June 2010 M35/M45

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#### < SERVICE INFORMATION >

- Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

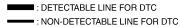
Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

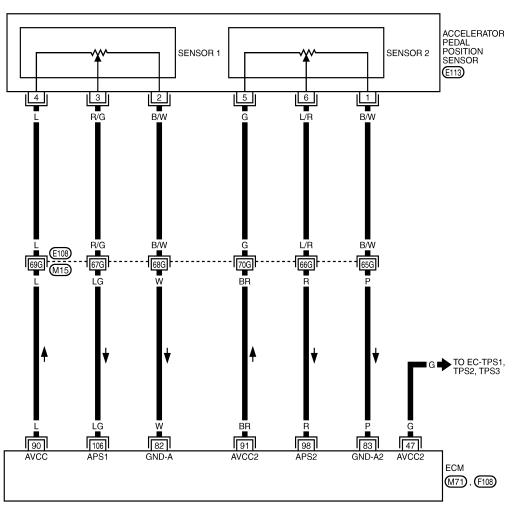
- Start engine and let it idle for 1 second.
- 2. Check DTC.
- 3. If DTC is detected, go to EC-1267, "Diagnosis Procedure".

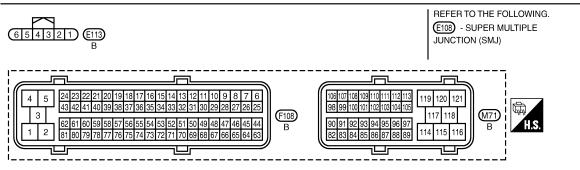
# Wiring Diagram

INFOID:0000000005354472

# EC-APPS3-01







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Specification data are reference values and are measured between each terminal and ground.

**CAUTION:** 

Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	G	Sensor power supply (Throttle position sensor)	[Ignition switch: ON]	Approximately 5 V
82	W	Sensor ground (APP sensor 1)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
83	Р	Sensor ground (APP sensor 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
90	L	Sensor power supply (APP sensor 1)	[Ignition switch: ON]	Approximately 5 V
91	BR	Sensor power supply (APP sensor 2)	[Ignition switch: ON]	Approximately 5 V
98	D	R Accelerator pedal position sensor 2	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.20 - 0.55 V
98 K	K		sensor 2	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed
106	LG	Accelerator pedal position sensor 1	[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully released	0.4 - 1.1 V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	3.7 - 4.8 V

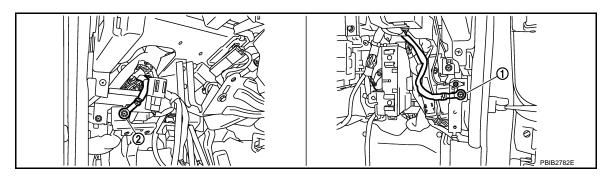
# Diagnosis Procedure

INFOID:0000000005354473

# 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

2. Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".



1. Body ground M70

2. Body ground M16

#### OK or NG

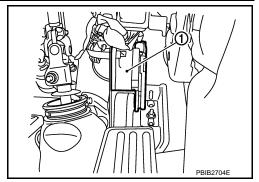
OK >> GO TO 2.

NG >> Repair or replace ground connections.

Revision: 2009 June **EC-1267** 2010 M35/M45

# 2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
- 2. Turn ignition switch ON.

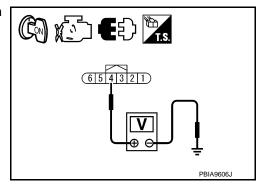


3. Check voltage between APP sensor terminal 4 and ground with CONSULT-III or tester.

## **Voltage: Approximately 5 V**

#### OK or NG

OK >> GO TO 4. NG >> GO TO 3.



# 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ECM and accelerator pedal position sensor
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

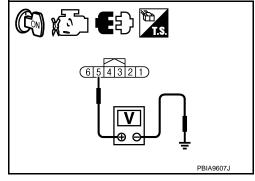
# 4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

 Check voltage between APP sensor terminal 5 and ground with CONSULT-III or tester.

## **Voltage: Approximately 5 V**

#### OK or NG

OK >> GO TO 10. NG >> GO TO 5.



# 5. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check harness continuity between APP sensor terminal 5 and ECM terminal 91. Refer to Wiring Diagram.

#### Continuity should exist.

## OK or NG

OK >> GO TO 7. NG >> GO TO 6.

# 6. DETECT MALFUNCTIONING PART

# **DTC P2138 APP SENSOR** [VK45DE] < SERVICE INFORMATION > Check the following. Harness connectors E108, M15 Α Harness for open or short between ECM and accelerator pedal position sensor >> Repair open circuit. EC 7. CHECK SENSOR POWER SUPPLY CIRCUIT Check harness for short to power and short to ground, between the following terminals. ECM terminal Sensor terminal Reference Wiring Diagram 91 APP sensor terminal 4 EC-1266, "Wiring Diagram" Electric throttle control actuator terminal 1 EC-1260, "Wiring Diagram" OK or NG Е OK >> GO TO 8. NG >> Repair short to ground or short to power in harness or connectors. 8.CHECK THROTTLE POSITION SENSOR Refer to EC-1263, "Component Inspection". OK or NG OK >> GO TO 16. NG >> GO TO 9. $9.\mathsf{REPLACE}$ ELECTRIC THROTTLE CONTROL ACTUATOR Replace the electric throttle control actuator. Perform <u>EC-764</u>, "Throttle Valve Closed Position Learning". Perform <u>EC-765</u>, "Idle Air Volume Learning". >> INSPECTION END 10.check app sensor ground circuit for open and short Turn ignition switch OFF. 2. Disconnect ECM harness connector. Check harness continuity between APP sensor terminal 2 and ECM terminal 82, APP sensor terminal 1 and ECM terminal 83. Refer to Wiring Diagram. Continuity should exist. Also check harness for short to ground and short to power. OK or NG OK >> GO TO 12. NG >> GO TO 11. 11. DETECT MALFUNCTIONING PART N Check the following. Harness connectors E108, M15 Harness for open or short between ECM and accelerator pedal position sensor >> Repair open circuit or short to ground or short to power in harness or connectors. Р 12. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check harness continuity between ECM terminal 106 and APP sensor terminal 3, ECM terminal 98 and APP sensor terminal 6.
 Refer to Wiring Diagram.

## Continuity should exist.

Also check harness for short to ground and short to power.

Revision: 2009 June EC-1269 2010 M35/M45

#### < SERVICE INFORMATION >

#### OK or NG

OK >> GO TO 14. NG >> GO TO 13.

# 13. DETECT MALFUNCTIONING PART

## Check the following.

- Harness connectors E108, M15
- · Harness for open or short between ECM and accelerator pedal position sensor
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

# 14. CHECK APP SENSOR

Refer to EC-1270, "Component Inspection".

#### OK or NG

OK >> GO TO 16. NG >> GO TO 15.

# 15. REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly.
- Perform <u>EC-764</u>, "Accelerator Pedal Released Position Learning".
- 3. Perform EC-764, "Throttle Valve Closed Position Learning".
- 4. Perform EC-765, "Idle Air Volume Learning".

#### >> INSPECTION END

# 16. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

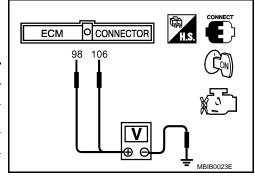
# Component Inspection

INFOID:0000000005354474

#### ACCELERATOR PEDAL POSITION SENSOR

- Reconnect all harness connectors disconnected.
- 2. Turn ignition switch ON.
- Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106	Fully released	0.4 - 1.1 V
(Accelerator pedal position sensor 1)	Fully depressed	3.7 - 4.8 V
98	Fully released	0.20 - 0.55 V
(Accelerator pedal position sensor 2)	Fully depressed	1.85 - 2.40 V



- 4. If NG, replace accelerator pedal assembly and go to next step.
- 5. Perform EC-764, "Accelerator Pedal Released Position Learning".
- 6. Perform EC-764, "Throttle Valve Closed Position Learning".
- 7. Perform EC-765, "Idle Air Volume Learning".

#### Removal and Installation

INFOID:0000000005354475

#### ACCELERATOR PEDAL

Refer to ACC-3, "Component".

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# DTC P2A00, P2A03 A/F SENSOR 1

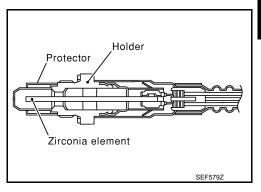
# Component Description

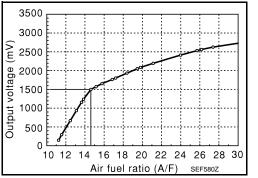
The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

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 (0.7 <  $\lambda$  < air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.

An electronic circuit controls the pump current through the oxygen pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at  $\lambda = 1$ . Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).





# CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1) A/F SEN1 (B2)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5 V

# On Board Diagnosis Logic

To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored not to shift to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2A00 2A00 (Bank 1)	Air fuel ratio (A/F) sensor 1	The A/F signal computed by ECM from the A/F sensor 1 signal shifts to the lean side for a specified period.	A/F sensor 1     A/F sensor 1 heater     Fuel pressure
P2A03 2A03 (Bank 2)	circuit range/performance	<ul> <li>The A/F signal computed by ECM from the A/F sensor 1 signal shifts to the rich side for a specified period.</li> </ul>	Fuel injector     Intake air leakage

# **DTC Confirmation Procedure**

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds. 1.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

#### **TESTING CONDITION:**

NOTE:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

EC-1271 Revision: 2009 June 2010 M35/M45

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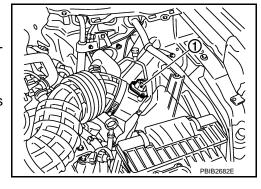
INFOID:0000000005354479

# (II) WITH CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CON-SULT-III.
- 6. Clear the self-learning coefficient by touching "CLEAR".
- 7. Turn ignition switch OFF and wait at least 10 seconds.
- 8. Turn ignition switch ON.
- 9. Turn ignition switch OFF and wait at least 10 seconds.
- 10. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
- 11. Let engine idle for 1 minute.
- 12. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
- 13. Check 1st trip DTC.
- 14. If 1st trip DTC is detected, go to EC-1276, "Diagnosis Procedure".

## **WITH GST**

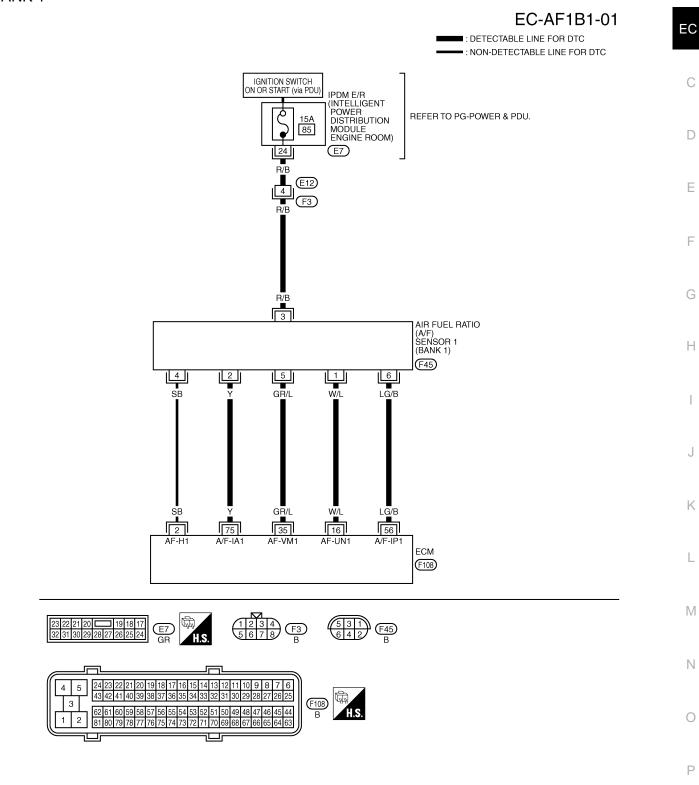
- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Disconnect mass air flow sensor (1) harness connector.
- 4. Start engine and let it idle for at least 5 seconds.
- Stop engine and reconnect mass air flow sensor harness connector.
- 6. Turn ignition switch ON.
- Select Service \$03 with GST and check that DTC P0102 is detected.
- 8. Select Service \$04 with GST and erase the DTC P0102.
- 9. Turn ignition switch OFF and wait at least 10 seconds.
- 10. Turn ignition switch ON.
- 11. Turn ignition switch OFF and wait at least 10 seconds.
- 12. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
- 13. Let engine idle for 1 minute.
- 14. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
- 15. Check 1st trip DTC.
- 16. If 1st trip DTC is detected, go to EC-1276, "Diagnosis Procedure".



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Wiring Diagram

BANK 1



TBWT1046E

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III. CAUTION:

# DTC P2A00, P2A03 A/F SENSOR 1

< SERVICE INFORMATION >

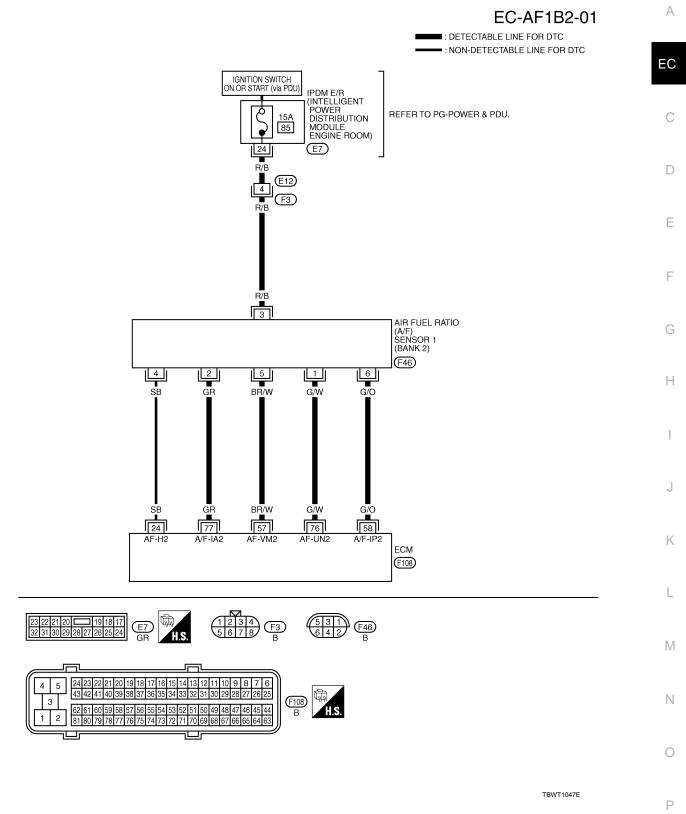
[VK45DE]

Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	SB	A/F sensor 1 heater (bank 1)	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Approximately 5 V★  → 10.0V/Div 10 ms/Div T  PBIB1584E
16	W/L		[Engine is running]  • Warm-up condition  • Idle speed	Approximately 3.1 V
35	GR/L	A/F sensor 1 (bank 1)		Approximately 2.6 V
56	LG/B			Approximately 2.3 V
75	Υ			Approximately 2.3 V

<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)





Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

#### CAUTION:

Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	SB	A/F sensor 1 heater (bank 2)	[Engine is running] • Warm-up condition • Idle speed	Approximately 5 V★  → 10.0V/Div 10 ms/Div T  PBIB1584E
57	BR/W		[Engine is running] • Warm-up condition • Idle speed	Approximately 2.6 V
58	G/O	A/F sensor 1 (bank 2)		Approximately 2.3 V
76	G/W			Approximately 3.1 V
77	GR			Approximately 2.3 V

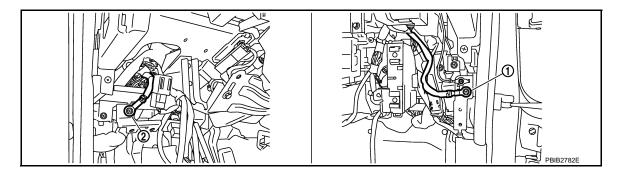
<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# Diagnosis Procedure

INFOID:0000000005354481

# 1. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Loosen and retighten ground screws on the body. Refer to EC-828, "Ground Inspection".



1. Body ground M70

2. Body ground M16

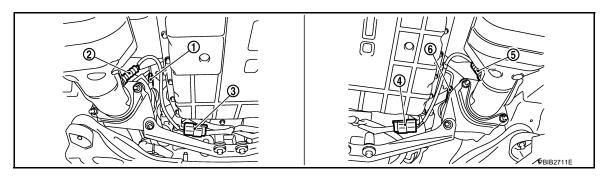
# OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

# 2.RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

1. Loosen and retighten the air fuel ratio (A/F) sensor 1.



# **DTC P2A00, P2A03 A/F SENSOR 1**

[VK45DE] < SERVICE INFORMATION >

- 1. A/F sensor 1 (bank 1)
- 2. Heated oxygen sensor 2 (bank 1)
- 3. Heated oxygen sensor 2 (bank 1) harness connector

- Heated oxygen sensor 2 (bank 2) harness connector
- 5. Heated oxygen sensor 2 (bank 2)
- 6. A/F sensor 1 (bank 2)

Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

# 3.CHECK FOR INTAKE AIR LEAKAGE

- Start engine and run it at idle.
- 2. Listen for an intake air leakage after the mass air flow sensor.

#### OK or NG

OK >> GO TO 4.

NG >> Repair or replace malfunctioning part.

# 4.CLEAR THE SELF-LEARNING DATA

# (II) With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
- 3. Clear the self-learning control coefficient by touching "CLEAR".
- 4. Run engine for at least 10 minutes at idle speed. Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?

# **▼ Without CONSULT-III**

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF.
- Disconnect mass air flow sensor (1) harness connector.
- 4. Restart engine and let it idle for at least 5 seconds.
- Stop engine and reconnect mass air flow sensor harness connector.
- 6. Check that DTC P0102 is displayed.
- Erase the DTC memory. Refer to "How to Erase DTC" in EC-735, "Emission-Related Diagnostic Information".
- 8. Check that DTC P0000 is displayed.
- 9. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?

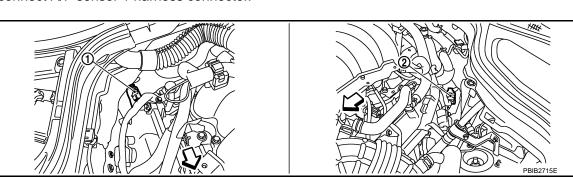
# Yes or No

>> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-970, "DTC Con-Yes firmation Procedure or EC-979, "DTC Confirmation Procedure".

Nο >> GO TO 5.

# 5. CHECK HARNESS CONNECTOR

- 1. Turn ignition switch OFF.
- Disconnect A/F sensor 1 harness connector.



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1. A/F sensor 1 (bank 2) harness connector

2. A/F sensor 1 (bank 1) harness connector

3. Check harness connector for water.

#### Water should not exit.

#### OK or NG

OK >> GO TO 6.

NG >> Repair or replace harness connector.

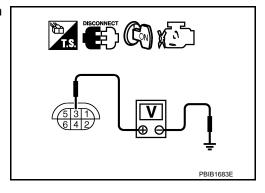
# 6.CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Turn ignition switch ON.
- 2. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-III or tester.

## Voltage: Battery voltage

#### OK or NG

OK >> GO TO 8. NG >> GO TO 7.



# 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- IPDM E/R harness connector E7
- 15 A fuse
- · Harness for open or short between A/F sensor 1 and fuse
  - >> Repair or replace harness or connectors.

# $8.\mathsf{CHECK}$ A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between A/F sensor 1 terminal and ECM terminal as per the following. Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
	1	16
Bank1	2	75
Baliki	5	35
	6	56
	1	76
Bank 2	2	77
Dalik 2	5	57
	6	58

#### Continuity should exist.

4. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

# **DTC P2A00, P2A03 A/F SENSOR 1**

< SERVICE INFORMATION >

[VK45DE]

k 1	Bar	ık 2
ECM terminal	A/F sensor 1 terminal	ECM terminal
16	1	76
75	2	77
35	5	57
56	6	58
	ECM terminal 16 75 35	ECM terminal         A/F sensor 1 terminal           16         1           75         2           35         5

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## Continuity should not exist.

5. Also check harness for short to power.

#### OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

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# 9. CHECK A/F SENSOR 1 HEATER

Refer to EC-851, "Component Inspection".

## OK or NG

OK >> GO TO 10.

NG >> GO TO 11.

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# 10. CHECK INTERMITTENT INCIDENT

Perform EC-822, "Diagnosis Procedure".

#### OK or NG

OK >> GO TO 11.

NG >> Repair or replace malfunctioning part.

# 11.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1.

#### **CAUTION:**

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> GO TO 12.

# 12.CONFIRM A/F ADJUSTMENT DATA

- Turn ignition switch ON.
- 2. Select "A/F ADJ-B1" and "A/F ADJ-B2" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check that 'that "0.000" is displayed on CONSULT-III screen.

## OK or NG

OK >> INSPECTION END

NG >> GO TO 13.

13.CLEAR A/F ADJUSTMENT DATA

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# (P) With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.
- Clear the self-learning control coefficient by touching "CLEAR".

#### (R) Without CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF.

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Revision: 2009 June **EC-1279** 2010 M35/M45

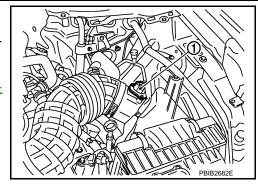
# DTC P2A00, P2A03 A/F SENSOR 1

#### < SERVICE INFORMATION >

[VK45DE]

- 3. Disconnect mass air flow sensor (1) harness connector.
- Restart engine and let it idle for at least 5 seconds.
- Stop engine and reconnect mass air flow sensor harness connector.
- 6. Check that DTC P0102 is displayed.
- 7. Erase the DTC memory. Refer to "How to Erase DTC" in <u>EC-735</u>, "Emission-Related Diagnostic Information".
- 8. Check that DTC P0000 is displayed.

>> GO TO 14.



# 14. CONFIRM A/F ADJUSTMENT DATA

- 1. Turn ignition switch OFF and then ON.
- 2. Select "A/F ADJ-B1" and "A/F ADJ-B2" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check that that "0.000" is displayed on CONSULT-III screen.

#### >> INSPECTION END

Removal and Installation

INFOID:0000000005354482

AIR FUEL RATIO (A/F) SENSOR 1 Refer to EM-178, "Component".

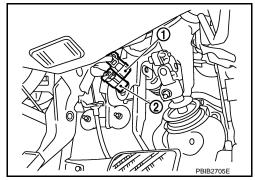
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# ASCD BRAKE SWITCH

# **Component Description**

When the brake pedal is depressed, ASCD brake switch (2) is turned OFF and stop lamp switch (1) is turned ON. ECM detects the state of the brake pedal by two kinds of input (ON/OFF signal). Refer to <a href="EC-717">EC-717</a>, "System Description" for the ASCD function.



# CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1	Ignition switch: ON	Brake pedal: Fully released	ON
(ASCD brake switch)	• Ignition switch. ON	Brake pedal: Slightly depressed	OFF
BRAKE SW2	Ignition switch: ON	Brake pedal: Fully released	OFF
(Stop lamp switch)	• Igrillion Switch. ON	Brake pedal: Slightly depressed	ON

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< SERVICE INFORMATION > Wiring Diagram EC-ASCBOF-01 : DETECTABLE LINE FOR DTC : NON-DETECTABLE LINE FOR DTC IGNITION SWITCH ON OR START (via PDU) **BATTERY** REFER TO PG-POWER & PDU. FUSE BLOCK (J/B) 10A 20 10A 12 E101), E102) G/R G/R STOP LAMP SWITCH ASCD BRAKE SWITCH DEPRESSED DEPRESSED RELEASED (E124) (E109) RELEASED RELEASED DEPRESSED B/R BR 108 101 BRAKE **BNCSW ECM** M71REFER TO THE FOLLOWING. (E108) - SUPER MULTIPLE 119 120 JUNCTION (SMJ) 2 1 BR (E101), (E102) - FUSE BLOCK -117 (M71) JUNCTION BOX (J/B) 114 115 116

Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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.

# **ASCD BRAKE SWITCH**

< SERVICE INFORMATION >

[VK45DE]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	
101	V/R	Stan Jama quitab	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0 V	
101	V/K	[Ignition switch: 0	/R Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)
108	BR	ASCD brake switch	[Ignition switch: ON] • Brake pedal: Slightly depressed	Approximately 0 V	
108	DK	ASOD DIAKE SWICTI	[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)	

# Diagnosis Procedure

INFOID:0000000005354486

# 1. CHECK OVERALL FUNCTION-I

# (II) 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.

CONDITION	INDICATION
Brake pedal: Fully released	ON
Brake pedal: Slightly depressed	OFF

# **⋈** Without CONSULT-III

- 1. Turn ignition switch ON.
- 2. Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Battery voltage
Brake pedal: Slightly depressed	Approximately 0 V

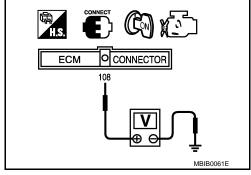
## OK or NG

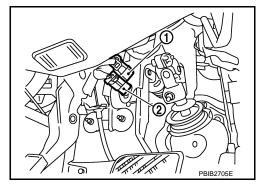
OK >> INSPECTION END

NG >> GO TO 2.

# 2.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch (2) harness connector.
- Stop lamp switch (1)
- Turn ignition switch ON.





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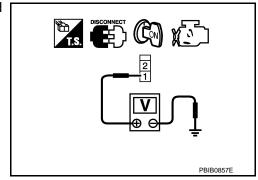
#### < SERVICE INFORMATION >

4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-III or tester.

#### Voltage: Battery voltage

## OK or NG

OK >> GO TO 4. NG >> GO TO 3.



# 3.DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E102
- 10 A fuse
- 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.

# 4. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 6. NG >> GO TO 5.

# 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- · Harness for open or short between ECM and ASCD brake switch
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

# 6. CHECK ASCD BRAKE SWITCH

Refer to EC-1213, "Component Inspection"

# OK or NG

OK >> GO TO 7.

NG >> Replace ASCD brake switch.

# 7. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

# Component Inspection

INFOID:0000000005354487

#### ASCD BRAKE SWITCH

- Turn ignition switch OFF.
- Disconnect ASCD brake switch harness connector.

# **ASCD BRAKE SWITCH**

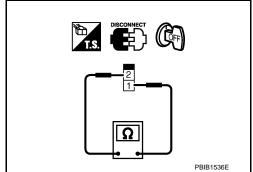
## < SERVICE INFORMATION >

[VK45DE]

3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

4. If NG, adjust ASCD brake switch installation, refer to <u>BR-6</u>, <u>"Inspection and Adjustment"</u>, and perform step 3 again.



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# **ASCD INDICATOR**

[VK45DE] < SERVICE INFORMATION >

# ASCD INDICATOR

# Component Description

INFOID:0000000005354488

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.

CRUISE lamp illuminates when MAIN switch on ASCD steering switch is turned ON to indicate that ASCD system is ready for operation.

SET lamp illuminates when the following conditions are met.

- CRUISE lamp is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of the ASCD setting.

SET lamp remains lit during ASCD control.

Refer to EC-717, "System Description" for the ASCD function.

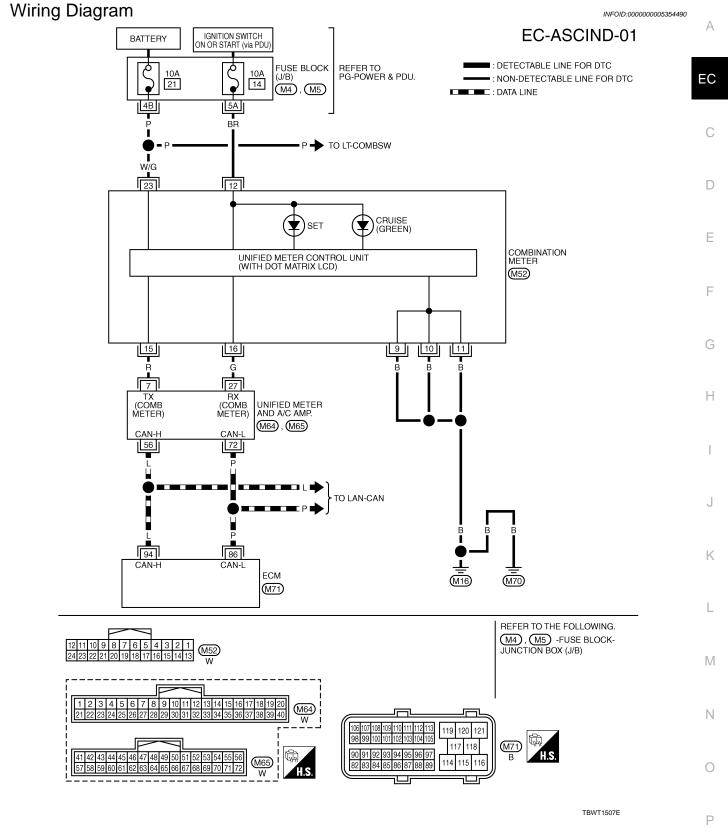
# CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354489

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time $\rightarrow$ at the 2nd time	$ON \to OFF$
	MAIN switch: ON	ASCD: Operating	ON
SET LAMP	Vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Not operating	OFF

INFOID:0000000005354491



# Diagnosis Procedure

1. CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

## **ASCD INDICATOR**

< SERVICE INFORMATION >

[VK45DE]

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	$ON \to OFF$
	MAIN switch: ON	ASCD: Operating	ON
SET LAMP	<ul> <li>Vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)</li> </ul>	ASCD: Not operating	OFF

# OK or NG

OK >> INSPECTION END

NG >> GO TO 2.

2. CHECK DTC

Check that DTC UXXXX is not displayed.

## OK or NG

OK >> GO TO 3.

NG >> Perform trouble diagnosis for DTC UXXXX.

 ${\bf 3.}$ CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to DI-28, "CONSULT-III Function (METER/M&A)".

# OK or NG

OK >> GO TO 4.

NG >> Go to DI-31, "DTC [B2202] Meter Communication Circuit".

4. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

>> INSPECTION END

< SERVICE INFORMATION >

[VK45DE]

INFOID:0000000005354493

# **ELECTRICAL LOAD SIGNAL**

Description INFOID:0000000005354492

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, heater fan switch signal, etc.) is transferred via the CAN communication line.

CONDITION

and/or

switch: OFF

Heater fan switch: ON

Heater fan switch: OFF

Rear window defogger switch: ON

Rear window defogger switch and lighting

Lighting switch: 2ND position

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## CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

	SPECIFICATION	
ON		-
OFF		

ON

OFF

Diagnosis Procedure

MONITOR ITEM

LOAD SIGNAL

HEATER FAN SW

INFOID:0000000005354494

# 1. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

· Engine: After warming up, idle the

Turn ignition switch ON.

2. Select "DATA MONITOR" mode with CONSULT-III.

· Ignition switch: ON

engine

3. Select "LOAD SIGNAL" and check indication under the following conditions.

Condition	Indication
Rear window defogger switch: ON	ON
Rear window defogger switch: OFF	OFF

#### OK or NG

OK >> GO TO 2. NG >> GO TO 4.

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# 2.CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Check "LOAD SIGNAL" indication under the following conditions.

Condition	Indication
Lighting switch: ON at 2nd position	ON
Lighting switch: OFF	OFF

#### OK or NG

OK >> GO TO 3. NG >> GO TO 5. Ν

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# 3.CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

Select "HEATER FAN SW" and check indication under the following conditions.

Condition	Indication
Heater fan control switch: ON	ON
Heater fan control switch: OFF	OFF

#### OK or NG

OK >> INSPECTION END

NG >> GO TO 6.

## **ELECTRICAL LOAD SIGNAL**

< SERVICE INFORMATION >

[VK45DE]

# 4. CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to GW-72, "Work Flow".

#### >> INSPECTION END

# 5. CHECK HEADLAMP SYSTEM

Refer to LT-6. "System Description" (For USA) or LT-35. "System Description" (For Canada).

## >> INSPECTION END

# 6. CHECK HEATER FAN CONTROL SYSTEM

Refer to ATC-48, "Self-Diagnosis Function".

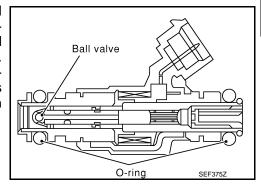
#### >> INSPECTION END

INFOID:0000000005354495

# **FUEL INJECTOR**

# **Component 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.



INFOID:0000000005354496

## CONSULT-III Reference Value in Data Monitor Mode

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
B/FUEL SCHDL	See EC-814, "Inspection Procedure".		
	Engine: After warming up	Idle	2.0 - 3.0 msec
INJ PULSE-B1 INJ PULSE-B2	Selector lever position: P or N     Air conditioner switch: OFF     No load	2,000 rpm	1.9 - 2.9 msec

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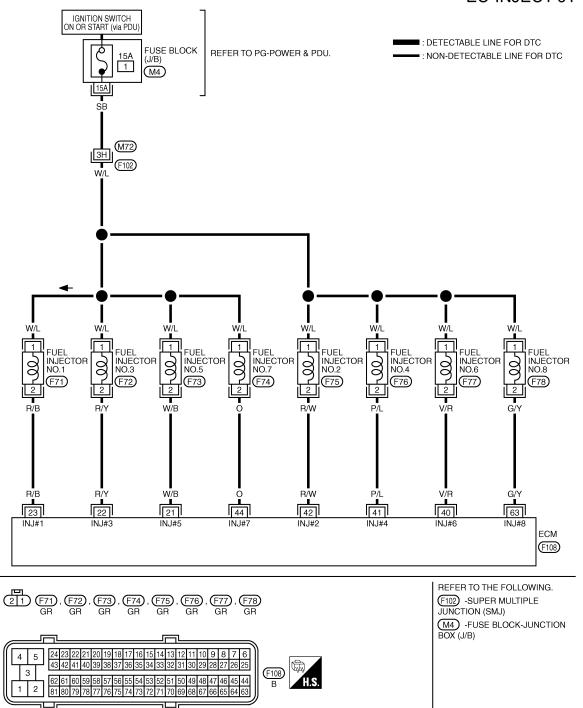
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Wiring Diagram

INFOID:0000000005354497

# **EC-INJECT-01**



TBWT1505E

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

**CAUTION:** 

## < SERVICE INFORMATION >

[VK45DE]

INFOID:0000000005354498

Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	EC	
			[Engine is running]	BATTERY VOLTAGE (11 - 14 V)*	С	
21	W/B	Fuel injector No. 5	Warm-up condition     Idle speed     NOTE:     The pulse cycle changes depending on rpm at idle	Idle speed     NOTE:     The pulse cycle changes depending on rpm at idle		D
22 23 40	R/Y R/B V/R	Fuel injector No. 3 Fuel injector No. 1 Fuel injector No. 6			>> 10.0V/Div 50 ms/Div PBIB0042E	Е
41 42 44 63	P/L R/W O G/Y	W Fuel injector No. 2 Fuel injector No. 7	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>	BATTERY VOLTAGE (11 - 14 V)*	F	
		211giilo opood. 2,000 ipiii	>> 10.0V/Div 50 ms/Div PBIB0043E	G H		

<sup>★:</sup> Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# Diagnosis Procedure

# 1.INSPECTION START

Turn ignition switch to START.

## Are any cylinders ignited?

## Yes or No

Yes >> GO TO 2. No >> GO TO 3.

# 2. CHECK OVERALL FUNCTION

## (II) With CONSULT-III

- 1. Start engine.
- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Check that each circuit produces a momentary engine speed drop.

#### Without CONSULT-III

- 1. Start engine.
- Listen to each fuel injector operating sound.

## Operating sound should exist.

#### OK or NG

OK >> INSPECTION END

NG >> GO TO 3.

# At idle Suitable tool Click Click Click PBIB1986E

# 3.check fuel injector power supply circuit

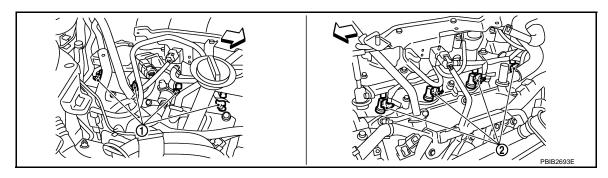
- 1. Turn ignition switch OFF.
- 2. Disconnect fuel injector harness connectors.

Revision: 2009 June **EC-1293** 2010 M35/M45

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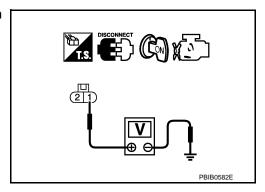
- 1. Fuel injector (bank 2)
- 2. Fuel injector (bank 1)

- 3. Turn ignition switch ON.
- 4. Check voltage between fuel injector terminal 1 and ground with CONSULT-III or tester.

## Voltage: Battery voltage

#### OK or NG

OK >> GO TO 5. NG >> GO TO 4.



# 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M72, F102
- Fuse block (J/B) connector M4
- 15 A fuse
- 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.

# 5.CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check harness continuity between ECM terminals 21, 22, 23, 40, 41, 42, 44, 63 and fuel injector terminal 2. Refer to Wiring Diagram.

#### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 6.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 6.CHECK FUEL INJECTOR

Refer to EC-1295, "Component Inspection".

#### OK or NG

OK >> GO TO 7.

NG >> Replace malfuncioning fuel injector.

# 7. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

# Component Inspection

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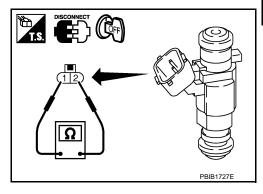
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## **FUEL INJECTOR**

- 1. Disconnect fuel injector harness connector.
- 2. Check resistance between terminals as shown in the figure.

Resistance: 13.5 - 17.5  $\Omega$  [at 10 - 60°C (50 - 140°F)]



INFOID:0000000005354500

# Removal and Installation

**FUEL INJECTOR** 

Refer to EM-189, "Component".

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# **FUEL PUMP**

Description INFOID:000000005354501

#### SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay
Battery	Battery voltage*		

<sup>\*:</sup> ECM determines the start signal status by the signals of engine speed and battery voltage.

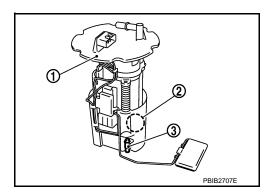
The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine start ability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal 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 DESCRIPTION

A turbine type design fuel pump is used in the fuel tank.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel tank temperature sensor (3)

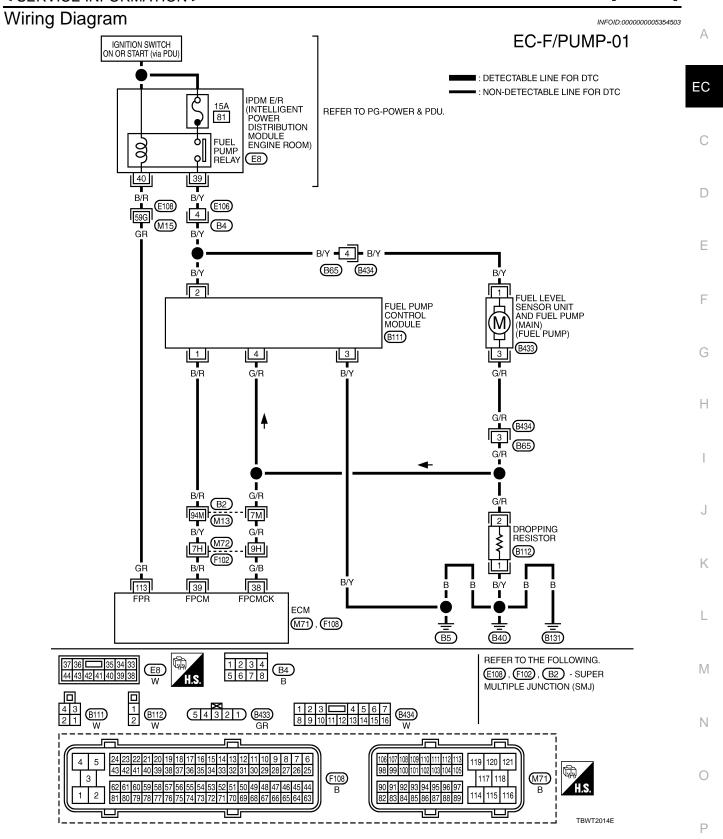


## CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354502

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	<ul><li>For 1 seconds after turning ignition switch: ON</li><li>Engine running or cranking</li></ul>	ON
	Except above	OFF



Specification data are reference values and are measured between each terminal and ground. **CAUTION**:

Never 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.

## **FUEL PUMP**

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
38	G/B	Fuel pump control module (FPCM) check	[When cranking engine]  [Engine is running]  • Warm-up condition  • Idle speed	Approximately 0 V 4 - 6 V
39	B/R	Fuel pump control module (FPCM)	[When cranking engine]  [Engine is running]  • Warm-up condition  • Idle speed	0 - 0.5 V 8 - 12 V
113	GR	Fuel pump relay	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.5 V
	JIX.	Tuci pump relay	[Ignition switch: ON]  • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)

## Diagnosis Procedure

INFOID:0000000005354504

## 1. CHECK OVERALL FUNCTION

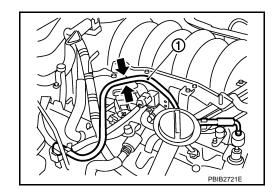
- 1. Turn ignition switch ON.
- 2. Pinch fuel feed hose (1) with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

### OK or NG

OK >> INSPECTION END

NG >> GO TO 2.



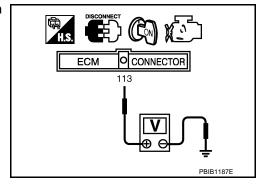
## $2.\mathsf{CHECK}$ FUEL PUMP POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Turn ignition switch ON.
- 4. Check voltage between ECM terminal 113 and ground with CONSULT-III or tester.

### **Voltage: Battery voltage**

## OK or NG

OK >> GO TO 5. NG >> GO TO 3.



## 3.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

## **FUEL PUMP**

#### < SERVICE INFORMATION >

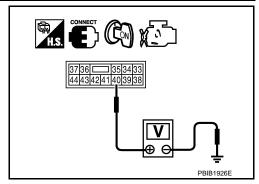
[VK45DE]

Check voltage between IPDM E/R terminal 40 and ground with CONSULT-III or tester.

Voltage: Battery voltage

### OK or NG

OK >> GO TO 4. NG >> GO TO 11.



## 4. DETECT MALFUNCTIONING PART

Check the following.

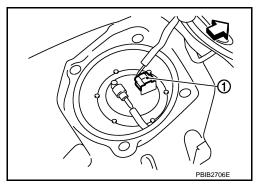
- Harness connectors E108, M15
- Harness for open or short between IPDM E/R and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 5. CHECK FUEL PUMP POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- Disconnect "fuel level sensor unit and fuel pump" harness connector (1).
- Illustration shows the view with rear seat cushion and inspection hole cover (RH) removed.
- <□: Vehicle front
- 4. Turn ignition switch ON.
- 5. Check voltage between "fuel level sensor unit and fuel pump" terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage should exist for 1 second after ignition switch is turned ON.



### OK or NG

OK >> GO TO 7. NG >> GO TO 6.

## 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, B4
- Harness connectors B65, B434
- IPDM E/R connector E8
- 15 A fuse
- Harness for open or short between IPDM E/R and condenser

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 7. CHECK FUEL PUMP GROUND CIRCUIT

- Turn ignition switch OFF.
- Disconnect dropping resistor harness connector.

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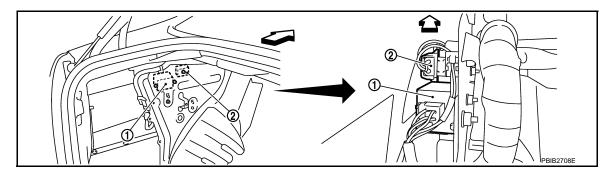
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1. FPCM

2. Dropping resistor

 Check harness continuity between "fuel level sensor unit and fuel pump" terminal 3 and dropping resistor terminal 2, dropping resistor terminal 1 and ground.
 Refer to Wiring Diagram.

### Continuity should exist.

4. Also check harness for short to ground and short to power.

### OK or NG

OK >> GO TO 9. NG >> GO TO 8.

## 8.DETECT MALFUNCTIONING PART

## Check the following.

- Harness connectors B65, B434
- Harness for open or short between "fuel level sensor unit and fuel pump" and dropping resistor
- Harness for open or short between dropping resistor and ground
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

## 9. CHECK DROPPING RESISTOR

Refer to EC-1300, "Component Inspection".

#### OK or NG

OK >> GO TO 10.

NG >> Replace dropping resistor.

## 10. CHECK FUEL PUMP

Refer to EC-1300, "Component Inspection".

## OK or NG

OK >> GO TO 11.

NG >> Replace fuel pump.

## 11. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

### OK or NG

OK >> Replace IPDM E/R.

NG >> Repair or replace harness or connectors.

## Component Inspection

### **FUEL PUMP**

- Turn ignition switch OFF.
- Disconnect "fuel level sensor unit and fuel pump" harness connector.

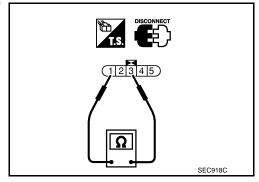
## **FUEL PUMP**

## < SERVICE INFORMATION >

[VK45DE]

Check resistance between "fuel level sensor unit and fuel pump" terminals 1 and 3.

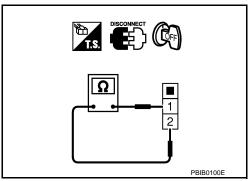
**Resistance:** 0.2 - 5.0  $\Omega$  [at 25°C (77°F)]



### DROPPING RESISTOR

- 1. Turn ignition switch OFF.
- 2. Disconnect dropping resistor harness connector.
- 3. Check resistance between dropping resistor terminals 1 and 2.

Resistance: Approximately 0.9  $\Omega$  [at 20°C (68°F)]



## Removal and Installation

**FUEL PUMP** 

Refer to FL-4, "Component".

INFOID:0000000005354506

Revision: 2009 June **EC-1301** 2010 M35/M45

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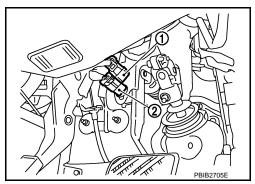
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INFOID:0000000005354507

## ICC BRAKE SWITCH

## **Component Description**

When the brake pedal is depressed, ICC brake switch (2) is turned OFF and stop lamp switch (1) is turned ON. ECM detects the state of the brake pedal by two kinds of input (ON/OFF signal). Refer to ACS-9, "Outline" for the ICC function.

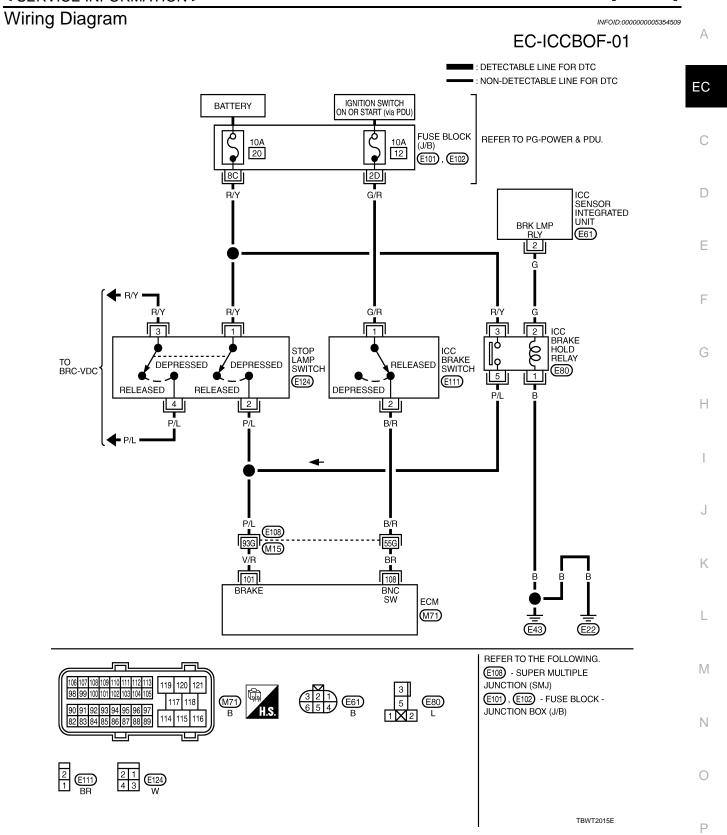


## CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354508

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1	Ignition switch: ON	Brake pedal: Fully released	ON
(ICC brake switch)	1grillion Switch. ON	Brake pedal: Slightly depressed	OFF
BRAKE SW2	• Ignition switch: ON	Brake pedal: Fully released	OFF
(Stop lamp switch)	Ignition switch: ON	Brake pedal: Slightly depressed	ON



Specification data are reference values and are measured between each terminal and ground. **CAUTION**:

Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	V/R	Stan Jama quitab	[Ignition switch: OFF] • Brake pedal: Fully released	Approximately 0 V  BATTERY VOLTAGE (11 - 14 V)
101	V/K	Stop lamp switch	[Ignition switch: OFF] • Brake pedal: Slightly depressed	
108	BR	Brake pedal: Slightly depressed	Approximately 0 V	
108	DK	IOC DIAKE SWILCH	[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)

## Diagnosis Procedure

INFOID:0000000005354510

## 1. CHECK OVERALL FUNCTION-I

## (I) With CONSULT-III

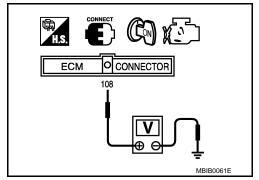
- 1. Turn ignition switch ON.
- 2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "BRAKE SW1" indication under the following conditions.

CONDITION	INDICATION
Brake pedal: Fully released	ON
Brake pedal: Slightly depressed	OFF

## **⊗** Without CONSULT-III

- 1. Turn ignition switch ON.
- Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Battery voltage
Brake pedal: Slightly depressed	Approximately 0 V



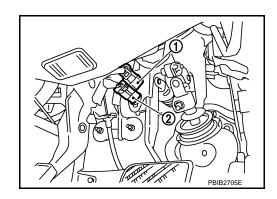
## OK or NG

OK >> INSPECTION END

NG >> GO TO 2.

## 2.CHECK ICC BRAKE SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ICC brake switch (2) harness connector.
- Stop lamp switch (1)
- 3. Turn ignition switch ON.



## **ICC BRAKE SWITCH**

### < SERVICE INFORMATION >

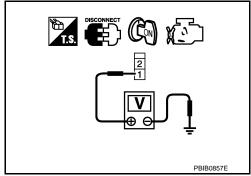
[VK45DE]

 Check voltage between ICC brake switch terminal 1 and ground with CONSULT-III or tester.

### Voltage: Battery voltage

### OK or NG

OK >> GO TO 4. NG >> GO TO 3.



## 3. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E102
- 10 A fuse
- · Harness for open or short between ICC brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 4. CHECK ICC BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check harness continuity between ICC brake switch terminal 2 and ECM terminal 108. Refer Wiring Diagram.

### Continuity should exist.

4. Also check harness for short to ground and short to power.

## OK or NG

OK >> GO TO 6. NG >> GO TO 5.

## ${f 5.}$ DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness for open or short between ICC brake switch and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 6.CHECK ICC BRAKE SWITCH

Refer to EC-1305, "Component Inspection".

#### OK or NG

OK >> GO TO 7.

NG >> Replace ICC brake switch.

## 7. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

## Component Inspection

### ICC BRAKE SWITCH

- Turn ignition switch OFF.
- 2. Disconnect ICC brake switch harness connector.

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Revision: 2009 June **EC-1305** 2010 M35/M45

## **ICC BRAKE SWITCH**

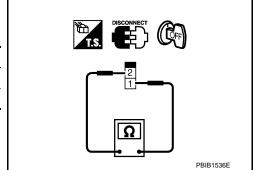
## < SERVICE INFORMATION >

[VK45DE]

3. Check continuity between ICC brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

4. If NG, adjust ICC brake switch installation, refer to <u>BR-6</u>. "Inspection and Adjustment", and perform step 3 again.



## [VK45DE]

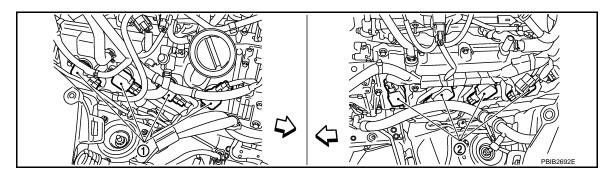
## **IGNITION SIGNAL**

## **Component Description**

#### INFOID:0000000005354512

## **IGNITION COIL & POWER TRANSISTOR**

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.



- Ignition coil (with power transistor) (bank 2)
- 2. Ignition coil (with power transistor) (bank 1)

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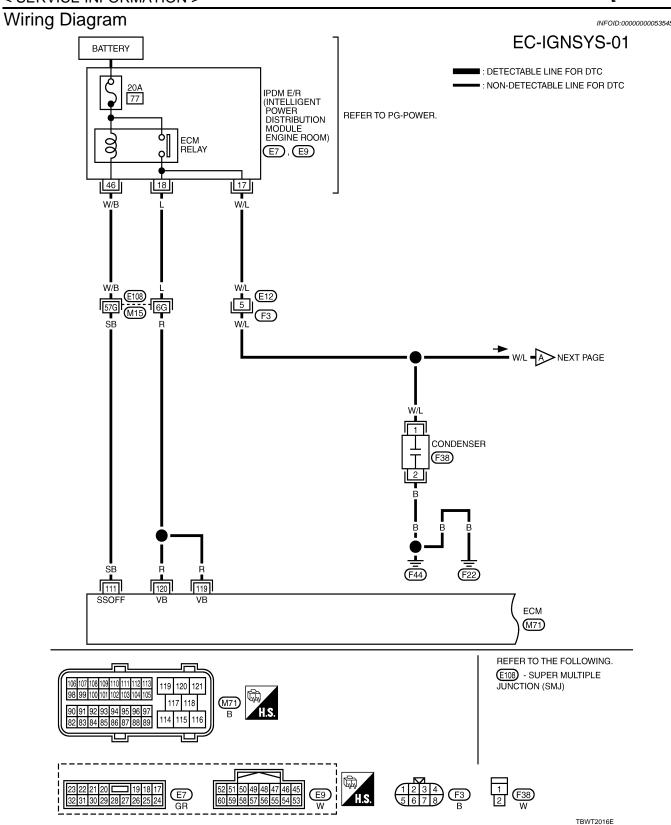
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Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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.

## **IGNITION SIGNAL**

[VK45DE] < SERVICE INFORMATION >

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)	А
					EC
			[Engine is running] [Ignition switch: OFF]		
111	SB	ECM relay (Self shut-off)	• For a few seconds after turning ignition switch OFF	0 - 1.5 V	С
		(Jell Shut-On)	[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)	D
119 120	R R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	

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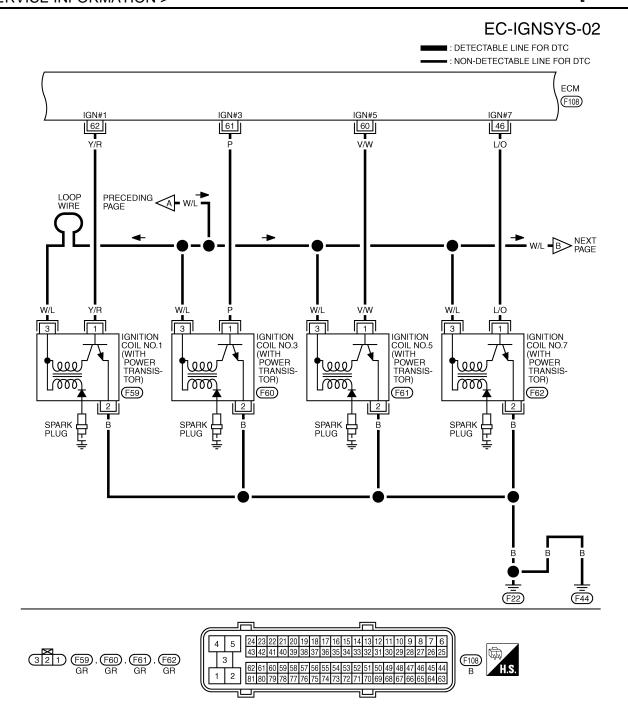
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TBWT1062E

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

#### **CAUTION:**

Never 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.

## **IGNITION SIGNAL**

< SERVICE INFORMATION >

[VK45DE]

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46 60	L/O V/W	Ignition signal No. 7 Ignition signal No. 5	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed NOTE:  The pulse cycle changes depending on rpm at idle</li> </ul>	0 - 0.2 V★
61 62	P Y/R	Ignition signal No. 3 Ignition signal No. 1	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.1 - 0.4 V★

 $<sup>\</sup>bigstar$ : Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

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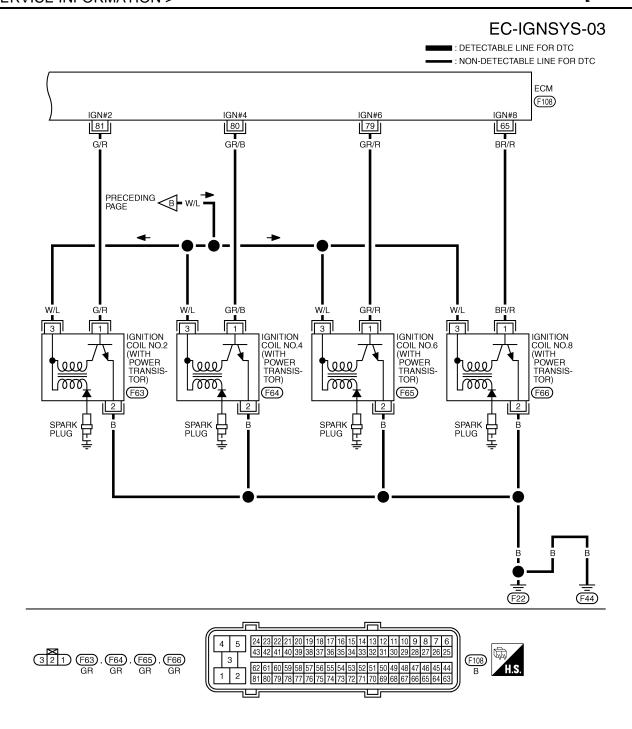
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TBWT1063E

Specification data are reference values and are measured between each terminal and ground. Pulse signal is measured by CONSULT-III.

#### **CAUTION:**

Never 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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TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
65 79	BR/R GR/R	Ignition signal No. 8 Ignition signal No. 6	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed NOTE: The pulse cycle changes depending on rpm at idle</li> </ul>	0 - 0.2 V*
80 81	GR/B G/R	Ignition signal No. 4 Ignition signal No. 2	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>	0.1 - 0.4 V★

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnosis Procedure

## 1. CHECK ENGINE START

Turn ignition switch OFF, and restart engine.

## Is engine running?

#### Yes or No

Yes (With CONSULT-III)>>GO TO 2.

Yes (Without CONSULT-III)>>GO TO 3.

No >> GO TO 4.

## 2. CHECK OVERALL FUNCTION

### (P) With CONSULT-III

- 1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 2. Check that each circuit produces a momentary engine speed drop.

### OK or NG

OK >> INSPECTION END

NG >> GO TO 10.

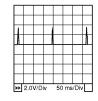
## 3. CHECK OVERALL FUNCTION

## (R) Without CONSULT-III

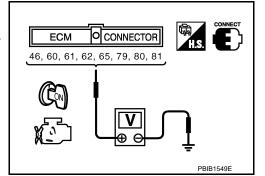
- 1. Let engine idle.
- 2. Read the voltage signal between ECM terminals 46, 60, 61, 62, 65, 79, 80, 81 and ground with an oscilloscope.
- 3. Verify that the oscilloscope screen shows the signal wave as shown below.

#### NOTE:

The pulse cycle changes depending on rpm at idle.



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#### OK or NG

### < SERVICE INFORMATION >

OK >> INSPECTION END

NG >> GO TO 10.

## 4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

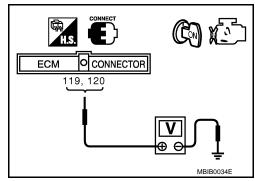
- 1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- 2. Check voltage between ECM terminals 119, 120 and ground with CONSULT-III or tester.

## Voltage: Battery voltage

### OK or NG

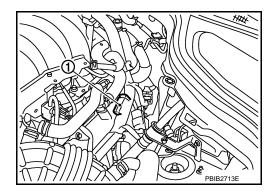
OK >> GO TO 5.

NG >> Go to EC-824, "Diagnosis Procedure".



## 5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect condenser (1) harness connector.
- 3. Turn ignition switch ON.

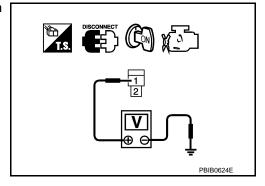


Check voltage between condenser terminal 1 and ground with CONSULT-III or tester.

### Voltage: Battery voltage

## OK or NG

OK >> GO TO 8. NG >> GO TO 6.



## 6. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector E7.
- Check harness continuity between IPDM E/R terminal 17 and condenser terminal 1. Refer to Wiring Diagram.

### Continuity should exist.

4. Also check harness for short to ground and short to power.

### OK or NG

OK >> Go to EC-824, "Diagnosis Procedure".

NG >> GO TO 7.

## 7. DETECT MALFUNCTIONING PART

### Check the following.

• Harness connectors E12, F3

- · Harness for open or short between IPDM E/R and condenser
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

## 8.check condenser ground circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Check harness continuity between condenser terminal 2 and ground. Refer to Wiring Diagram.

### Continuity should exist.

3. Also check harness for short to power.

### OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to power in harness or connectors.

## 9. CHECK CONDENSER

Refer to EC-1316, "Component Inspection"

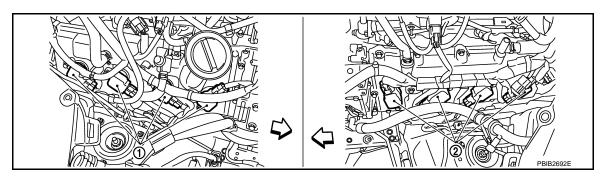
## OK or NG

OK >> GO TO 10.

NG >> Replace condenser.

## 10.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect ignition coil harness connector.



⟨□ : Vehicle front

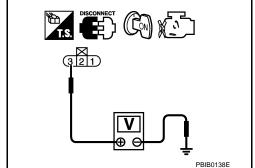
- Ignition coil (with power transistor) (bank 2)
- 2. Ignition coil (with power transistor) (bank 1)

- 4. Turn ignition switch ON.
- Check voltage between ignition coil terminal 3 and ground with CONSULT-III or tester.

## Voltage: Battery voltage

#### OK or NG

OK >> GO TO 12. NG >> GO TO 11.



## 11. DETECT MALFUNCTIONING PART

### Check the following.

- Harness connector F3
- Harness for open or short between ignition coil and harness connector F3

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>> Repair or replace harness or connectors.

## 12.check ignition coil ground circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Check harness continuity between ignition coil terminal 2 and ground. Refer to Wiring Diagram.

### Continuity should exist.

3. Also check harness for short to power.

#### OK or NG

OK >> GO TO 13.

NG >> Repair open circuit or short to power in harness or connectors.

## 13. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Disconnect ECM harness connector.
- 2. Check harness continuity between ECM terminals 46, 60, 61, 62, 65, 79, 80, 81 and ignition coil terminal 1. Refer to Wiring Diagram.

### Continuity should exist.

3. Also check harness for short to ground and short to power.

### OK or NG

OK >> GO TO 14.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 14. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-1316, "Component Inspection".

#### OK or NG

OK >> GO TO 15.

NG >> Replace malfunctioning ignition coil with power transistor.

## 15. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

## Component Inspection

INFOID:0000000005354515

### **IGNITION COIL WITH POWER TRANSISTOR**

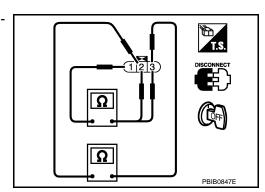
#### **CAUTION:**

### Perform the following procedure in a place with no combustible objects and good ventilation.

- 1. Turn ignition switch OFF.
- 2. Disconnect ignition coil harness connector.
- Check resistance between ignition coil terminals as per the following.

Terminal No. (Polarity)	Resistance [at 25°C (77°F)]	
1 and 2	Except 0 or $\infty$ $\Omega$	
1 and 3	Except 0 Ω	
2 and 3	Ελοθρί Ο 22	

- If NG, replace ignition coil with power transistor.
   If OK, go to next step.
- 5. Turn ignition switch OFF.
- 6. Reconnect all harness connectors disconnected.



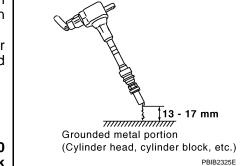
#### < SERVICE INFORMATION >

Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

#### NOTE:

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- 8. Start engine.
- 9. After engine stalls, crank it two or three times to release all fuel pressure.
- 10. Turn ignition switch OFF.
- 11. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 12. Remove ignition coil and spark plug of the cylinder to be checked.
- 13. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 14. Connect spark plug and harness connector to ignition coil.
- 15. Fix ignition coil using a rope etc. with gap of 13 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
- 16. Crank engine for approximately 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

- Never place the spark plug and the ignition coil within 50 cm each other. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might damage the ignition coil if the gap of more than 17 mm is made. NOTE:

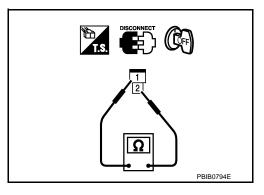
When the gap is less than 13 mm, spark might be generated even if the coil is malfunctioning.

17. If NG, replace malfunctioning ignition coil with power transistor.

### CONDENSER

- 1. Turn ignition switch OFF.
- Disconnect condenser harness connector.
- Check resistance between condenser terminals 1 and 2.

Resistance: Above 1 M $\Omega$  [at 25°C (77°F)]



Removal and Installation

IGNITION COIL WITH POWER TRANSISTOR

Refer to EM-187, "Component".

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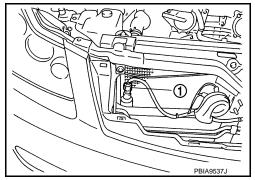
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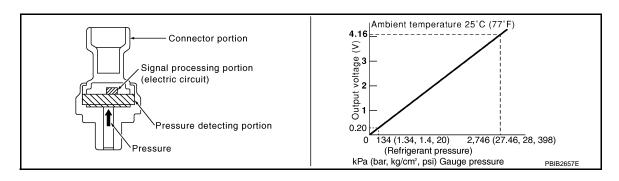
## REFRIGERANT PRESSURE SENSOR

## **Component Description**

INFOID:0000000005354517

The refrigerant pressure sensor (1) 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.

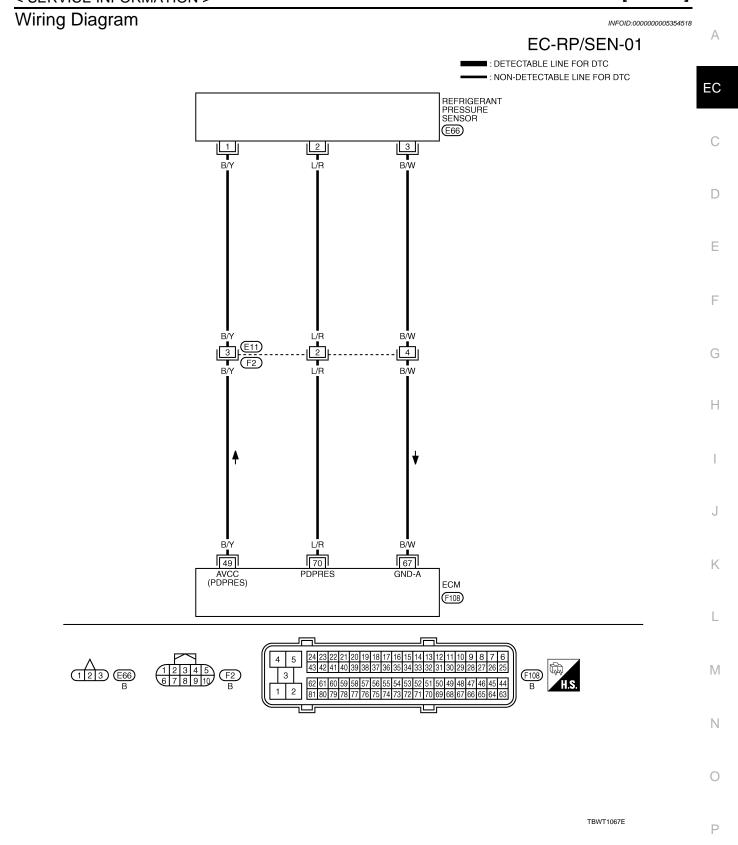




## REFRIGERANT PRESSURE SENSOR

< SERVICE INFORMATION >

[VK45DE]



Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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.

TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	B/Y	Sensor power supply (Refrigerant pressure sensor)	[Ignition switch: ON]	Approximately 5 V
67	B/W	Sensor ground (Refrigerant pressure sensor)	[Engine is running] • Warm-up condition • Idle speed	Approximately 0 V
70	L/R	Refrigerant pressure sensor	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Both A/C switch and blower fan motor switch: ON (Compressor operates)</li> </ul>	1.0 - 4.0 V

## Diagnosis Procedure

INFOID:0000000005354519

# 1.CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

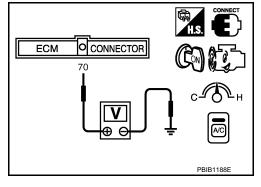
- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn A/C switch and blower fan switch ON.
- 3. Check voltage between ECM terminal 70 and ground with CON-SULT-III or tester.

Voltage: 1.0 - 4.0 V

## OK or NG

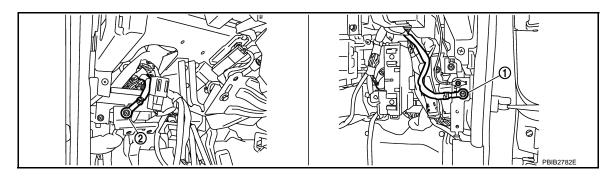
OK >> INSPECTION END

NG >> GO TO 2.



## 2. CHECK GROUND CONNECTIONS

- Turn A/C switch and blower fan switch OFF.
- 2. Turn ignition switch OFF.
- 3. Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".



1. Body ground M70

2. Body ground M16

### OK or NG

OK >> GO TO 3.

NG >> Repair or replace ground connections.

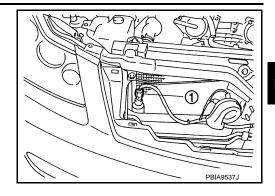
3. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

## REFRIGERANT PRESSURE SENSOR

### < SERVICE INFORMATION >

[VK45DE]

- Disconnect refrigerant pressure sensor (1) harness connector.
- Turn ignition switch ON.

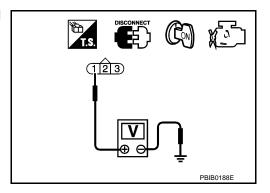


Check voltage between refrigerant pressure sensor terminal 1 and ground with CONSULT-III or tester.

## Voltage: Approximately 5 V

### OK or NG

OK >> GO TO 5. NG >> GO TO 4.



## f 4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E11, F2
- 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.

## ${f 5.}$ CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- Check harness continuity between refrigerant pressure sensor terminal 3 and ECM terminal 67. Refer to Wiring Diagram.

### Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 7. NG >> GO TO 6.

## O. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E11, F2
- 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.

## 1. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check harness continuity between ECM terminal 70 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram.

## Continuity should exist.

Also check harness for short to ground and short to power.

## OK or NG

EC-1321 Revision: 2009 June 2010 M35/M45

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## REFRIGERANT PRESSURE SENSOR

### REFRIGERANT PRESSURE SENSOR

OK >> GO TO 9. NG >> GO TO 8.

## 8. DETECT MALFUNCTIONING PART

## Check the following.

• Harness connectors E11, F2

< SERVICE INFORMATION >

- 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.

## 9. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

### OK or NG

OK >> Replace refrigerant pressure sensor.

NG >> Repair or replace malfunctioning part.

## Removal and Installation

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[VK45DE]

### REFRIGERANT PRESSURE SENSOR

Refer to ATC-165, "VK45DE: Removal and Installation of Refrigerant Pressure Sensor".

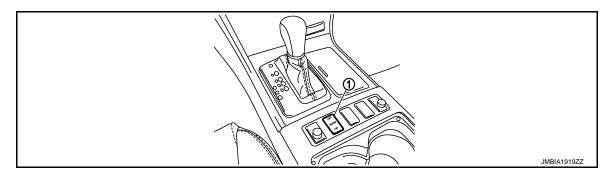
< SERVICE INFORMATION > [VK45DE]

## **SNOW MODE SWITCH**

Description INFOID:0000000005354521

The snow mode switch signal is sent to the "unified meter and A/C amp." from the snow mode switch. The "unified meter and A/C amp." then sends the signal to the ECM via the CAN communication line.

The snow mode is used for driving or starting the vehicle on snowy roads or slippery areas. If the snow mode is activated, the vehicle speed will not be accelerated immediately than your original pedal in due to avoid the vehicle slip. In other words, ECM controls the rapid engine torque change by controlling the electric throttle control actuator operating speed.



1. Snow mode switch

## CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354522

MONITOR ITEM CONDITION		SPECIFICATION	
SNOW MODE SW	Ignition switch: ON	SNOW MODE SW: ON	ON
SNOW WODE SW	• Igrillion switch. ON	SNOW MODE SW: OFF	OFF

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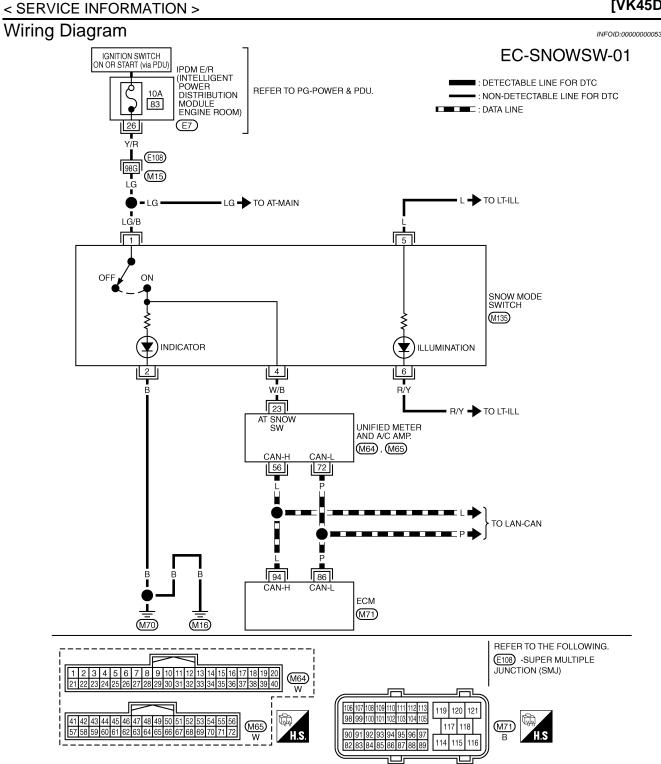
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TBWT2489E

## Diagnosis Procedure

INFOID:0000000005354524

# 1.check snow mode switich overall function-i

- Turn ignition switch ON.
- 2. Select "SNOW MODE SW" in "DATA MONITOR" mode with CONSULT-III.
- Check "SNOW MODE SW" indication under the following conditions.

EC-1324 Revision: 2009 June 2010 M35/M45

CONDITION	INDICATION
Snow mode switch: ON	ON
Snow mode switch: OFF	OFF

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## OK or NG

OK >> GO TO 2. NG >> GO TO 3.

## 2.check snow mode switich overall function-ii

- Turn ignition switch ON.
- 2. Start engine.
- Check the snow mode indicator in the snow mode switch under the following condition.

CONDITION	INDICATION
Snow mode switch: ON	ON
Snow mode switch: OFF	OFF

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### OK or NG

OK >> INSPECTION END

NG >> GO TO 7.

## ${f 3.}$ CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to DI-28, "CONSULT-III Function (METER/M&A)".

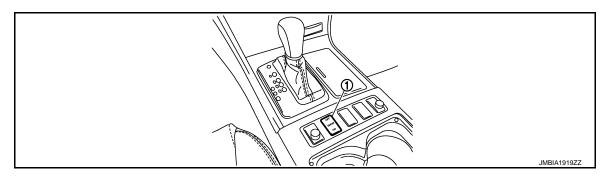
### OK or NG

OK >> GO TO 4.

NG >> Follow the instructions of DI-28, "CONSULT-III Function (METER/M&A)".

## 4. CHECK SNOW MODE SWITCH POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect snow mode switch harness connector.

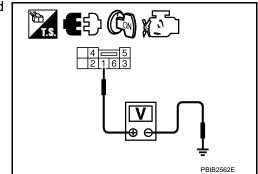


- 1. Snow mode switch
- 3. Turn ignition switch ON.
- Check voltage between snow mode switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage.

## OK or NG

OK >> GO TO 6. NG >> GO TO 5.



## 5.DETECT MALFUNCTIONING PART

EC-1325 Revision: 2009 June 2010 M35/M45

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### < SERVICE INFORMATION >

Check the following.

- Harness connectors E108, M15
- IPDM E/R harness connector E7
- 10 A fuse
- Harness for open or short between snow mode switch and fuse.
  - >> Repair open circuit or short to ground or short to power in harness or connectors.

## 6.CHECK SNOW MODE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect "unified meter and A/C amp." harness connector.
- Check harness continuity between snow mode switch terminal 4 and "unified meter and A/C amp." terminal 23. Refer to Wiring Diagram.

## Continuity should exist.

4. Also check harness for short to ground and short to power.

#### OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 7. CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Loosen and retighten ground screws on the body. Refer to <u>EC-828</u>, "Ground Inspection".



1. Body ground M70

2. Body ground M16

## OK or NG

OK >> GO TO 8.

NG >> Repair or replace ground connections.

## 8.CHECK SNOW MODE INDICATOR LAMP GROUND CIRCUIT FOR OPEN AND SHORT

 Check harness continuity between snow mode switch terminal 2 and ground. Refer to Wiring Diagram.

### Continuity should exist.

Also check harness for short to power.

### OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to power in harness or connectors.

### $\mathbf{9}.$ CHECK SNOW MODE SWITCH

Refer to EC-1327, "Component Inspection".

## OK or NG

OK >> GO TO 10.

NG >> Replace snow mode switch.

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## 10. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

### >> INSPECTION END

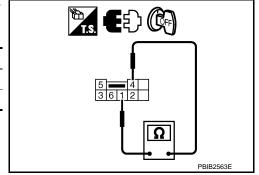
## Component Inspection

## SNOW MODE SWITCH

1. Check continuity between snow mode switch terminals 1 and 4 under the following conditions.

CONDITION	CONTINUITY
Snow mode switch: ON	Should exist
Snow mode switch: OFF	Should not exist

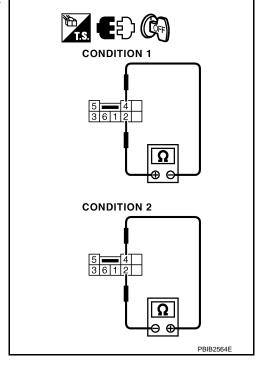
If NG, replace snow mode switch. If OK, go to following step.



3. Check continuity between snow mode switch terminals 2 and 4 under the following conditions.

CONDITION	CONTINUITY
1	Should exist.
2	Should not exist.

If NG, replace snow mode switch.



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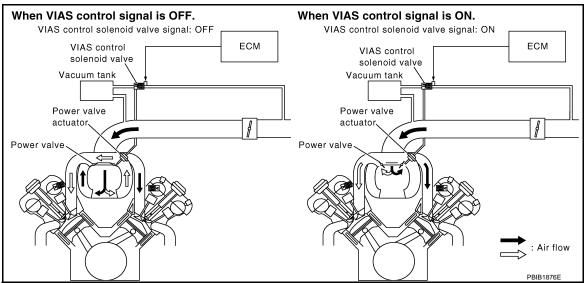
## **VIAS**

Description INFOID:0000000005354526

### SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*			
Mass air flow sensor	Amount of intake air			
Throttle position sensor	Throttle position	VIAS control	VIAS control solenoid valve	
Accelerator pedal position sensor	Accelerator pedal position			
Battery	Battery voltage*			
Engine coolant temperature sensor	Engine coolant temperature			

<sup>\*:</sup> The ECM determines the start signal status by the signals of engine speed and battery voltage.



When the engine is running at low or medium speed, the power valve is fully closed. Under this condition, the effective suction port length is equivalent to the total length of the intake manifold collector's suction port including the intake valve. This long suction port provides increased air intake which results in improved suction efficiency and higher torque generation.

The surge tank and one-way valve are provided. When engine is running at high speed, the ECM sends the signal to the VIAS control solenoid valve. This signal introduces the intake manifold vacuum into the power valve actuator and therefore opens the power valve to two suction passages together in the collector.

Under this condition, the effective port length is equivalent to the length of the suction port provided independently for each cylinder. This shortened port length results in enhanced engine output with reduced suction resistance under high speeds.

The power valve is always open regardless of the engine speed when gear position is in N or P.

### COMPONENT DESCRIPTION

Power Valve

[VK45DE]

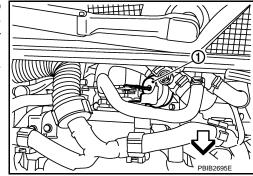
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The power valve is installed in intake manifold collector and used to control the suction passage of the variable induction air control system. It is set in the fully closed or fully opened position by the power valve actuator (1) operated by the vacuum stored in the surge tank. The vacuum in the surge tank is controlled by the VIAS control solenoid valve.

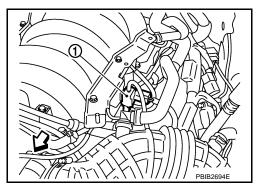
• <□: Vehicle front



#### VIAS Control Solenoid Valve

The VIAS control solenoid valve (1) cuts the intake manifold vacuum signal for power valve actuator. It responds to ON/OFF signals from the ECM. When the solenoid is off, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.

• <: Vehicle front



## CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005354527	7

MONITOR ITEM	CONDITION	SPECIFICATION	
	Selector lever position: P or N ON		
VIAS S/V-1	Engine speed: More than 5,000 rpm	ON	
	Selector lever position: Except P or N     Engine speed: Less than 5,000 rpm	OFF	

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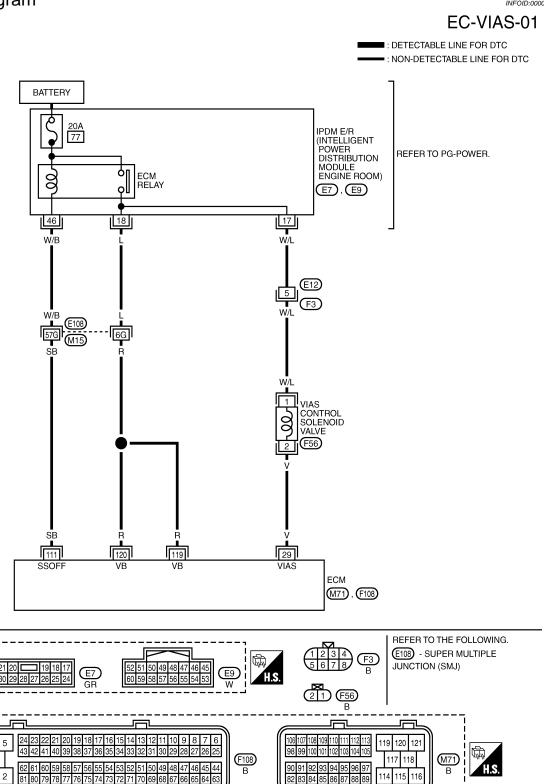
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Wiring Diagram



Specification data are reference values and are measured between each terminal and ground. **CAUTION:** 

Never 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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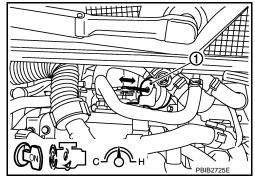
TER- MI- NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
			[Engine is running] • Selector lever position: P or N	0 - 1.0 V
29	V	VIAS control solenoid valve	<ul><li>[Engine is running]</li><li>Selector lever position: D</li><li>Engine speed: Below 5,000 rpm</li></ul>	BATTERY VOLTAGE (11 - 14 V)
			[Engine is running] • Engine speed: Above 5,000 rpm	0 - 1.0 V
111	SB	ECM relay	<ul><li>[Engine is running]</li><li>[Ignition switch: OFF]</li><li>For a few seconds after turning ignition switch OFF</li></ul>	0 - 1.5 V
		(Self shut-off)	[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
119 120	R R	Power supply for ECM	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

## Diagnosis Procedure

## 1. CHECK OVERALL FUNCTION

## (P) With CONSULT-III

- Start engine and warm it up to normal operating temperature.
- Perform "VIAS S/V-1" in "ACTIVE TEST" mode with CONSULT-III.
- Turn VIAS control solenoid valve ON and OFF, and check that power valve actuator (1) rod moves.



### (R) Without CONSULT-III

- 1. Lift up the vehicle.
- Start engine and warm it up to normal operating temperature.
- Check that power valve actuator (1) rod moves when changing the selector lever position to the N and D alternately.

## OK or NG

OK >> INSPECTION END

NG (With CONSULT-III)>>GO TO 2.

NG (Without CONSULT-III)>>GO TO 3.

## 2. CHECK VACUUM EXISTENCE

## (II) With CONSULT-III

Stop engine and disconnect vacuum hose connected to power valve actuator.

### < SERVICE INFORMATION >

- Start engine and let it idle.
- 3. Perform "VIAS S/V-1" in "ACTIVE TEST" mode with CONSULT-III.
- Turn VIAS control solenoid valve ON and OFF, and check vacuum existence under the following conditions

VIAS S/V-1	Vacuum
ON	Should exist.
OFF	Should not exist.

## OK or NG

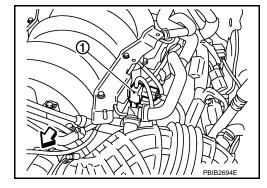
OK >> Repair or replace power valve actuator.

NG >> GO TO 4.

## 3. CHECK VACUUM EXISTENCE

## **⊗** Without CONSULT-III

- 1. Stop engine and disconnect vacuum hose connected to power valve actuator.
- 2. Disconnect VIAS control solenoid valve (1) harness connector.
- <□: Vehicle front
- 3. Start engine and let it idle.



- 4. Apply 12 V of direct current between VIAS control solenoid valve terminals 1 and 2.
- 5. Check vacuum existence under the following conditions.

Condition	Vacuum
12 V direct current supply	Should exist.
No supply	Should not exist.

#### OK or NG

OK >> Repair or replace power valve actuator.

NG >> GO TO 4.

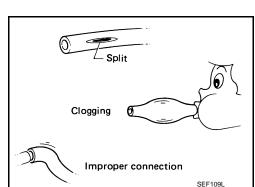
## 4. CHECK VACUUM HOSE

- Stop engine.
- 2. Check hoses and tubes between intake manifold and power valve actuator for cracks, clogging, improper connection or disconnection. Refer to <a href="EC-788">EC-788</a>, "Vacuum Hose Drawing".

### OK or NG

OK >> GO TO 5.

NG >> Repair hoses or tubes.



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## 5. CHECK VACUUM TANK

Refer to EC-1334, "Component Inspection".

### OK or NG

OK >> GO TO 6.

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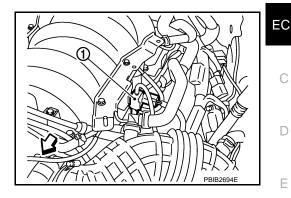
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NG >> Replace vacuum tank.

## 6. CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect VIAS control solenoid valve (1) harness connector.
- <□: Vehicle front
- 3. Turn ignition switch ON.

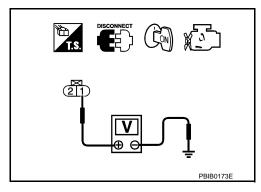


Check voltage between VIAS control solenoid valve terminal 1 and ground with CONSULT-III or tester.

### Voltage: Battery voltage

### OK or NG

OK >> GO TO 8. NG >> GO TO 7.



## 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- Harness continuity between IPDM E/R and VIAS control solenoid valve

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 8.CHECK VIAS CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check harness continuity between ECM terminal 29 and VIAS control solenoid valve terminal 2. Refer to Wiring Diagram.

### Continuity should exist.

4. Also check harness for short to ground and short to power.

### OK or NG

OK >> GO TO 9.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 9. CHECK VIAS CONTROL SOLENOID VALVE

Refer to EC-1334, "Component Inspection".

### OK or NG

OK >> GO TO 10.

NG >> Replace VIAS control solenoid valve.

## 10. CHECK INTERMITTENT INCIDENT

Refer to EC-822, "Diagnosis Procedure".

#### >> INSPECTION END

## Component Inspection

INFOID:0000000005354530

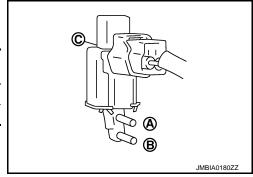
### VIAS CONTROL SOLENOID VALVE

### (II) With CONSULT-III

- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VIAS S/V-1" in "ACTIVE TEST" mode.
- 4. Check air passage continuity and operation delay time under the following conditions.

Condition VIAS S/V-1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
ON	Yes	No
OFF	No	Yes



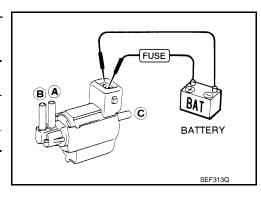


## ₩ Without CONSULT-III

Check air passage continuity and operation delay time under the following conditions.

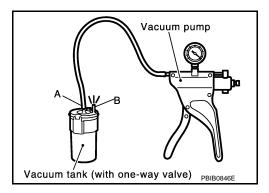
Condition	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

Operation takes less than 1 second.



### **VACUUM TANK**

- 1. Disconnect vacuum hose connected to vacuum tank.
- 2. Connect a vacuum pump to the port A of vacuum tank.
- 3. Apply vacuum and make sure that vacuum exists at the port B.



INFOID:0000000005354531

## Removal and Installation

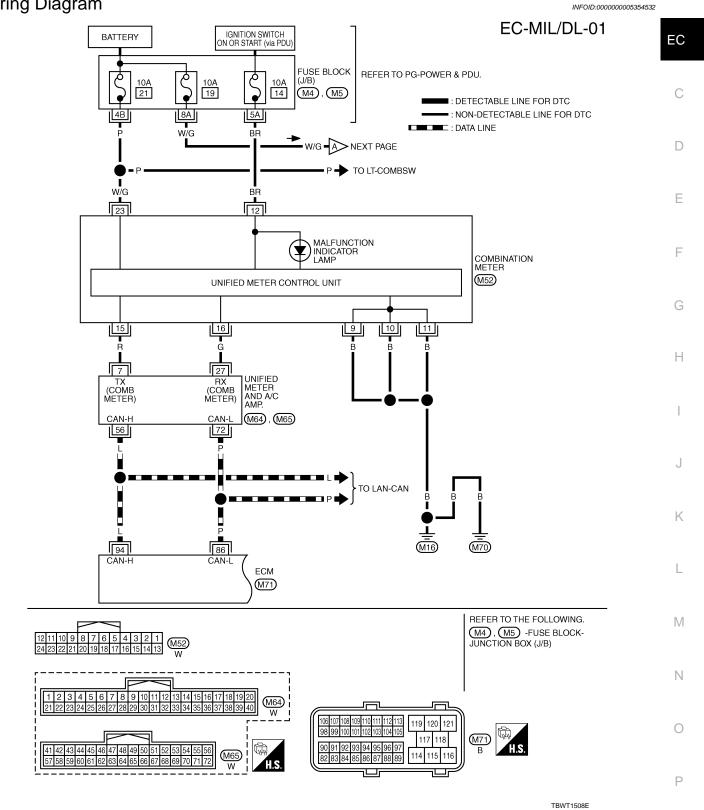
VIAS CONTROL SOLENOID VALVE Refer to EM-174, "Component".

[VK45DE]

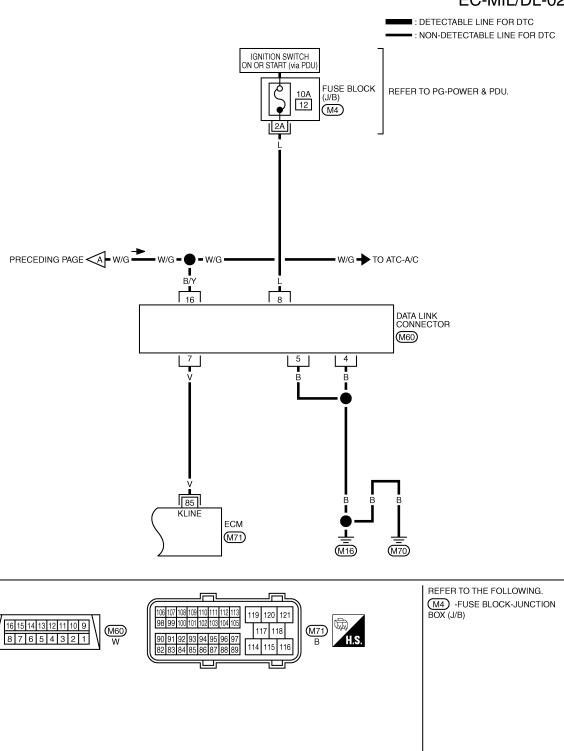
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## MIL AND DATA LINK CONNECTOR





## EC-MIL/DL-02



TBWT2490E

## **SERVICE DATA AND SPECIFICATIONS (SDS)**

< SERVICE INFORMATION >

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## SERVICE DATA AND SPECIFICATIONS (SDS)

Fuel Pressure

Fuel pressure at idling [kPa (kg/cm², psi)]	Approximately 350 (3.57, 51)

## Idle Speed and Ignition Timing

INFOID:0000000005354534	

Idle speed	No load* (in P or N position)	$650\pm50~\mathrm{rpm}$
Air conditioner: ON	In P or N position	650 rpm or more
Ignition timing	In P or N position	12 ± 5° BTDC

<sup>\*:</sup> Under the following conditions:

- · Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- · Steering wheel: Kept in straight-ahead position

## Calculated Load Value

INFOID:0000000005354535

Condition	Calculated load value [% (Using CONSULT-III or GST)]	
At idle	14 - 33	
At 2,500 rpm	12 - 25	

## Mass Air Flow Sensor

INFOID:0000000005354536

Supply voltage	Battery voltage (11 - 14 V)
Output voltage at idle	0.9 - 1.2 V*
Mass air flow (Using CONSULT-III or GST)	2.0 - 6.0 g·m/sec at idle* 7.0 - 20.0 g·m/sec at 2,500 rpm*

<sup>\*:</sup> Engine is warmed up to normal operating temperature and running under no load.

## Intake Air Temperature Sensor

INFOID:0000000005354537

Temperature [°C (°F)]	Resistance (kΩ)
25 (77)	1.800 - 2.200

## Engine Coolant Temperature Sensor

INFOID:0000000005354538

Temperature [°C (°F)]	Resistance (kΩ)
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

## Fuel Tank Temperature Sensor

INFOID:0000000005354539

Temperature [°C (°F)]	Resistance (kΩ)
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

Revision: 2009 June **EC-1337** 2010 M35/M45

## **SERVICE DATA AND SPECIFICATIONS (SDS)**

< SERVICE INFORMATION >	or con to Ariono (obo)	[VK45DE]
Crankshaft Position Sensor (POS)		INFOID:0000000005354540
Refer to EC-1018, "Component Inspection".		
Camshaft Position Sensor (PHASE)		INFOID:0000000005354541
Refer to EC-1024, "Component Inspection".		
A/F Sensor 1 Heater		INFOID:0000000005354542
Resistance [at 25°C (77°F)]	2.3 - 4.3 Ω	
Heated Oxygen Sensor 2 Heater		INFOID:0000000005354543
Resistance [at 25°C (77°F)]	5.0 - 7.0 Ω	
Throttle Control Motor		INFOID:0000000005354544
Resistance [at 25°C (77°F)]	Approximately 1 - 15 Ω	
Fuel Injector		INFOID:0000000005354545
Resistance [at 10 - 60°C (50 - 140°F)]	13.5 - 17.5 Ω	
Fuel Pump		INFOID:0000000005354546
Resistance [at 25°C (77°F)]	0.2 - 5.0 Ω	