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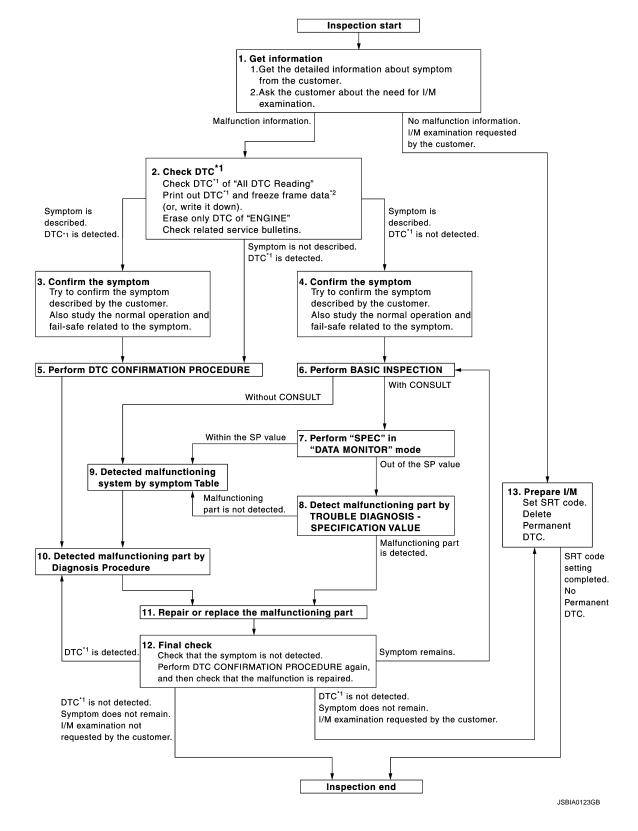
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BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

OVERALL SEQUENCE



< BASIC INSPECTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

DETAILED FLOW

1.GET INFORMATION FOR SYMPTOM

- Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the "Diagnostic Work Sheet". (Refer to EC-17, "Diagnostic Work Sheet".)
- Ask if the customer requests I/M examination.

Malfunction information, obtained>>GO TO 2.

No Malfunction information, but a request for I/M examination>>GO TO 13.

2.CHECK DTC

- Check DTC of "All DTC Reading".
- Perform the following procedure if DTC is displayed.
- Record DTC and freeze frame data. (Print them out with CONSULT or GST.)
- Erase only DTC of "ENGINE".
 - (X) With CONSULT: Refer to "How to Erase DTC and 1st Trip DTC" in EC-117, "CONSULT Function".
 - (R) Without CONSULT: Refer to "How to Erase Self-diagnostic Results" in EC-114, "On Board Diagnosis Function".
- Turn ignition switch OFF.
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to EC-473, "Symptom Table".)
- Check related service bulletins for information.

Are any symptoms described and any DTCs detected?

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

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

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

3.confirm the symptom

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

Also study the normal operation and fail-safe related to the symptom. Refer to EC-477, "Description" and EC-460, "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-477, "Description" and EC-460, "Fail Safe".

Diagnosis Work Sheet is useful to verify the incident.

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

>> GO TO 6.

${f 5}$.PERFORM DTC CONFIRMATION PROCEDURE

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

If two or more DTCs are detected, refer to EC-462, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

Freeze frame data is useful if the DTC is not detected.

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< BASIC INSPECTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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

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

Is DTC detected?

YES >> GO TO 10.

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

6.PERFORM BASIC INSPECTION

Perform EC-19, "BASIC INSPECTION: Special Repair Requirement".

Do you have CONSULT?

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

7. PERFORM SPEC IN DATA MONITOR MODE

(F)With CONSULT

Make sure that "MAS A/F SE-B1", "MAS A/F SE-B2", "B/FUEL SCHDL", "A/F ALPHA-B1" and "A/F ALPHA-B2" are within the SP value using CONSULT "SPEC" in "DATA MONITOR" mode of "ENGINE". Refer to EC-126, "Component Function Check".

Is the measurement value within the SP value?

YES >> GO TO 9.

NO >> GO TO 8.

$oldsymbol{8}$.DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-127, "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-473</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-44. "Circuit Inspection".

Is a malfunctioning part detected?

YES >> GO TO 11.

NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CON-SULT. Refer to <u>EC-445</u>, "<u>Reference Value</u>".

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

- 1. Repair or replace the malfunctioning part.
- Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
- Check DTC. If DTC is displayed, erase it.
 - (R) With CONSULT: Refer to "How to Erase DTC and 1st Trip DTC" in EC-117, "CONSULT Function".
 - Without CONSULT: Refer to "How to Erase Self-diagnostic Results" in <u>EC-114, "On Board Diagnosis Function"</u>.

>> GO TO 12.

< BASIC INSPECTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

12. FINAL CHECK

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

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

Is DTC detected and does symptom remain?

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

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

NO-1 >> No request for I/M examination from the customer: Before returning the vehicle to the customer, always erase unnecessary DTC in ECM and TCM (®) With CONSULT: Refer to "How to Read DTC and 1st Trip DTC" in EC-117, "CONSULT Function", ® Without CONSULT: Refer to "How to Read Self-diagnostic Results" in EC-114, "On Board Diagnosis Function").

NO-2 >> I/M examination, requested from the customer: GO TO 13.

13. PREPARE FOR I/M EXAMINATION

- 1. Set SRT codes. Refer to EC-28, "Description".
- Erase permanent DTCs. Refer to <u>EC-34, "Description"</u>.

>> INSPECTION END.

Diagnostic Work Sheet

DESCRIPTION

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

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

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

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

KEY POINTS

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

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< BASIC INSPECTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

WORKSHEET SAMPLE

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

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[MR18DE (EXCEPT FOR CALIFORNIA)]

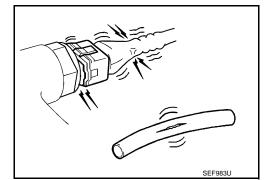
INSPECTION AND ADJUSTMENT BASIC INSPECTION

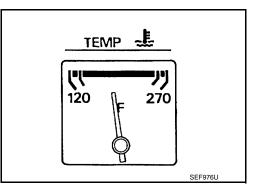
BASIC INSPECTION: Special Repair Requirement

INFOID:0000000007769907

1.INSPECTION START

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

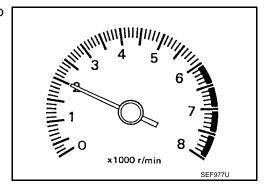




- 5. Run engine at about 2,000 rpm for about 2 minutes under no load.
- 6. Make sure that no DTC is displayed with CONSULT or GST.

Is any DTC detected?

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



2. REPAIR OR REPLACE

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

>> GO TO 3

3.CHECK IDLE SPEED

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

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< BASIC INSPECTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

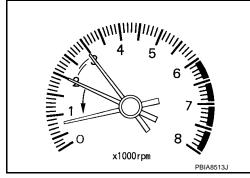
2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.

3. Check idle speed.

For procedure, refer to <u>EC-22</u>, "IDLE <u>SPEED</u>: <u>Special Repair Requirement</u>". For specification, refer to <u>EC-489</u>, "Idle <u>Speed</u>".

Is the inspection result normal?

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



4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- 1. Stop engine.
- 2. Perform <u>EC-24</u>, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 5.

PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-25, "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-22, "IDLE SPEED: Special Repair Requirement".

For specification, refer to EC-489, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the Following.

- Check camshaft position sensor (PHASE) and circuit. Refer to <u>EC-250, "DTC Logic"</u>.
- Check crankshaft position sensor (POS) and circuit. Refer to <u>EC-246, "DTC Logic"</u>.

Is the inspection result normal?

YES >> GO TO 9.

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

9. CHECK ECM FUNCTION

- 1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is rare.)
- 2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to SEC-9, "ECM: Special Repair Requirement" or SEC-154, "ECM: Special Repair Requirement".

>> GO TO 4.

10. CHECK IGNITION TIMING

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

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< BASIC INSPECTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

For procedure, refer to EC-23, "IGNITION TIMING: Special Repair Requirement". For specification, refer to EC-489, "Ignition Timing". Α Is the inspection result normal? YES >> GO TO 19. NO >> GO TO 11. EC 11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING Stop engine. Perform EC-24, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement". D >> GO TO 12. 12.perform throttle valve closed position learning Perform EC-24. "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement". >> GO TO 13. 13.perform idle air volume learning Perform EC-25, "IDLE AIR VOLUME LEARNING: Special Repair Requirement". Is Idle Air Volume Learning carried out successfully? YES >> GO TO 14. >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4. NO 14. CHECK IDLE SPEED AGAIN Н Start engine and warm it up to normal operating temperature. Check idle speed. For procedure, refer to EC-22, "IDLE SPEED: Special Repair Requirement". For specification, refer to EC-489, "Idle Speed". Is the inspection result normal? YES >> GO TO 15. NO >> GO TO 17. 15. CHECK IGNITION TIMING AGAIN Run engine at idle. 2. Check ignition timing with a timing light. For procedure, refer to EC-23, "IGNITION TIMING: Special Repair Requirement". For specification, refer to EC-489, "Ignition Timing". Is the inspection result normal? YES >> GO TO 19. M NO >> GO TO 16. 16.check timing chain installation Check timing chain installation. Refer to EM-45, "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 (PHASE) and circuit. Refer to <u>EC-250, "DTC Logic"</u>. • Check crankshaft position sensor (POS) and circuit. Refer to EC-246, "DTC Logic". Is the inspection result normal? YES >> GO TO 18. >> Repair or replace. Then GO TO 4. NO 18.check ecm function

< BASIC INSPECTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

- 1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is rare.)
- 2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to EC-22, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Special Repair Requirement".

>> GO TO 4.

19. INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, perform <u>EC-22</u>, "<u>ADDITIONAL SERVICE</u> WHEN REPLACING CONTROL UNIT: Special Repair Requirement".

>> INSPECTION END

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Description

INFOID:0000000007769908

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Special Repair Requirement

 ${f 1}$.perform initialization of nats system and registration of all nats ignition key ids

Refer to SEC-9, "ECM: Special Repair Requirement" or SEC-154, "ECM: Special Repair Requirement".

>> GO TO 2.

2.PERFORM VIN REGISTRATION

Refer to EC-23, "VIN REGISTRATION: Special Repair Requirement".

>> GO TO 3.

3. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-24, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 4.

4. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 5.

5. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-25, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> END

IDLE SPEED

IDLE SPEED: Description

INFOID:0000000007769910

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

IDLE SPEED: Special Repair Requirement

INFOID:0000000007769911

1. CHECK IDLE SPEED

[MR18DE (EXCEPT FOR CALIFORNIA)]

< BASIC INSPECTION >

(P)With CONSULT

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

With GST

Check idle speed with Service \$01 of GST.

>> INSPECTION END

IGNITION TIMING

IGNITION TIMING: Description

INFOID:0000000007769912

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

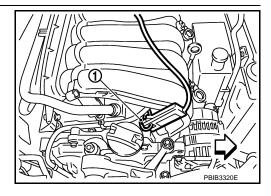
IGNITION TIMING: Special Repair Requirement

INFOID:0000000007769913

1. CHECK IGNITION TIMING

1. Attach timing light to No. 1 ignition coil (1) wire as shown.

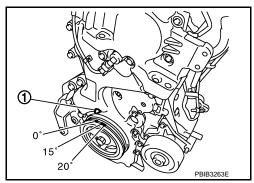
: Vehicle front



2. Check ignition timing.

1 : Timing indicator

>> INSPECTION END



VIN REGISTRATION

VIN REGISTRATION: Description

INFOID:0000000007769914

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

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

VIN REGISTRATION : Special Repair Requirement

INFOID:0000000007769915

1.CHECK VIN

Check the VIN of the vehicle and note it. Refer to GI-23, "Model Variation".

>> GO TO 2.

2. PERFORM VIN REGISTRATION

(P)With CONSULT

- Turn ignition switch ON and engine stopped.
- 2. Select "VIN REGISTRATION" in "WORK SUPPORT" mode.

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[MR18DE (EXCEPT FOR CALIFORNIA)]

< BASIC INSPECTION >

Follow the instruction of CONSULT display.

>> END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

ACCELERATOR PEDAL RELEASED POSITION LEARNING: Description INFOID-00000007769916

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

ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement INFOID:0000000007769917

1.START

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

>> END

THROTTLE VALVE CLOSED POSITION LEARNING

THROTTLE VALVE CLOSED POSITION LEARNING: Description

INFOID:0000000007769918

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

THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement

INFOID:0000000007769919

1.START

(P)With CONSULT

- Turn ignition switch ON.
- Select "CLSD THL POS LEARN" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
- 3. Follow the instructions on the CONSULT display.
- Turn ignition switch OFF and wait at least 10 seconds.

Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

⋈Without CONSULT

Start the engine.

NOTE:

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

2. Warm up the engine.

NOTE:

Raise engine coolant temperature until it reaches 65°C (149°F) or more.

Turn ignition switch OFF and wait at least 10 seconds.

Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

>> END

IDLE AIR VOLUME LEARNING

IDLE AIR VOLUME LEARNING: Description

INFOID:0000000007769920

Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps each engine idle speed within the specific range. It must be performed under any of the following conditions:

Each time electric throttle control actuator or ECM is replaced.

< BASIC INSPECTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

• Idle speed or ignition timing is out of specification.

IDLE AIR VOLUME LEARNING : Special Repair Requirement

INFOID:0000000007769921

1.PRECONDITIONING

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Make sure that all of the following conditions are satisfied.

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

- Battery voltage: More than 12.9 V (At idle)
- Engine coolant temperature: 70 100°C (158 212°F)
- Selector lever: P or N (CVT), Neutral (M/T)
- 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
- CVT models
- With CONSULT: Drive vehicle until "FLUID TEMP SE" in "DATA MONITOR" mode of "TRANSMISSION" system indicates less than 0.9 V.
- Without CONSULT: Drive vehicle for 10 minutes.
- M/T models
- Drive vehicle for 10 minutes.

Do you have CONSULT?

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

2.IDLE AIR VOLUME LEARNING

(P)With CONSULT

- Perform Accelerator Pedal Released Position Learning. Refer to <u>EC-24, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement"</u>.
- Perform Throttle Valve Closed Position Learning. Refer to <u>EC-24</u>, "THROTTLE VALVE CLOSED POSI-TION LEARNING: Special Repair Requirement".
- 3. Start engine and warm it up to normal operating temperature.
- 4. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
- 5. Touch "START" and wait 20 seconds.

Is "CMPLT" displayed on CONSULT screen?

YES >> GO TO 4.

NO >> GO TO 5.

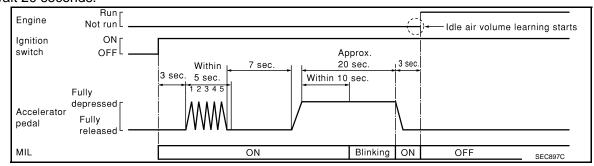
3.IDLE AIR VOLUME LEARNING

NOTF:

- 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-24, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement"</u>.
- 2. Perform Throttle Valve Closed Position Learning. Refer to EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- 3. Start engine and warm it up to normal operating temperature.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- 6. Repeat the following procedure quickly five times within 5 seconds.
- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.
- 7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turned ON.
- 8. Fully release the accelerator pedal within 3 seconds after the MIL turned ON.
- 9. Start engine and let it idle.

< BASIC INSPECTION >

10. Wait 20 seconds



>> GO TO 4.

4. CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.

Item	Specification
Idle speed	CVT: 700 \pm 50 rpm (in P or N position) M/T: 700 \pm 50 rpm (in Neutral position)
Ignition timing	CVT: $13 \pm 5^{\circ}$ BTDC (in P or N position) M/T: $13 \pm 5^{\circ}$ BTDC (in Neutral position)

Is the inspection result normal?

YES >> INSPECTION END

5. DETECT MALFUNCTIONING PART

Check the following

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6. DETECT MALFUNCTIONING PART

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

It is useful to perform "TROUBLE DIAGNOSIS - SPECIFICATION VALUE". Refer to <u>EC-126</u>, "<u>Description</u>". If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning again:

- Engine stalls.
- · Erroneous idle.

>> INSPECTION END

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Description

INFOID:0000000007769922

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:0000000007769923

1.START

With CONSULT

< BASIC INSPECTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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

With GST

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

>> END

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HOW TO SET SRT CODE

Description INFOID:000000007769924

OUTLINE

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

SRT ITEM

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

SRT item ^{*1} (CONSULT indication)	Performance Priority*2	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420
EVAP SYSTEM	2	EVAP control system purge flow monitoring	P0441
	1	EVAP control system	
	2	EVAP control system	P0456
HO2S 2		Air fuel ratio (A/F) sensor 1	P0133
		Heated oxygen sensor 2	P0137
		Heated oxygen sensor 2	P0138
		Heated oxygen sensor 2	P0139
EGR/VVT SYSTEM	3	Intake value timing control function	P0011

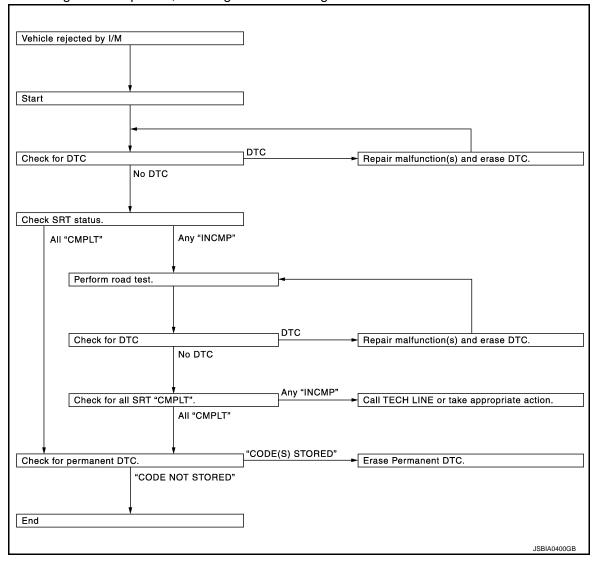
^{*1:} Though displayed on the CONSULT screen, "HO2S HTR" is not SRT item.

SRT SERVICE PROCEDURE

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

HOW TO SET SRT CODE

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



SRT Set Driving Pattern

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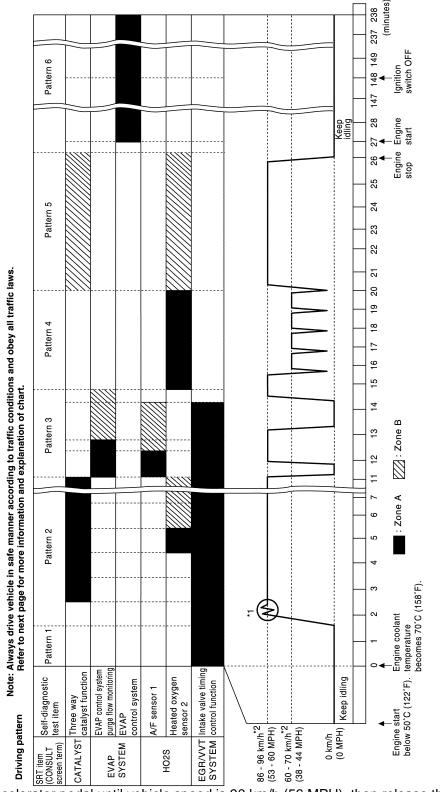
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Always drive the vehicle in safe manner according to traffic conditions and obey all traffic laws.



^{*1:} Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

^{*2:} Checking the vehicle speed with GST is advised.

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

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

HOW TO SET SRT CODE

< BASIC INSPECTION >	[MR18DE (EXCEPT FOR CALIFORNIA)]		
*: Normal conditions - Sea level - Flat road - Ambient air temperature: 20 – 30°C (68 – 86°F)			
NOTE: Diagnosis is performed as quickly as possible under r diagnosis may also be performed. [For example: ambier			
Work Procedure	INFOID:000000007769926		
1.check dtc			
Check DTC.			
Is any DTC detected?			
YES >> Repair malfunction(s) and erase DTC. Reference NO >> GO TO 2.	to <u>EC-463, "DTC_Index"</u> .		
2.CHECK SRT STATUS			
⊕With CONSULT Select "SRT STATUS" in "DTC & SRT CONFIRMATION"	mode with CONSULT.		
Perform "SRT status" mode with EC-114, "On Board Dia	gnosis Function".		
With GST Select Service \$01 with GST.	(
Is SRT code(s) set?			
YES >> GO TO 11.			
NO-1 >> With CONSULT: GO TO 3.			
NO-2 >> Without CONSULT: GO TO 4.			
3.DTC CONFIRMATION PROCEDURE			
 Select "SRT WORK SUPPORT" in "DTC & SRT CO For SRT(s) that is not set, perform the corresponding the "Performance Priority" in the "SRT ITEM" table. Check DTC. 	"DTC CONFIRMATION PROCEDURE" according to		
Is any DTC detected?			
YES >> Repair malfunction(s) and erase DTC. Reference NO >> GO TO 10.	to EC-463, "DTC_Index".		
4.PERFORM ROAD TEST			
 Check the "Performance Priority" in the "SRT ITEM" ta Perform the most efficient SRT set driving pattern to se Pattern". In order to set all SRTs, the SRT set driving pattern mu 	et the SRT properly. Refer to EC-29, "SRT Set Driving		
>> GO TO 5.			
5. PATTERN 1			
-			
 Check the vehicle condition; Engine coolant temperature is -10 to 35°C (14 to 95 Fuel tank temperature is more than 0°C (32°F). 	°F).		

- Start the engine.
 Keep engine idling until the engine coolant temperature is greater than 70°C (158°F)

NOTE:

ECM terminal voltage is follows;

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

Refer to EC-445, "Reference Value".

Ρ

>> GO TO 6.

6. PATTERN 2

- 1. Drive the vehicle. And depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds.
- 2. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again

NOTE:

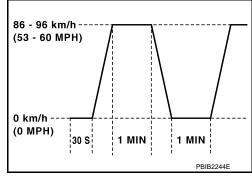
- Checking the vehicle speed with GST is advised.
- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

>> GO TO 7.

7. PATTERN 3

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

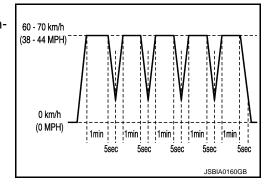
>> GO TO 8.



8. PATTERN 4

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

>> GO TO 9.



9. PATTERN 5

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

>> GO TO 10.

10. CHECK SRT STATUS

(P)With CONSULT

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

Perform "SRT status" mode with EC-114. "On Board Diagnosis Function".

Select Service \$01 with GST.

Is SRT(s) set?

YES >> GO TO 11.

NO >> Call TECH LINE or take appropriate action.

11. CHECK PERMANENT DTC

HOW TO SET SRT CODE

< BASIC INSPECTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

NOTE:

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

(P)With CONSULT

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

With GST

Select Service \$0A with GST.

Is permanent DTC(s) detected?

YES >> Proceed to EC-34, "Description".

NO >> END

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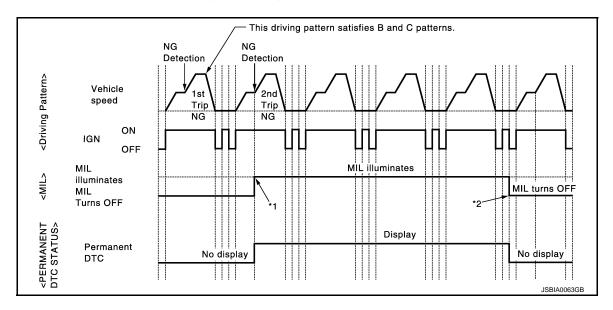
HOW TO ERASE PERMANENT DTC

Description INFOID:000000007769927

OUTLINE

When a DTC is stored in ECM

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



- *1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.
- *2: MIL will turn off after vehicle is driven 3 times (driving pattern B) without any malfunctions.

When a DTC is not stored in ECM

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

NOTE:

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

×: Applicable —: Not applicable

Group*	Perform "DTC CONFIRMATION PROCE-	Driving	Reference	
	DURE" for applicable DTCs.	В	D	Kelefelice
Α	×	_	_	EC-35
В	_	×	×	EC-37

^{*:} For group, refer to EC-463, "DTC Index".

PERMANENT DTC ITEM

For permanent DTC items, MIL turns ON. Refer to EC-463, "DTC Index".

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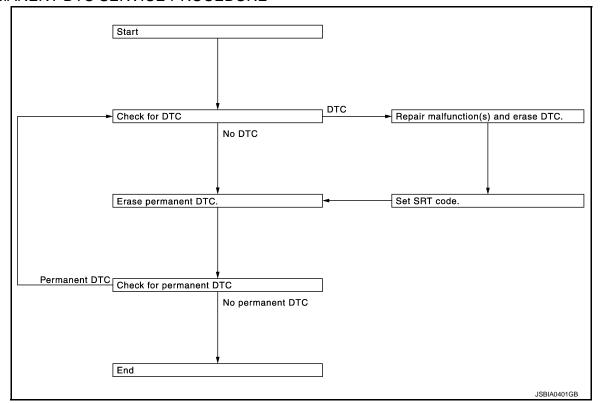
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INFOID:0000000007769928

PERMANENT DTC SERVICE PROCEDURE



Work Procedure (Group A)

Repair applicable parts indicated by DTC. DTC CONFIRMATION PROCEDURE for applicable NG NG DTC is completed. Detection Detection <Driving Pattern> Vehicle speed 1st 2nd Trip Trip NG NG ON IGN OFF MIL MIL illuminates illuminates <MIL> MIL turns OFF MIL Turns OFF Display <DTC> DTC No display No display <PERMANENT DTC STATUS> Display Permanent No display No display DTC JSBIA0064GB

< BASIC INSPECTION >

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

1. CHECK DTC

Check DTC.

Is any DTC detected?

YES-1 >> (a) With CONSULT: Repair malfunction(s) and erase DTC. Refer to (a) EC-117, "CONSULT Function". YES-2 >> (a) Without CONSULT: Repair malfunction(s) and erase DTC. Refer to (a) EC-114, "On Board Diagnosis Function".

NO >> GO TO 2.

2. CHECK PERMANENT DTC

(P)With CONSULT

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Select "PERMANENT DTC STATUS" mode with CONSULT.

With GST

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

Is any permanent DTC detected?

YES >> GO TO 3. NO >> END

3.perform dtc confirmation procedure

Perform "DTC CONFIRMATION PROCEDURE" for DTCs which are the same as permanent DTCs stored in ECM. Refer to EC-463, "DTC Index".

>> GO TO 4.

4. CHECK PERMANENT DTC

(I) With CONSULT

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

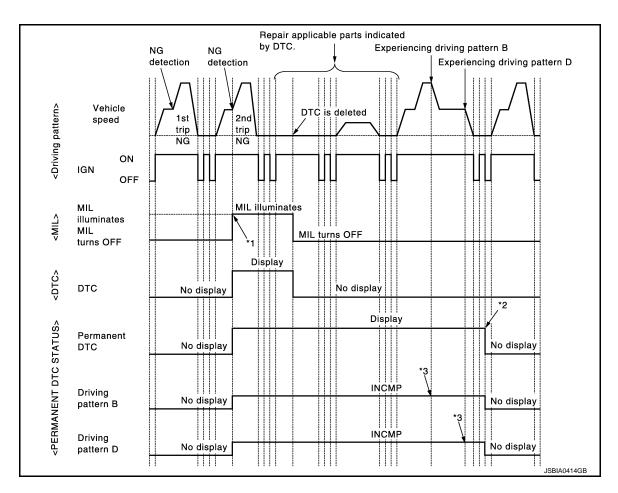
With GST

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- Select Service \$0A with GST.

Is any permanent DTC detected?

YES >> GO TO 1. NO >> END Work Procedure (Group B)

INFOID:0000000007769929



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

NOTE:

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

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES-1 >> (a) With CONSULT: Repair malfunction(s) and erase DTC. Refer to EC-117, "CONSULT Function".

YES-2 >> ®Without CONSULT: Repair malfunction(s) and erase DTC. Refer to EC-114, "On Board Diagnosis Function".

>> GO TO 2. NO

2.CHECK PERMANENT DTC

(P)With CONSULT

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

With GST

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

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HOW TO ERASE PERMANENT DTC

< BASIC INSPECTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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

Is any permanent DTC detected?

YES >> GO TO 3. NO >> END

3.drive driving pattern b

CAUTION:

- · Always drive at a safe speed.
- Never erase self-diagnosis results.
- If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset.

(P)With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Use "PERMANENT DTC WORK SUPPORT" mode with CONSULT to drive the vehicle according to driving pattern B. Refer to <u>EC-117</u>, "<u>CONSULT Function</u>", <u>EC-111</u>, "<u>DIAGNOSIS DESCRIPTION</u>: <u>Driving Pattern</u>".

With GST

- 1. Start engine and warm it up to normal operating temperature.
- Drive the vehicle according to driving pattern B. Refer to <u>EC-111, "DIAGNOSIS DESCRIPTION: Driving Pattern"</u>.

>> GO TO 4.

4. CHECK PERMANENT DTC

(P)With CONSULT

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- Select "PERMANENT DTC STATUS" mode with CONSULT.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- Select Service \$0A with GST.

Is any permanent DTC detected?

YES >> GO TO 5. NO >> END

5.DRIVE DRIVING PATTERN D

CAUTION:

- Always drive at a safe speed.
- Never erase self-diagnosis results.
- If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset.
- Drive the vehicle according to driving pattern D. Refer to <u>EC-111, "DIAGNOSIS DESCRIPTION: Driving Pattern"</u>.

>> GO TO 6.

6. CHECK PERMANENT DTC

(I) With CONSULT

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

HOW TO ERASE PERMANENT DTC

< BASIC INSPECTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- Select Service \$0A with GST.

Is any permanent DTC detected?

YES >> GO TO 1.

NO >> END

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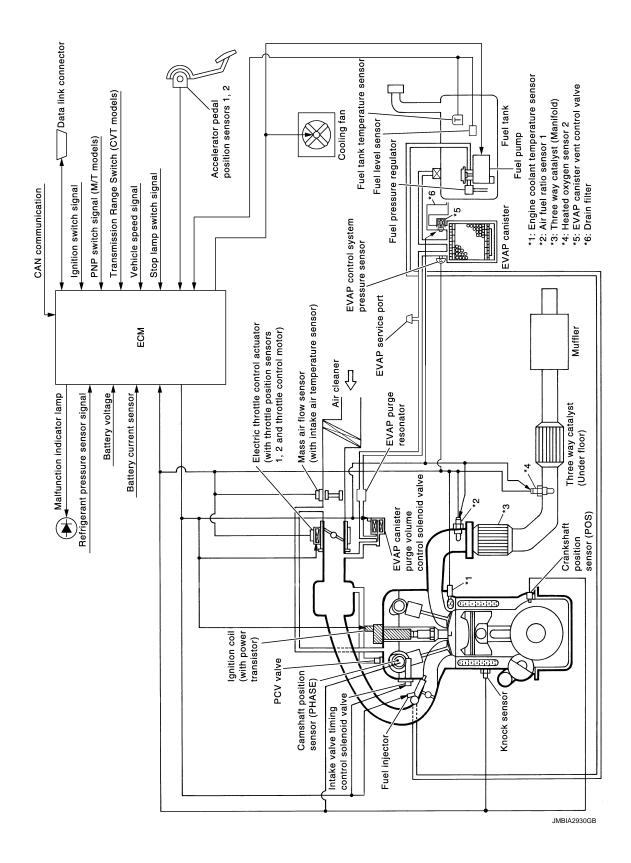
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SYSTEM DESCRIPTION

ENGINE CONTROL SYSTEM

System Diagram



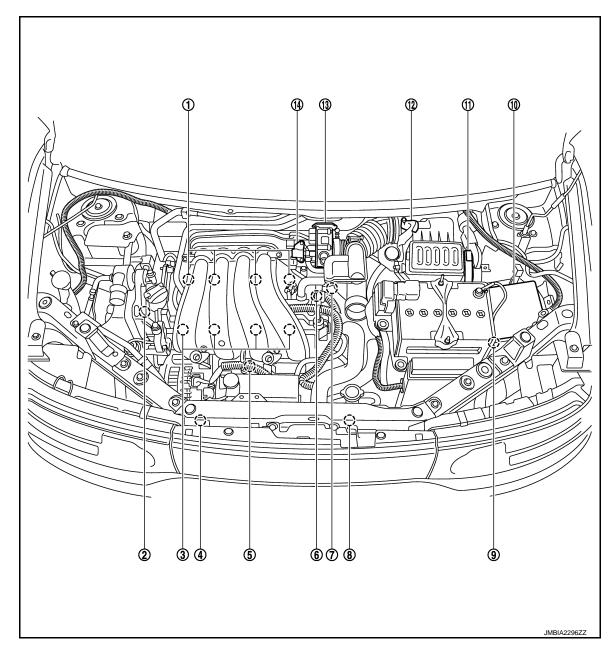
System Description

INFOID:0000000007769931

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

Component Parts Location

INFOID:0000000007769932



- Ignition coil (with power transistor) and spark plug
- 4. Refrigerant pressure sensor
- 7. Engine coolant temperature sensor
- 10. IPDM E/R
- Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- Intake valve timing control solenoid 3. valve
- 5. Knock sensor
- 8. Cooling fan motor
- 11. ECM
- 14. EVAP canister purge volume control solenoid valve
- Fuel injector
- 6. Camshaft position sensor (PHASE)
- 9. Battery current sensor
- Mass air flow sensor (with intake air temperature sensor)

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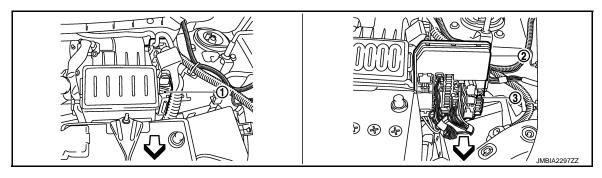
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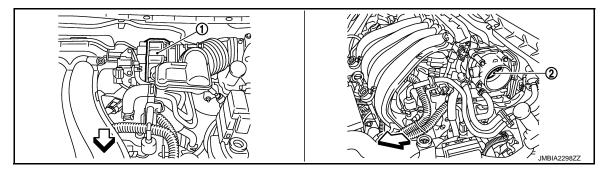


1. ECM

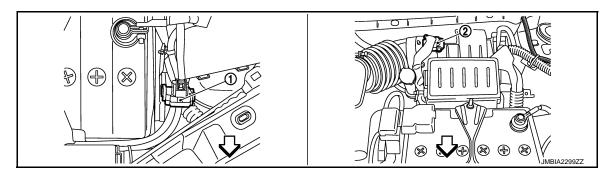
2. IPDM E/R

3. Fuel pump fuse (15 A)

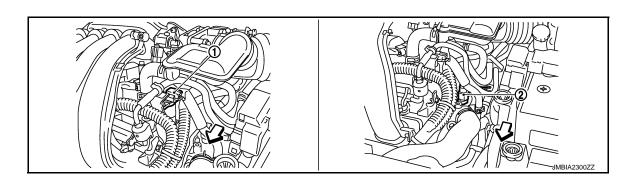




- Electric throttle control actuator (with built-in position sensor, throttle control motor)
- Throttle valve



- Battery current sensor
- Mass air flow sensor (with Intake air temperature sensor)



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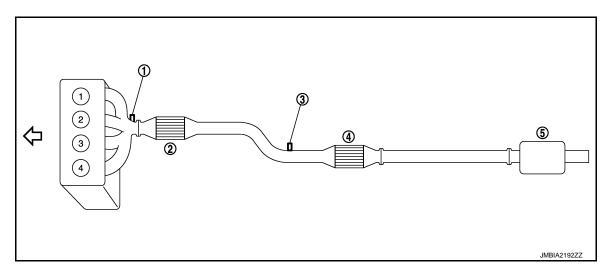
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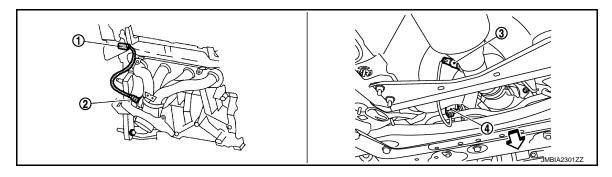
- Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor



- Air fuel ratio (A/F) sensor 1
- Three way catalyst (under floor)
- Vehicle front

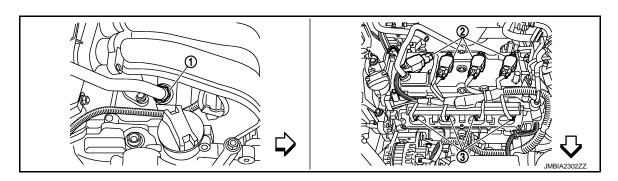
- 2. Three way catalyst (Manifold)
- Muffler

3. Heated oxygen sensor 2



- connector
- Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1
- 3. Heated oxygen sensor 2

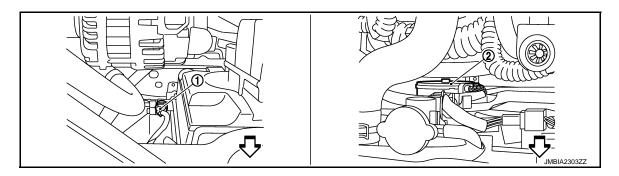
- Heated oxygen sensor 2 harness connector



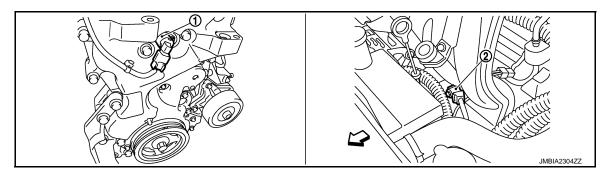
PCV valve

Ignition coil (with power transistor) and spark plug

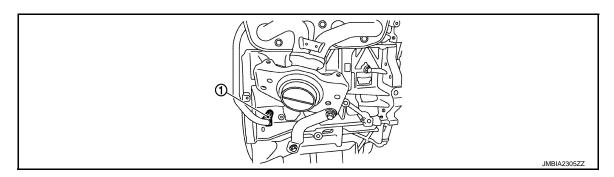
Vehicle front



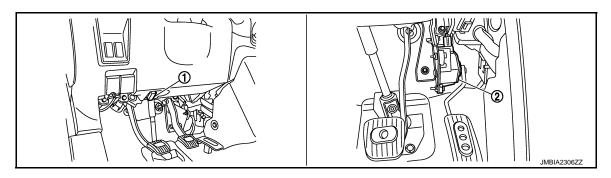
- 1. Refrigerant pressure sensor
- 2. Cooling fan motor



- Intake valve timing control solenoid 2. Knock sensor valve



1. Crankshaft position sensor (POS)



- 1. Data link connector
- 2. Accelerator pedal position sensor

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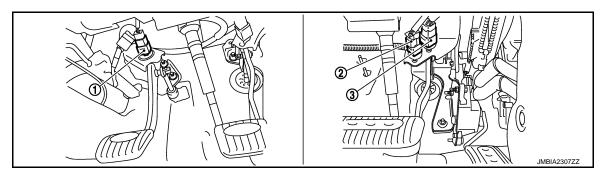
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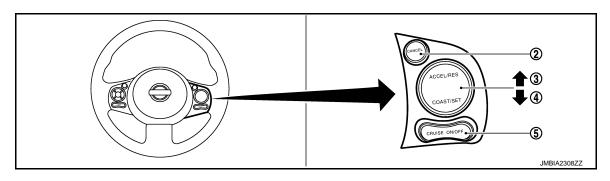
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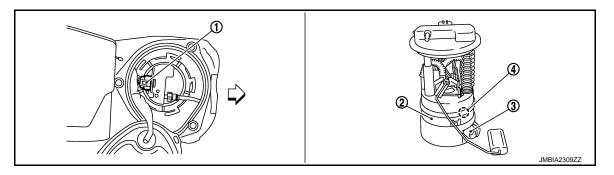


- ASCD clutch switch
- 2. ASCD brake switch
- 3. Stop lamp switch

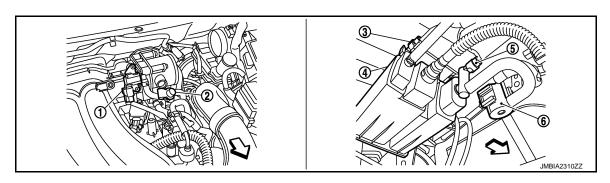


- ASCD steering switch 1.
- CANCEL switch
- RESUME/ACCELERATE switch

- SET/COST switch
- MAIN switch



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



- EVAP canister purge volume control 2. EVAP service port solenoid valve
- EVAP control system pressure sen-

ENGINE CONTROL SYSTEM

< SYSTEM DESCRIPTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

4. EVAP canisterVehicle front

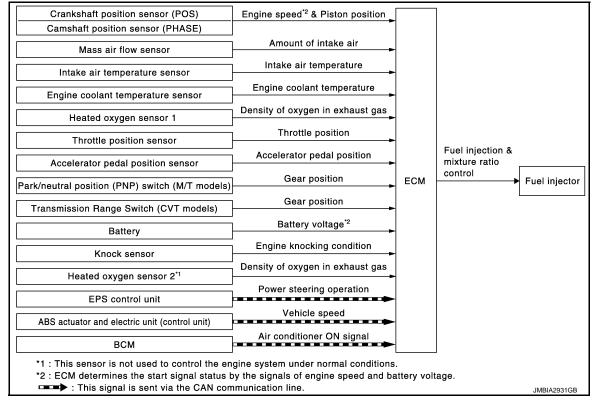
5. EVAP canister vent control valve

6. Drain filter

Component Description

Component	Reference	
A/F sensor 1	EC-185, "Description"	
A/F sensor 1 heater	EC-143, "Description"	
Accelerator pedal position sensor	EC-397, "Description"	
ASCD brake switch	EC-372, "Description"	
ASCD steering switch	EC-369, "Description"	
ASCD vehicle speed sensor	EC-379, "Description"	
Battery current sensor	EC-353, "Description"	
Camshaft position sensor (PHASE)	EC-250, "Description"	
Crankshaft position sensor (POS)	EC-246, "Description"	
Cooling fan motor	EC-79, "System Description"	
Electric throttle control actuator	EC-395, "Description"	
Engine coolant temperature sensor	EC-168, "Description"	
EVAP canister purge volume control solenoid valve	EC-272, "Description"	
EVAP canister vent control valve	EC-280, "Description"	
EVAP control system pressure sensor	EC-288, "Description"	
Fuel injector	EC-424, "Description"	
Fuel level sensor	EC-315, "Description"	
Fuel pump	EC-427, "Description"	
Fuel tank temperature sensor	EC-228, "Description"	
Heated oxygen sensor 2	EC-195, "Description"	
Heated oxygen sensor 2 heater	EC-146, "Description"	
Ignition signal	EC-430, "Description"	
Intake air temperature sensor	EC-166, "Description"	
Intake valve timing control solenoid valve	EC-97, "System Description"	
Knock sensor	EC-244, "Description"	
Mass air flow sensor	EC-152, "Description"	
Park/neutral position switch (M/T models)	FO 225 Decembring	
Transmission range switch (CVT models)	EC-335, "Description"	
PCV valve	EC-442, "Description"	
Refrigerant pressure sensor	EC-443, "Description"	
Stop lamp switch	EC-383, "Description"	
Throttle control motor	EC-393, "Description"	
Throttle control motor relay	EC-386, "Description"	
Throttle position sensor	EC-174, "Description"	

System Diagram



System Description

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INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator		
Crankshaft position sensor (POS)	Engine speed*3				
Camshaft position sensor (PHASE)	Piston position				
Mass air flow sensor	Amount of intake air				
Intake air temperature sensor	Intake air temperature				
Engine coolant temperature sensor	Engine coolant temperature	Fuel injection & mixture ratio control			
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		mixture ratio	Fuel injector	
Park/neutral position (PNP) switch (M/T models)	Gear position				
Transmission range switch (CVT models)	Gear position				
Battery	Battery voltage*3				
Knock sensor	Engine knocking condition		_		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas				
EPS control unit	Power steering operation*2				
ABS actuator and electric unit (control unit)	Vehicle speed*2				
всм	Air conditioner ON signal*2				

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

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

< SYSTEM DESCRIPTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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

SYSTEM DESCRIPTION

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

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

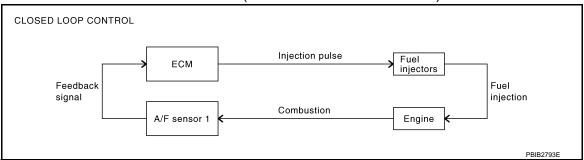
<Fuel increase>

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

<Fuel decrease>

- During deceleration
- · During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (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-185, "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 (CVT models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

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

< SYSTEM DESCRIPTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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.

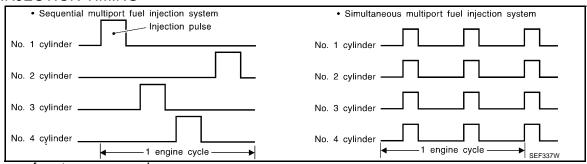
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"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 four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
 - The four injectors will then receive the signals two times for each engine cycle.
 - This system is used 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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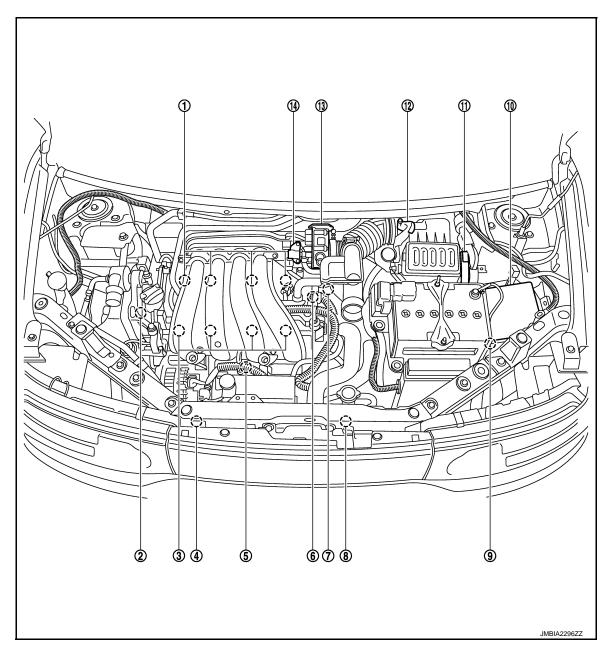
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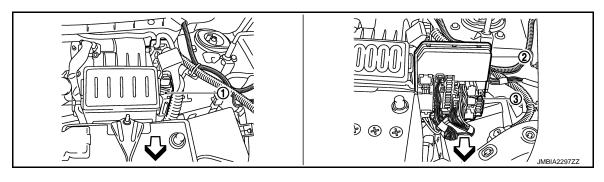
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Component Parts Location



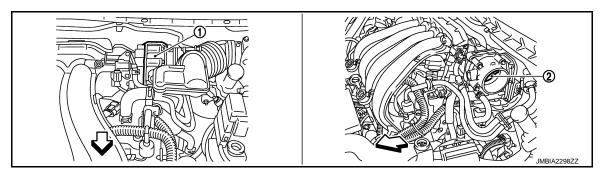
- Ignition coil (with power transistor) and spark plug
- 4. Refrigerant pressure sensor
- 7. Engine coolant temperature sensor
- 10. IPDM E/R
- 13. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- Intake valve timing control solenoid 3. valve
- 5. Knock sensor
- 8. Cooling fan motor
- 11. ECM
- 14. EVAP canister purge volume control solenoid valve
- Fuel injector
- 6. Camshaft position sensor (PHASE)
- 9. Battery current sensor
- 12. Mass air flow sensor (with intake air temperature sensor)



1. ECM

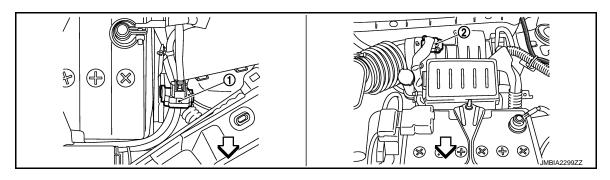
2. IPDM E/R

3. Fuel pump fuse (15 A)



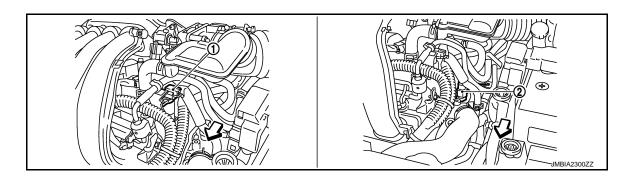
- Electric throttle control actuator (with built-in position sensor, throttle control motor)
- . Throttle valve

∀ Vehicle front



- Battery current sensor
- Mass air flow sensor (with Intake air temperature sensor)

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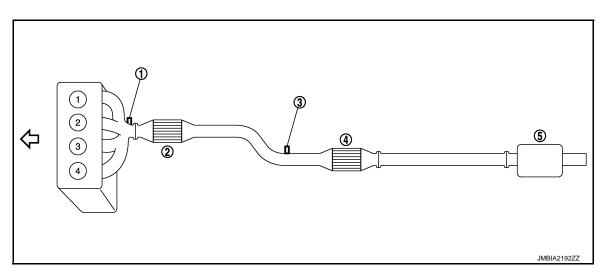
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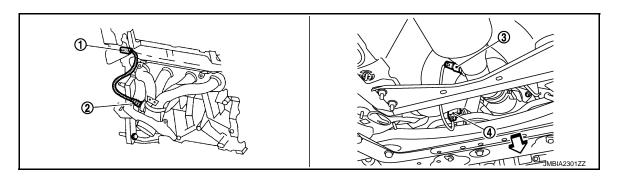
- 1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor



- 1. Air fuel ratio (A/F) sensor 1
- 4. Three way catalyst (under floor)

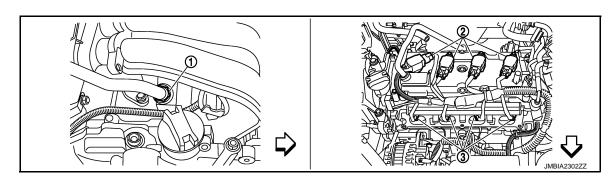
- 2. Three way catalyst (Manifold)
- 5. Muffler

3. Heated oxygen sensor 2



- Air fuel ratio (A/F) sensor 1 harness connector
- Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1
- 3. Heated oxygen sensor 2

- Heated oxygen sensor 2 harness connector



1. PCV valve

- 2. Ignition coil (with power transistor) and spark plug
- Fuel injector

Vehicle front

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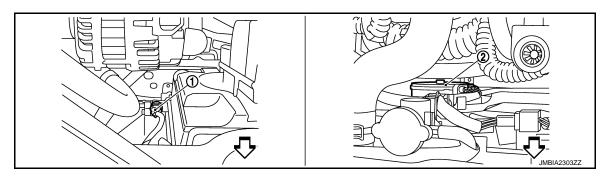
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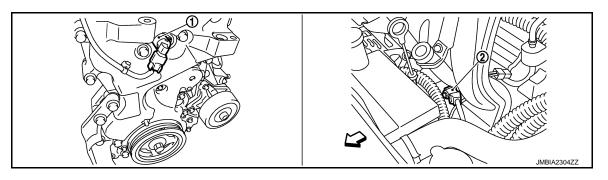
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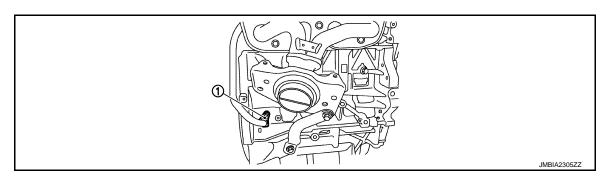


- 1. Refrigerant pressure sensor
- Cooling fan motor

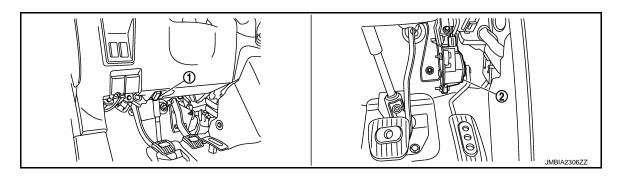
√ Vehicle front



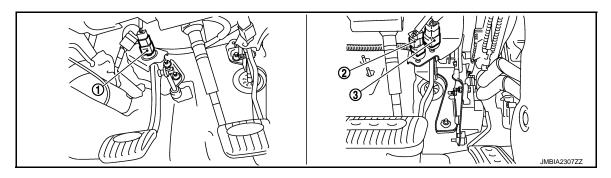
- Intake valve timing control solenoid 2. Knock sensor valve



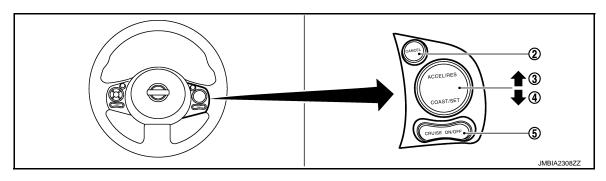
1. Crankshaft position sensor (POS)



- Data link connector
- 2. Accelerator pedal position sensor

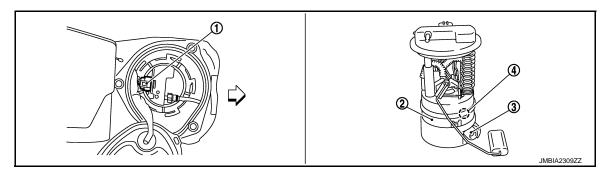


- ASCD clutch switch
- 2. ASCD brake switch
- Stop lamp switch



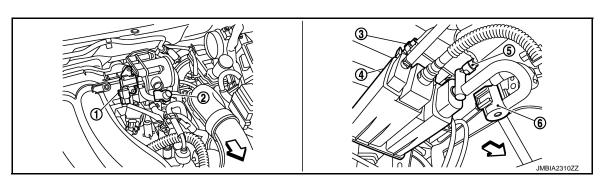
- ASCD steering switch 1.
- SET/COST switch
- CANCEL switch
- MAIN switch

RESUME/ACCELERATE switch



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

- Fuel tank temperature sensor



- EVAP canister purge volume control 2. solenoid valve
- **EVAP** service port
- EVAP control system pressure sen-

< SYSTEM DESCRIPTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

4. EVAP canister

5. EVAP canister vent control valve

6. Drain filter

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Component Description

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Component	Reference
A/F sensor 1	EC-185, "Description"
Accelerator pedal position sensor	EC-397, "Description"
Camshaft position sensor (PHASE)	EC-250, "Description"
Crankshaft position sensor (POS)	EC-246, "Description"
Engine coolant temperature sensor	EC-168, "Description"
Fuel injector	EC-424, "Description"
Heated oxygen sensor 2	EC-195, "Description"
Intake air temperature sensor	EC-166, "Description"
Knock sensor	EC-244, "Description"
Mass air flow sensor	EC-152, "Description"
Park/neutral position switch (M/T models)	EC 225 "Description"
Transmission range switch (CVT models)	EC-335, "Description"
Throttle position sensor	EC-174, "Description"

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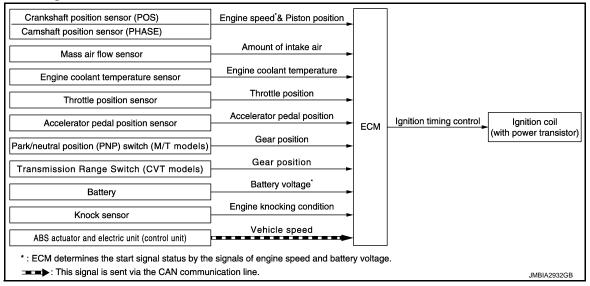
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ELECTRIC IGNITION SYSTEM

System Diagram

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System Description

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INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2		
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air	Ignition timing control	Ignition coil (with power transistor)
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*2		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch (M/T models)	Gear position		
Transmission range switch (CVT models)	Gear position		
ABS actuator and electric unit (control unit)	Vehicle speed*1		

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

SYSTEM DESCRIPTION

Ignition order: 1 - 3 - 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.

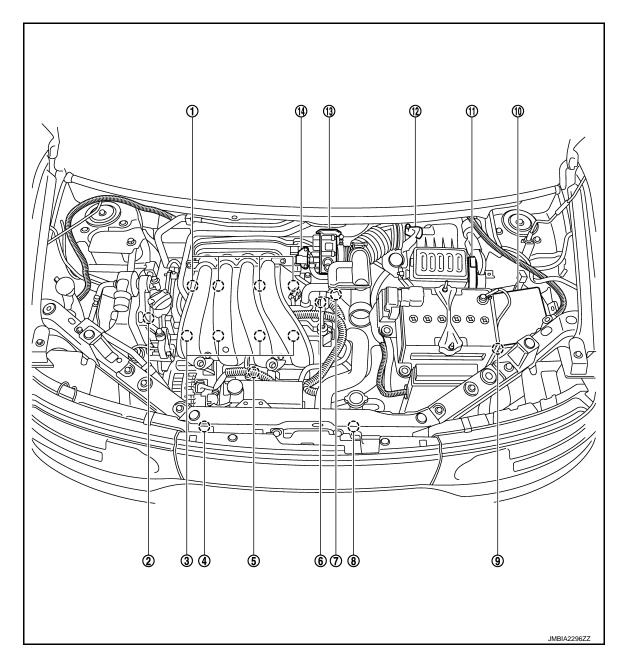
- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

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

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Component Parts Location

INFOID:0000000007769940



- Ignition coil (with power transistor) and spark plug
- 4. Refrigerant pressure sensor
- 7. Engine coolant temperature sensor
- 10. IPDM E/R
- Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- Intake valve timing control solenoid valve
- 5. Knock sensor
- 8. Cooling fan motor
- 11. ECM
- EVAP canister purge volume control solenoid valve
- Fuel injector
- 6. Camshaft position sensor (PHASE)
- 9. Battery current sensor
- Mass air flow sensor (with intake air temperature sensor)

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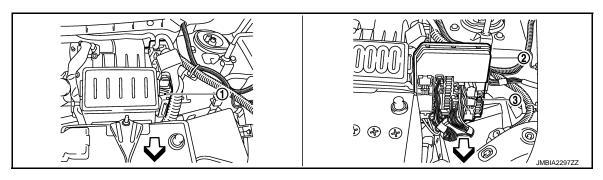
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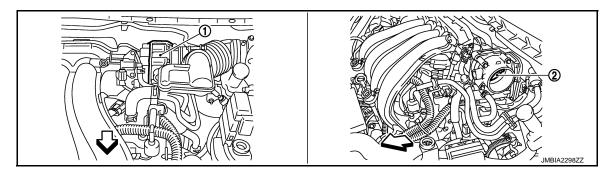


1. ECM

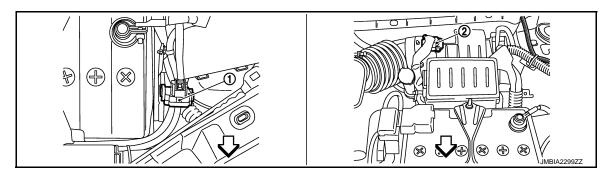
2. IPDM E/R

3. Fuel pump fuse (15 A)

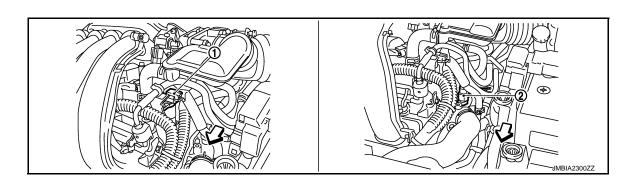




- Electric throttle control actuator (with built-in position sensor, throttle control motor)
- Throttle valve



- Battery current sensor
- Mass air flow sensor (with Intake air temperature sensor)



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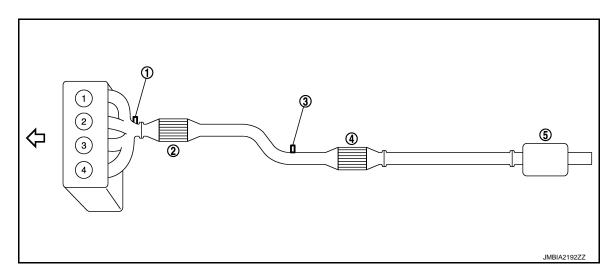
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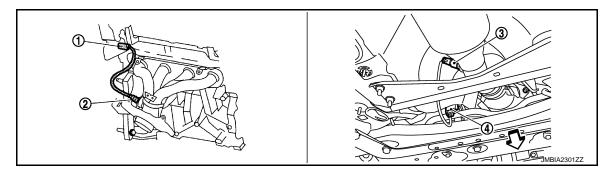
- Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor



- Air fuel ratio (A/F) sensor 1
- Three way catalyst (under floor)
- Vehicle front

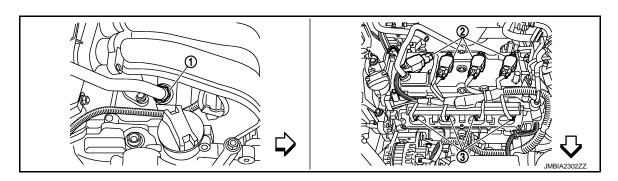
- 2. Three way catalyst (Manifold)
- Muffler

3. Heated oxygen sensor 2



- connector
- Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1
- 3. Heated oxygen sensor 2

- Heated oxygen sensor 2 harness connector

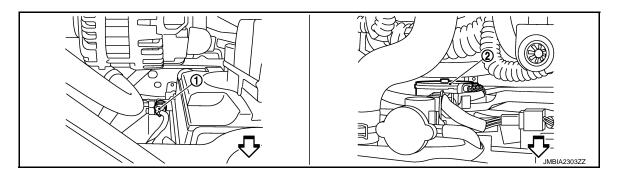


PCV valve

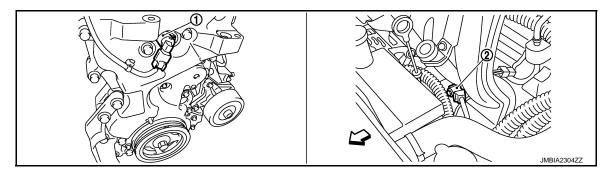
Ignition coil (with power transistor) and spark plug

Vehicle front

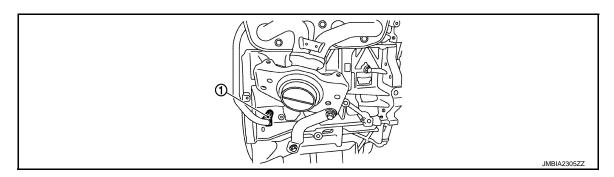
Fuel injector



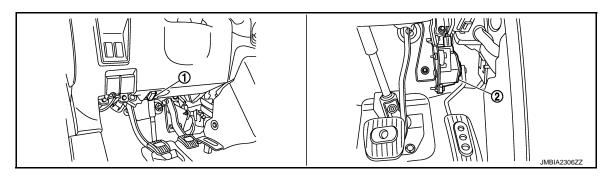
- 1. Refrigerant pressure sensor
- 2. Cooling fan motor



- Intake valve timing control solenoid 2. Knock sensor valve



1. Crankshaft position sensor (POS)



- 1. Data link connector
- 2. Accelerator pedal position sensor

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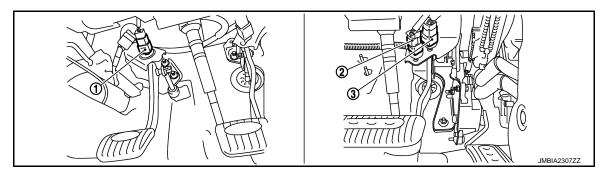
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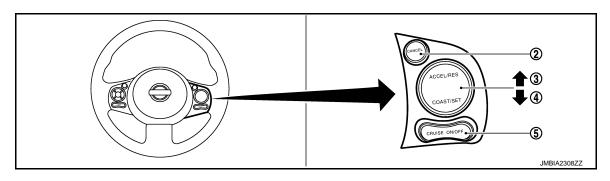
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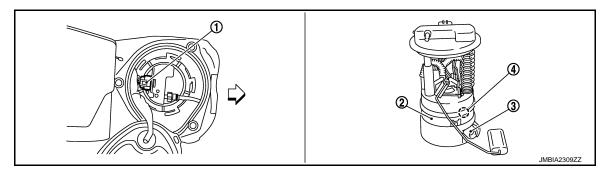


- ASCD clutch switch
- 2. ASCD brake switch
- 3. Stop lamp switch

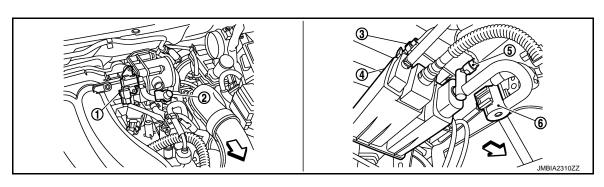


- ASCD steering switch 1.
- CANCEL switch
- RESUME/ACCELERATE switch

- SET/COST switch
- MAIN switch



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



- EVAP canister purge volume control 2. EVAP service port solenoid valve
- EVAP control system pressure sen-

ELECTRIC IGNITION SYSTEM

< SYSTEM DESCRIPTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

4. EVAP canister

5. EVAP canister vent control valve

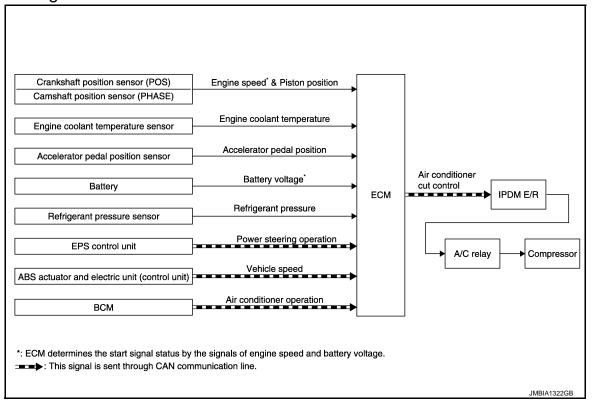
6. Drain filter

Component Description

Component	Reference
Accelerator pedal position sensor	EC-397, "Description"
Camshaft position sensor (PHASE)	EC-250, "Description"
Crankshaft position sensor (POS)	EC-246, "Description"
Engine coolant temperature sensor	EC-168, "Description"
Ignition signal	EC-430, "Description"
Knock sensor	EC-244, "Description"
Mass air flow sensor	EC-152, "Description"
Park/neutral position switch (M/T models)	EC-335, "Description"
Transmission range switch (CVT models)	LO-333, Description
Throttle position sensor	EC-174, "Description"
Vehicle speed sensor	EC-321, "M/T MODELS : Description"

AIR CONDITIONING CUT CONTROL

System Diagram INFOID:0000000007769942



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator	
Air conditioner switch*1	Air conditioner ON signal		IPDM E/R ↓ Air conditioner relay ↓ Compressor	
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		
Battery	Battery voltage*2	cut control		
Refrigerant pressure sensor	Refrigerant pressure			
EPS control unit	Power steering operation			
ABS actuator and electric unit (control unit)	Vehicle speed*1			
BCM	Air conditioner ON signal*1			

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

SYSTEM DESCRIPTION

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

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

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

EC-63 Revision: 2011 November 2012 CUBE

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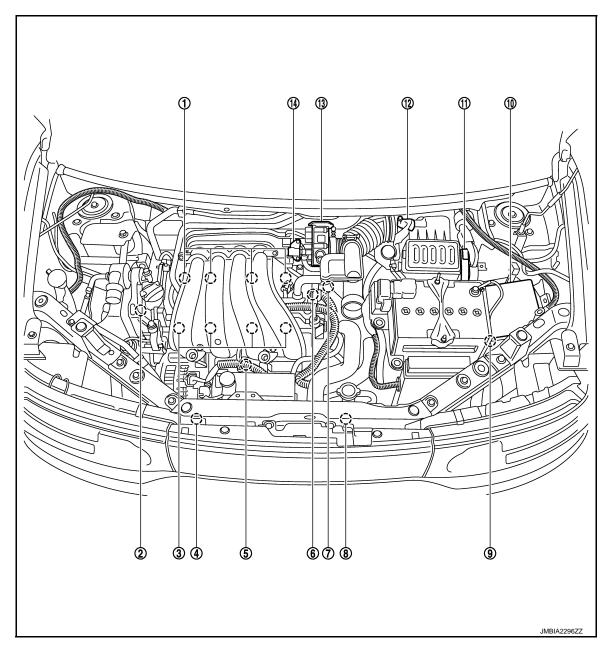
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^{*2:} ECM determines the start signal status by the signals of engine speed and battery voltage.

< SYSTEM DESCRIPTION >

- When engine speed is excessively low.
- · When refrigerant pressure is excessively low or high.

Component Parts Location



- Ignition coil (with power transistor) and spark plug
- 4. Refrigerant pressure sensor
- 7. Engine coolant temperature sensor
- 10. IPDM E/R
- Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- Intake valve timing control solenoid valve
- 5. Knock sensor
- 8. Cooling fan motor
- 11. ECM
- 14. EVAP canister purge volume control solenoid valve
- 3. Fuel injector
- 6. Camshaft position sensor (PHASE)
- 9. Battery current sensor
- Mass air flow sensor (with intake air temperature sensor)

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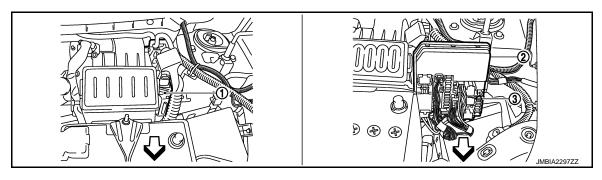
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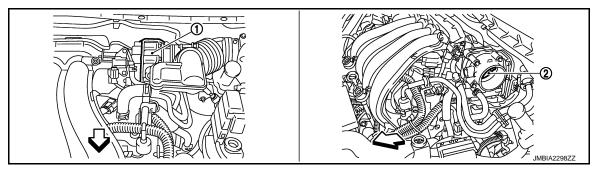
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1. ECM

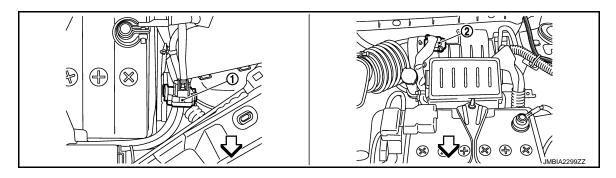
2. IPDM E/R

3. Fuel pump fuse (15 A)



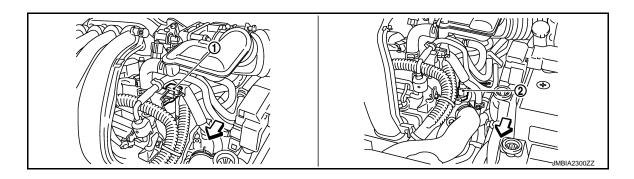
- Electric throttle control actuator (with built-in position sensor, throttle control motor)
- . Throttle valve

∀ Vehicle front

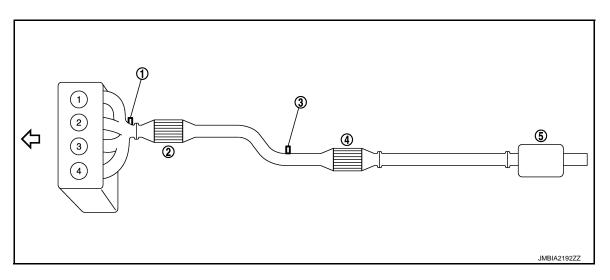


- Battery current sensor
- Mass air flow sensor (with Intake air temperature sensor)

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→ Vehicle front



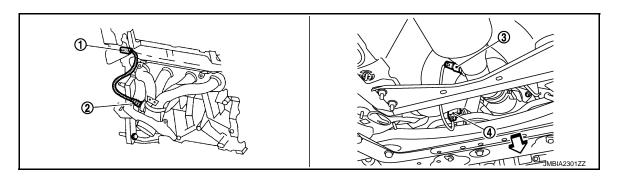
- 1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor



- 1. Air fuel ratio (A/F) sensor 1
- 4. Three way catalyst (under floor)

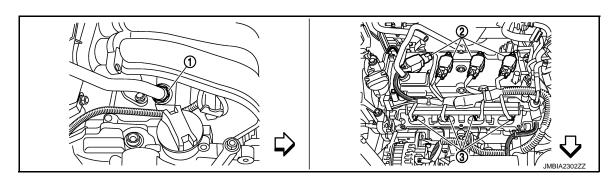
- 2. Three way catalyst (Manifold)
- 5. Muffler

3. Heated oxygen sensor 2



- Air fuel ratio (A/F) sensor 1 harness connector
- Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1
- 3. Heated oxygen sensor 2

- Heated oxygen sensor 2 harness connector
- ⟨
 → Vehicle front



1. PCV valve

- Ignition coil (with power transistor) and spark plug
- Fuel injector

Vehicle front

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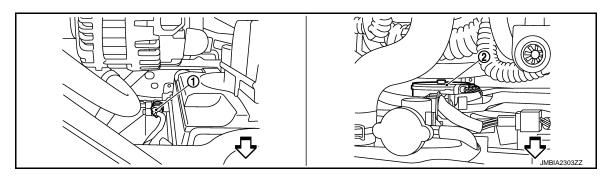
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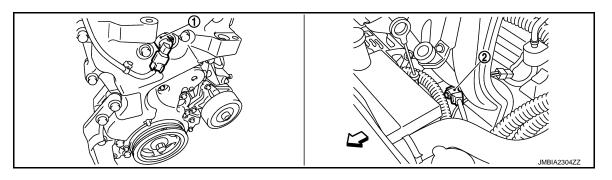
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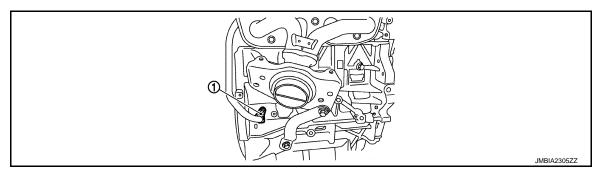


- 1. Refrigerant pressure sensor
- Cooling fan motor

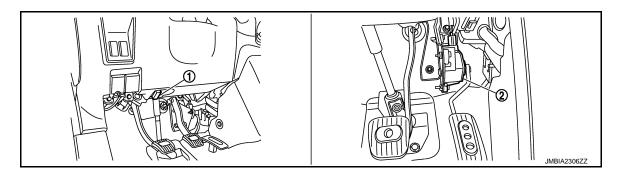
√ Vehicle front



- Intake valve timing control solenoid 2. Knock sensor valve

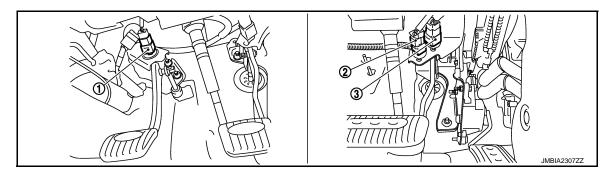


1. Crankshaft position sensor (POS)

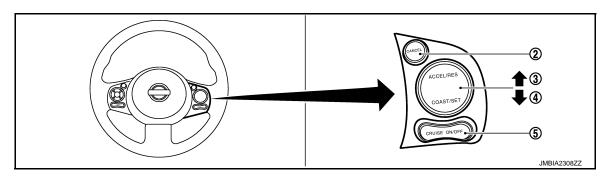


Data link connector

2. Accelerator pedal position sensor

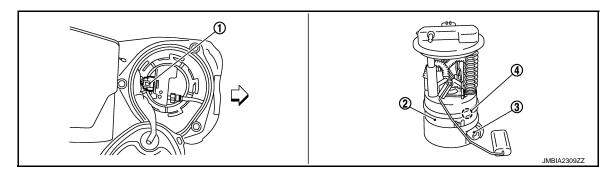


- ASCD clutch switch
- 2. ASCD brake switch
- Stop lamp switch



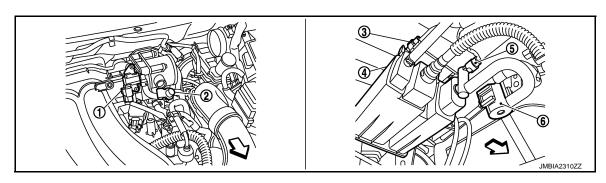
- ASCD steering switch 1.
- SET/COST switch
- CANCEL switch
- MAIN switch

RESUME/ACCELERATE switch



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

- Fuel tank temperature sensor



- EVAP canister purge volume control 2. solenoid valve
- **EVAP** service port
- EVAP control system pressure sen-

AIR CONDITIONING CUT CONTROL

< SYSTEM DESCRIPTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

4. EVAP canister

5. EVAP canister vent control valve

6. Drain filter

⟨
→ Vehicle front

Component Description

INFOID:0000000007769945

Component	Reference
Accelerator pedal position sensor	EC-397, "Description"
Camshaft position sensor (PHASE)	EC-250, "Description"
Crankshaft position sensor (POS)	EC-246, "Description"
Engine coolant temperature sensor	EC-168, "Description"
Refrigerant pressure sensor	EC-443, "Description"

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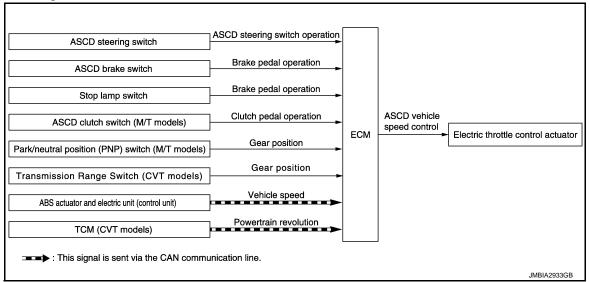
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AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram

INFOID:0000000007769946



System Description

INFOID:0000000007769947

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD steering switch	ASCD steering switch operation		Electric throttle control actuator
ASCD brake switch	Drake pedal aparation		
Stop lamp switch	Brake pedal operation		
ASCD clutch switch (M/T models)	Clutch pedal operation	ASCD vehicle	
Park/neutral position (PNP) switch (M/T models)	Gear position	speed control	
Transmission range switch (CVT models)	Gear position		
ABS actuator and electric unit (control unit)	Vehicle speed*		
TCM (M/T models)	Powertrain revolution*		

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

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.

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

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

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

NOTE:

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

SET OPERATION

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

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

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.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

< SYSTEM DESCRIPTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

CANCEL OPERATION

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

- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to neutral position (M/T models)
- Selector lever position is changed to N, P, 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 indicator lamp.

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

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

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

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

COAST OPERATION

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

RESUME OPERATION

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

- Brake pedal is released
- Clutch pedal is released (M/T models)
- Selector lever position is other than P and N (CVT models)
- Vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)

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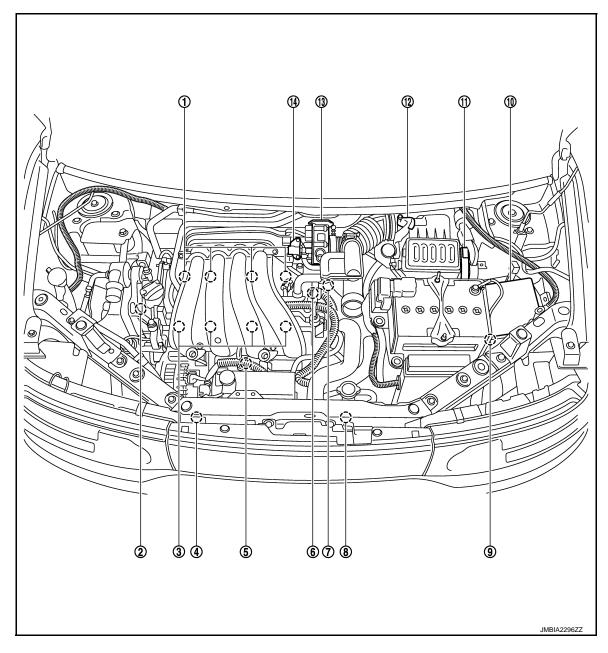
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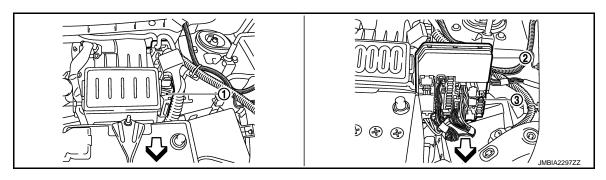
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Component Parts Location



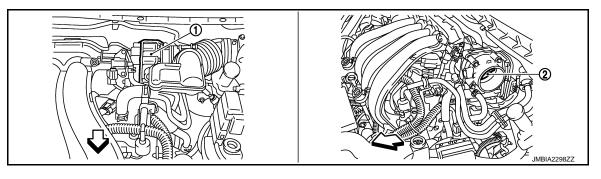
- Ignition coil (with power transistor) and spark plug
- 4. Refrigerant pressure sensor
- 7. Engine coolant temperature sensor
- 10. IPDM E/R
- 13. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- Intake valve timing control solenoid 3. valve
- 5. Knock sensor
- 8. Cooling fan motor
- 11. ECM
- 14. EVAP canister purge volume control solenoid valve
- Fuel injector
- 6. Camshaft position sensor (PHASE)
- 9. Battery current sensor
- 12. Mass air flow sensor (with intake air temperature sensor)



1. ECM

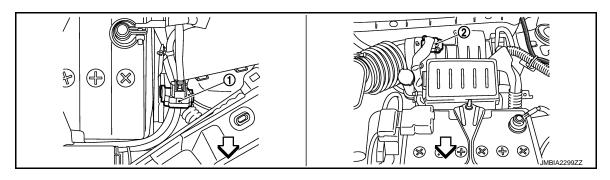
2. IPDM E/R

3. Fuel pump fuse (15 A)



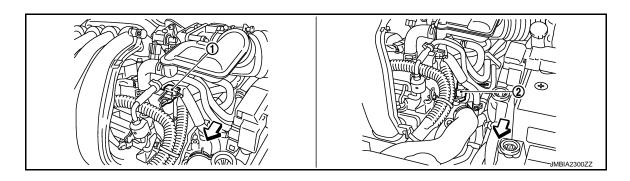
- Electric throttle control actuator (with built-in position sensor, throttle control motor)
- 2. Throttle valve

∀ Vehicle front



- Battery current sensor
- Mass air flow sensor (with Intake air temperature sensor)

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→ Vehicle front



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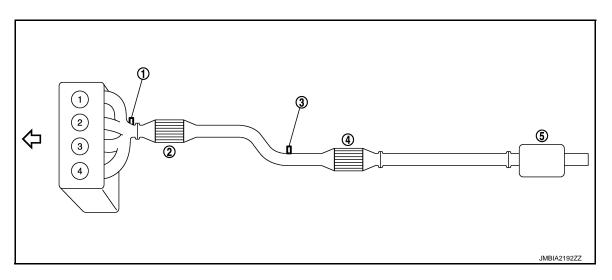
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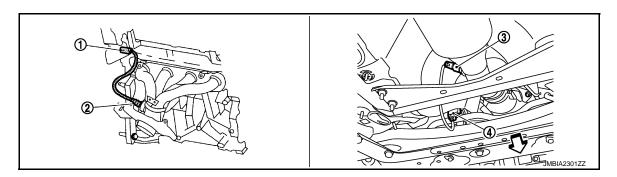
- Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor
- ⟨□ Vehicle front



- Air fuel ratio (A/F) sensor 1
- Three way catalyst (under floor)
- Vehicle front

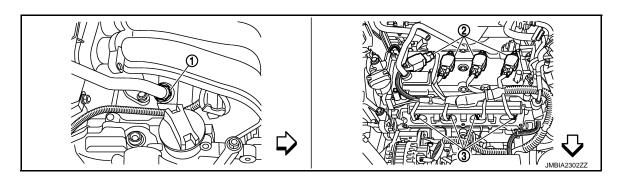
- Three way catalyst (Manifold) 2.
- 5. Muffler

3. Heated oxygen sensor 2



- connector
- Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1
- Heated oxygen sensor 2

- Heated oxygen sensor 2 harness connector



PCV valve

- Ignition coil (with power transistor) and spark plug
- Fuel injector

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→ Vehicle front

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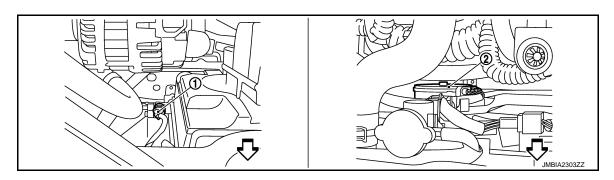
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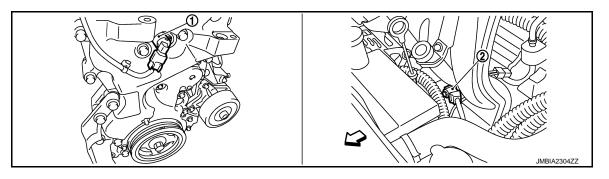
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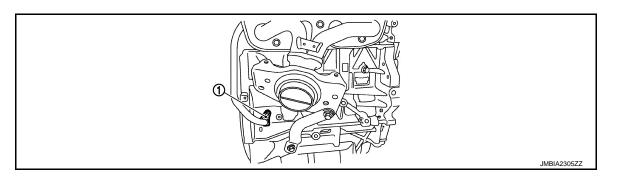


- 1. Refrigerant pressure sensor
- Cooling fan motor

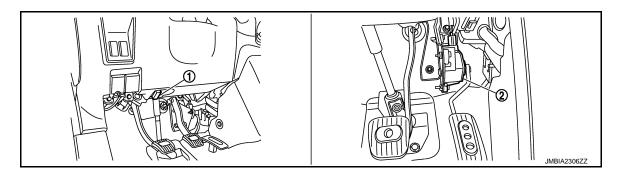
√ Vehicle front



- Intake valve timing control solenoid 2. Knock sensor valve



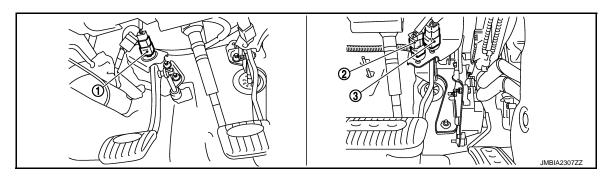
1. Crankshaft position sensor (POS)



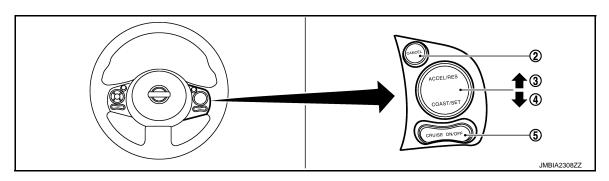
Data link connector

2. Accelerator pedal position sensor

Revision: 2011 November EC-75 2012 CUBE

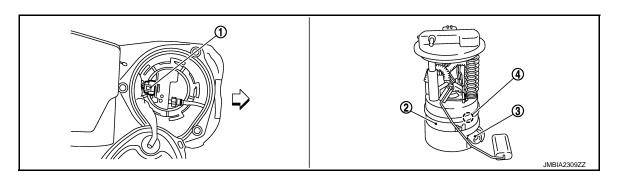


- ASCD clutch switch
- 2. ASCD brake switch
- Stop lamp switch



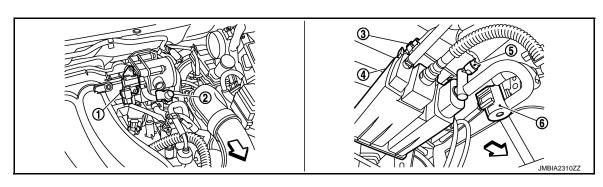
- ASCD steering switch
 - SET/COST switch
- CANCEL switch
- MAIN switch

RESUME/ACCELERATE switch



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

- Fuel tank temperature sensor



- EVAP canister purge volume control 2. solenoid valve
- **EVAP** service port
- EVAP control system pressure sen-

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

< SYSTEM DESCRIPTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

4. EVAP canister

5. EVAP canister vent control valve

6. Drain filter

⟨
→ Vehicle front

Component Description

Component	Reference
ASCD steering switch	EC-369, "Description"
ASCD brake switch	EC-372, "Description"
ASCD indicator	EC-419, "Description"
Electric throttle control actuator	EC-395, "Description"
Park/neutral position switch (M/T models)	EC-335, "Description"
Transmission range switch (CVT models)	LO-333, Description
Stop lamp switch	EC-372, "Description"

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CAN COMMUNICATION

< SYSTEM DESCRIPTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

CAN COMMUNICATION

System Description

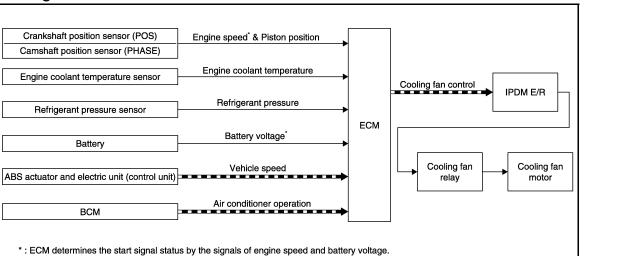
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CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped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

Refer to LAN-22, "CAN Communication Signal Chart", about CAN communication for detail.

COOLING FAN CONTROL

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

: This signal is sent through CAN communication line.

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1		
Battery	Battery voltage*1		IPDM E/R
ABS actuator and electric unit (control unit)	Vehicle speed*2	Cooling fan	↓Cooling fan relay
Engine coolant temperature sensor	Engine coolant temperature	Control	↓ Cooling fan motor
ВСМ	Air conditioner ON signal*2		Cooling fair motor
Refrigerant pressure sensor	Refrigerant pressure		

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

SYSTEM DESCRIPTION

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pressure, air conditioner ON signal. Then control system has 3-step control [HIGH/LOW/OFF].

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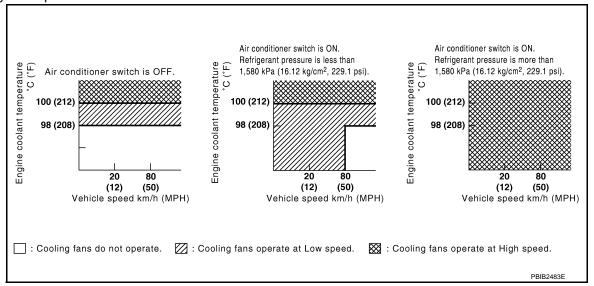
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^{*2:} This signal is sent to ECM via the CAN communication line.

Cooling Fan Operation



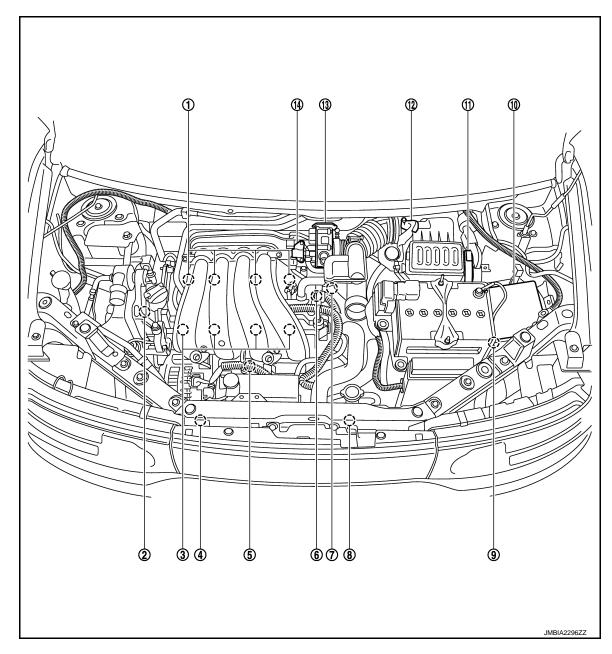
Cooling Fan Relay Operation

The ECM controls cooling fan relays via the CAN communication line.

Cooling for speed	Cooling fan relay		
Cooling fan speed	1	2	3
Stop (OFF)	OFF	OFF	OFF
Low (LOW)	ON	OFF	OFF
High (HI)	ON	ON	ON

Component Parts Location

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- Ignition coil (with power transistor) and spark plug
- 4. Refrigerant pressure sensor
- 7. Engine coolant temperature sensor
- 10. IPDM E/R
- 13. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- Intake valve timing control solenoid valve
- 5. Knock sensor
- 8. Cooling fan motor
- 11. ECM
- 14. EVAP canister purge volume control solenoid valve
- Fuel injector
- 6. Camshaft position sensor (PHASE)
- 9. Battery current sensor
- 12. Mass air flow sensor (with intake air temperature sensor)

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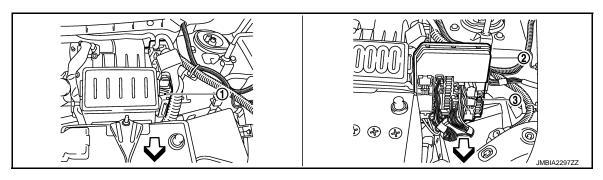
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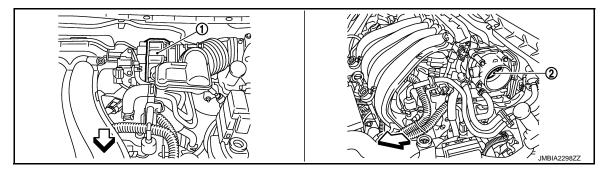


1. ECM

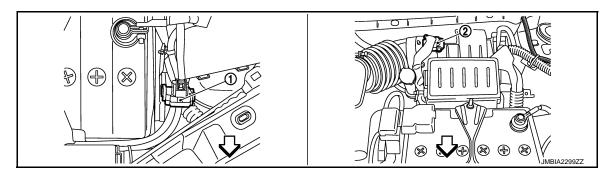
2. IPDM E/R

B. Fuel pump fuse (15 A)

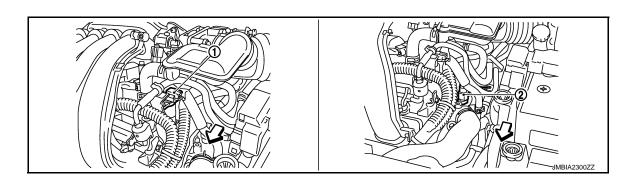




- Electric throttle control actuator (with built-in position sensor, throttle control motor)
- 2. Throttle valve



- Battery current sensor
- Mass air flow sensor (with Intake air temperature sensor)



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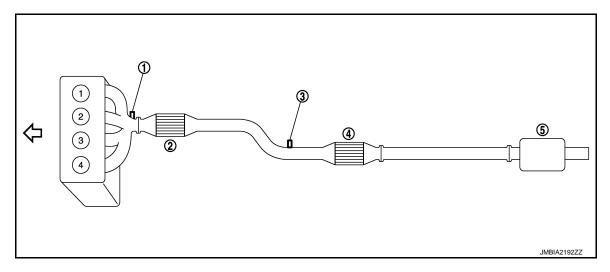
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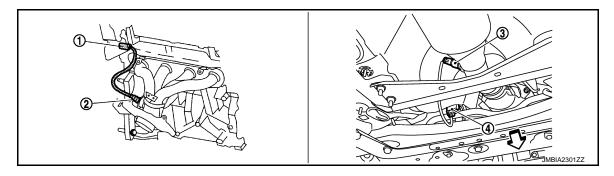
- Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor



- Air fuel ratio (A/F) sensor 1
- Three way catalyst (under floor)
- Vehicle front

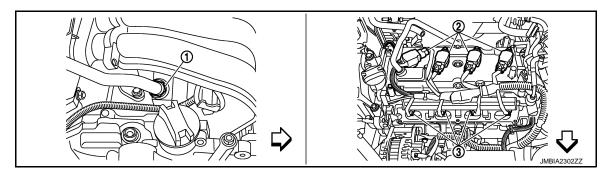
- 2. Three way catalyst (Manifold)
- Muffler

3. Heated oxygen sensor 2



- connector
- Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1
- Heated oxygen sensor 2

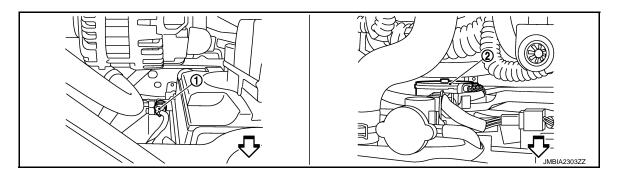
- Heated oxygen sensor 2 harness connector
- ⟨ Vehicle front



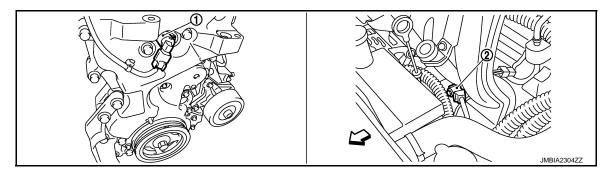
PCV valve

- Ignition coil (with power transistor) and spark plug
- Fuel injector

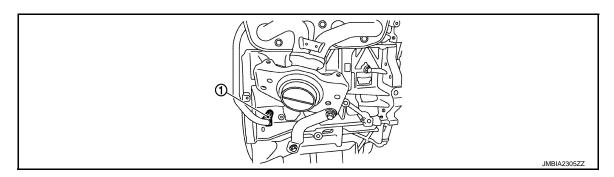
Vehicle front



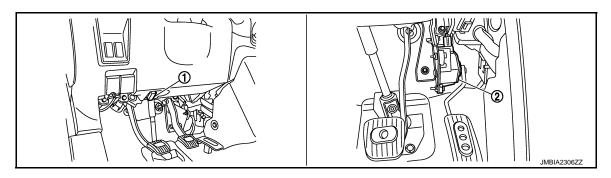
- 1. Refrigerant pressure sensor
- 2. Cooling fan motor



- Intake valve timing control solenoid 2. Knock sensor valve



1. Crankshaft position sensor (POS)



- 1. Data link connector
- 2. Accelerator pedal position sensor

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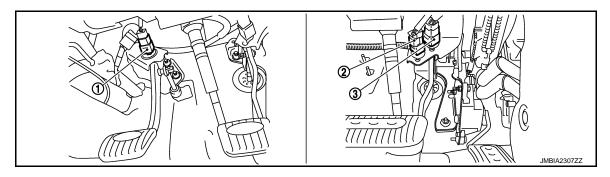
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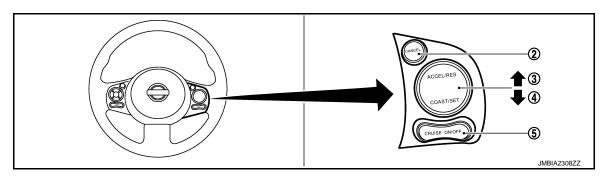
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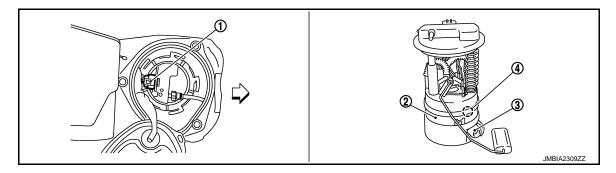


- ASCD clutch switch
- 2. ASCD brake switch
- Stop lamp switch

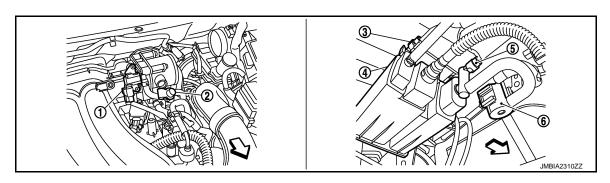


- ASCD steering switch 1.
- CANCEL switch
- RESUME/ACCELERATE switch

- SET/COST switch
- MAIN switch



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



- EVAP canister purge volume control 2. EVAP service port solenoid valve
- EVAP control system pressure sen-

COOLING FAN CONTROL

< SYSTEM DESCRIPTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

4. EVAP canister

EVAP canister vent control valve

6. Drain filter

Component Description

INFOID:0000000007769954

Component	Reference	
Camshaft position sensor (PHASE)	EC-250, "Description"	
Crankshaft position sensor (POS)	EC-246. "Description"	
Cooling fan motor	EC-79, "System Description"	
Engine coolant temperature sensor	EC-168, "Description"	
Refrigerant pressure sensor	EC-443, "Description"	

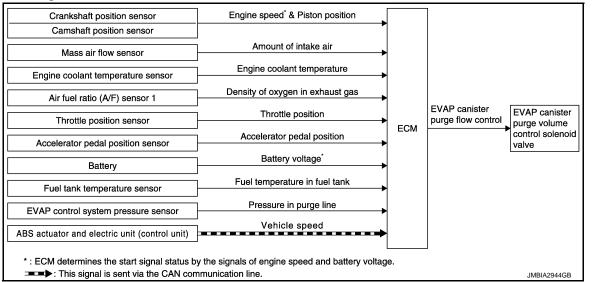
EVAPORATIVE EMISSION SYSTEM

< SYSTEM DESCRIPTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

EVAPORATIVE EMISSION SYSTEM

System Diagram



System Description

INFOID:0000000007769956

INFOID:0000000007769955

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INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*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	EVAP canister purge vol-	
Accelerator pedal position sensor	Accelerator pedal position	purge flow control ume control solenoid val	ume control solenoid valve	
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)			
Fuel tank temperature sensor	Fuel temperature in fuel tank			
EVAP control system pressure sensor	Pressure in purge line			
ABS actuator and electric unit (control unit)	Vehicle speed*2			

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

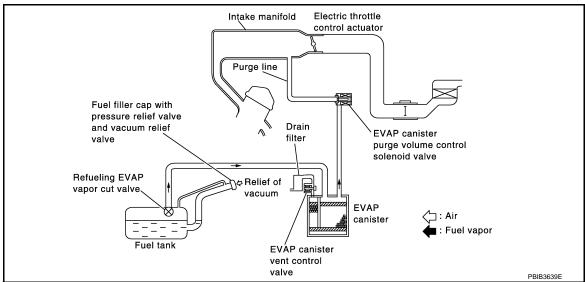
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^{*2:} This signal is sent to the ECM via the CAN communication line.

SYSTEM DESCRIPTION



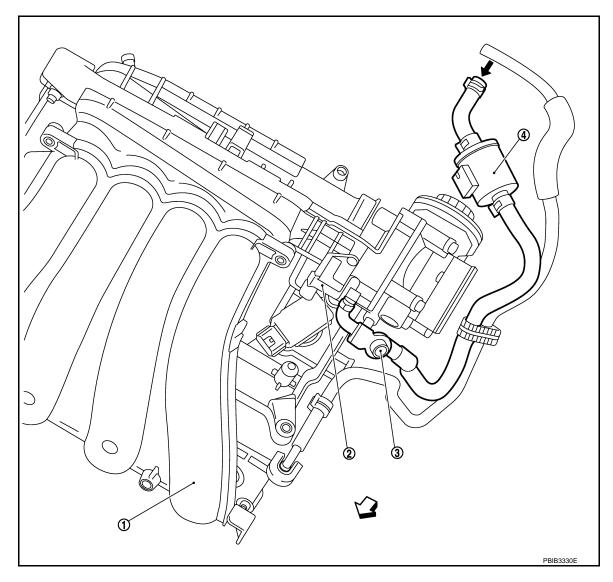
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

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



- 1. Intake manifold collector
- 4. EVAP purge resonator

- EVAP canister purge volume control 3. EVAP service port solenoid valve
- From next figure

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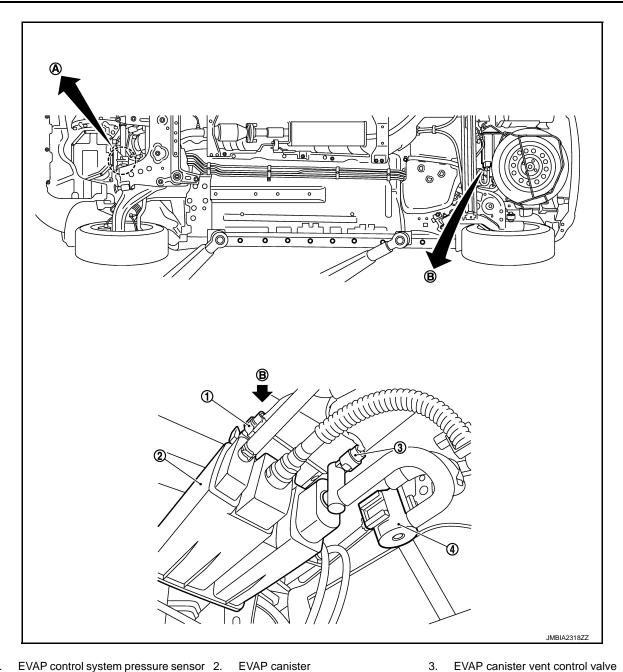
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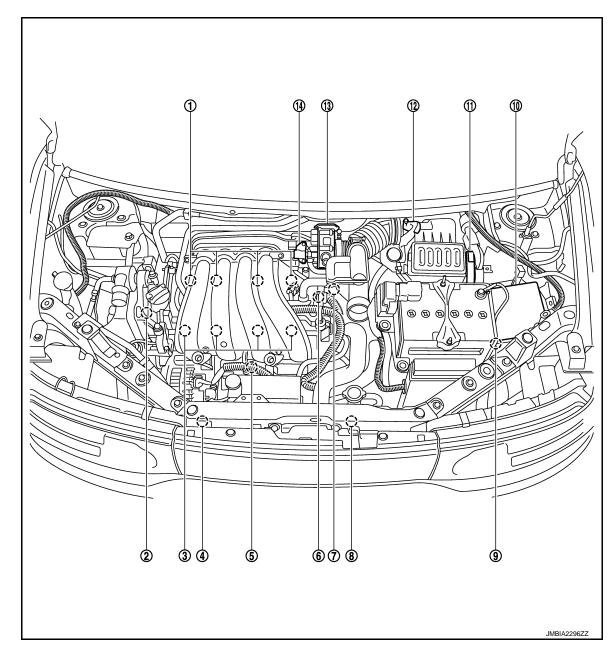
- EVAP control system pressure sensor 2. EVAP canister
- Drain filter
- A. To previous figure

NOTE:

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

Component Parts Location

INFOID:0000000007769957



- Ignition coil (with power transistor) and spark plug
- 4. Refrigerant pressure sensor
- 7. Engine coolant temperature sensor
- 10. IPDM E/R
- 13. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- Intake valve timing control solenoid valve
- 5. Knock sensor
- 8. Cooling fan motor
- 11. ECM
- 14. EVAP canister purge volume control solenoid valve
- Fuel injector
- 6. Camshaft position sensor (PHASE)
- 9. Battery current sensor
- 12. Mass air flow sensor (with intake air temperature sensor)

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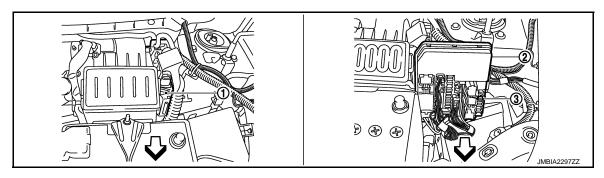
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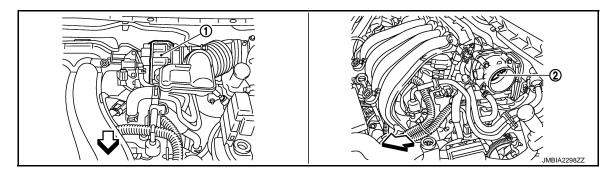


1. ECM

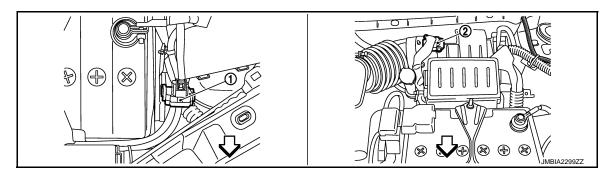
2. IPDM E/R

3. Fuel pump fuse (15 A)

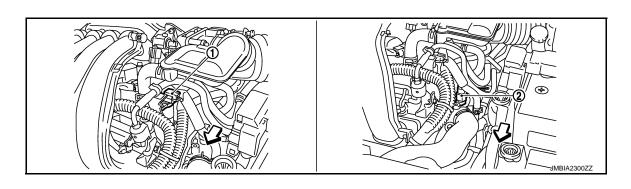




- Electric throttle control actuator (with built-in position sensor, throttle control motor)
- Throttle valve



- Battery current sensor
- Mass air flow sensor (with Intake air temperature sensor)



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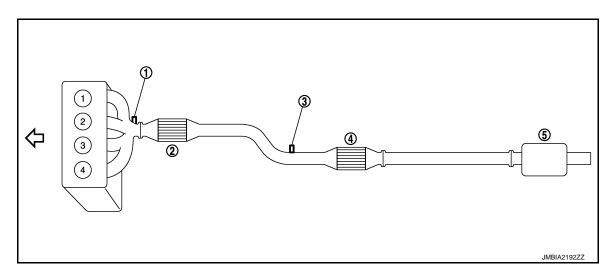
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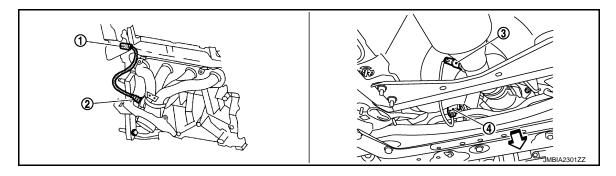
- Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor



- Air fuel ratio (A/F) sensor 1
- Three way catalyst (under floor)
- Vehicle front

- 2. Three way catalyst (Manifold)
- Muffler

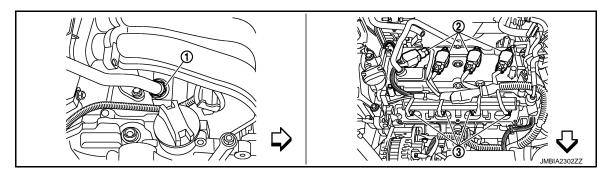
3. Heated oxygen sensor 2



- Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1 connector
- Heated oxygen sensor 2

Fuel injector

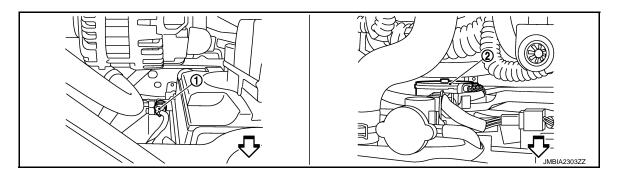
- Heated oxygen sensor 2 harness connector



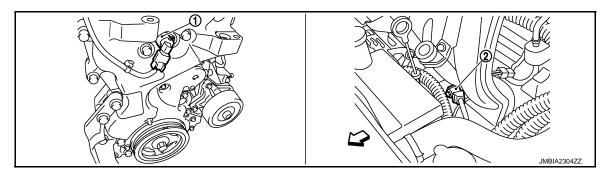
PCV valve

Ignition coil (with power transistor) and spark plug

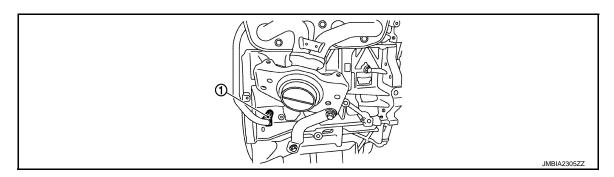
Vehicle front



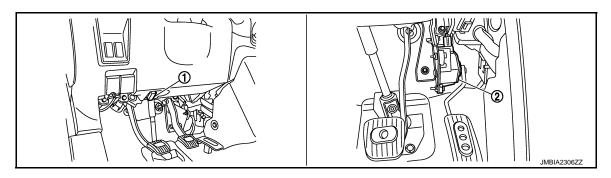
- 1. Refrigerant pressure sensor
- 2. Cooling fan motor



- Intake valve timing control solenoid 2. Knock sensor valve
- ⟨→ Vehicle front



1. Crankshaft position sensor (POS)



- 1. Data link connector
- 2. Accelerator pedal position sensor

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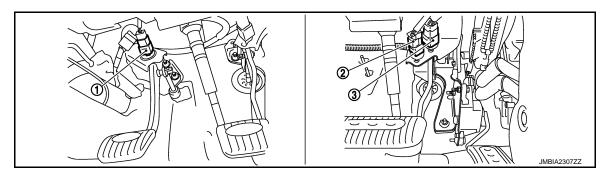
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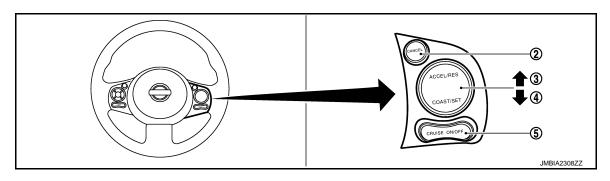
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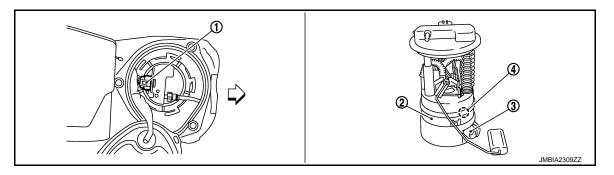


- ASCD clutch switch
- 2. ASCD brake switch
- 3. Stop lamp switch

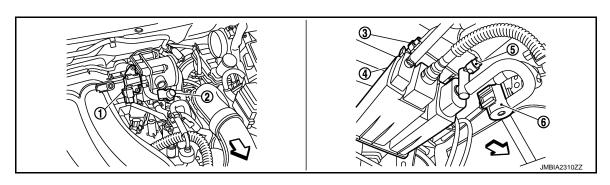


- ASCD steering switch 1.
- CANCEL switch
- RESUME/ACCELERATE switch

- SET/COST switch
- MAIN switch



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



- EVAP canister purge volume control 2. EVAP service port solenoid valve
- EVAP control system pressure sen-

EVAPORATIVE EMISSION SYSTEM

< SYSTEM DESCRIPTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

4. EVAP canister

EVAP canister vent control valve

6. Drain filter

Component Description

INFOID:0000000007769958

Component	Reference
A/F sensor 1	EC-185, "Description"
Accelerator pedal position sensor	EC-397, "Description"
Camshaft position sensor (PHASE)	EC-250, "Description"
Crankshaft position sensor (POS)	EC-246, "Description"
Engine coolant temperature sensor	EC-168, "Description"
EVAP canister purge volume control solenoid valve	EC-272, "Description"
EVAP control system pressure sensor	EC-288, "Description"
Fuel tank temperature sensor	EC-228, "Description"
Mass air flow sensor	EC-152, "Description"
Throttle position sensor	EC-174, "Description"

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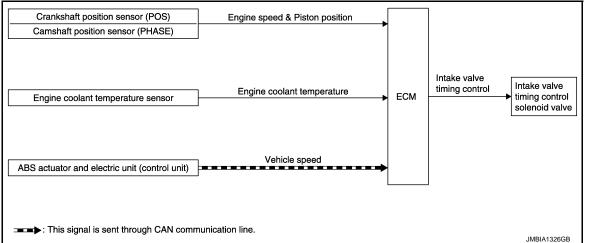
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INFOID:0000000007769960

INTAKE VALVE TIMING CONTROL

System Diagram



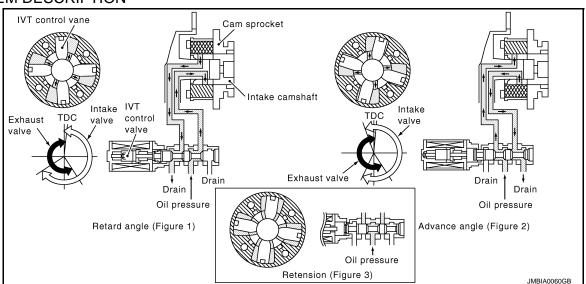
System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	- Engine speed and piston position	Intake valve timing control	Intake valve timing control solenoid valve
Camshaft position sensor (PHASE)	Engine speed and piston position		
Engine coolant temperature sensor	Engine coolant temperature		
ABS actuator and electric unit (control unit)	Vehicle apped*		
Combination meter	Vehicle speed*		

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

SYSTEM DESCRIPTION

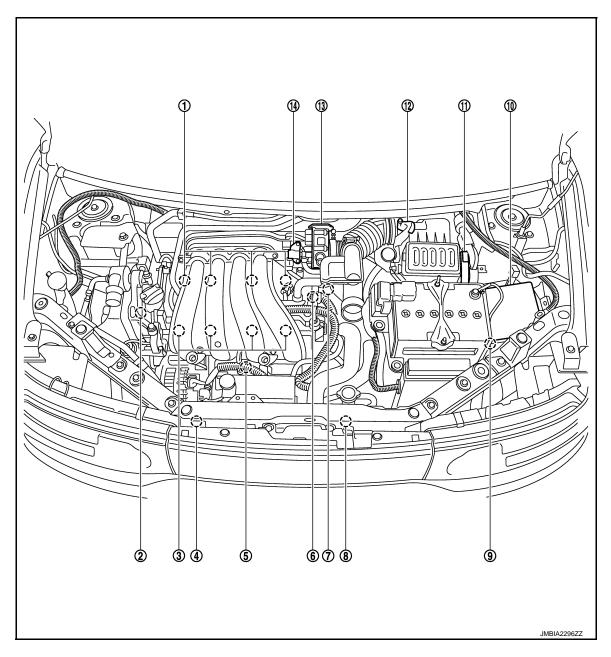


This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

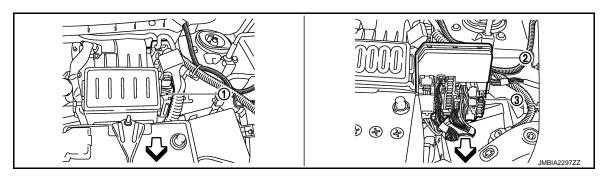
The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing (IVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing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

Component Parts Location

INFOID:0000000007769961

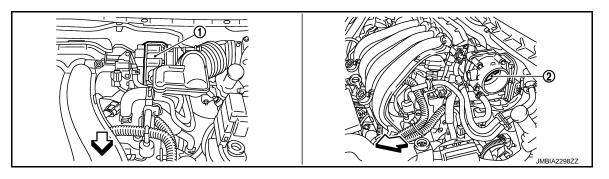


- Ignition coil (with power transistor) and spark plug
- 4. Refrigerant pressure sensor
- 7. Engine coolant temperature sensor
- 10. IPDM E/R
- 13. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- Intake valve timing control solenoid 3. valve
- 5. Knock sensor
- 8. Cooling fan motor
- 11. ECM
- 14. EVAP canister purge volume control solenoid valve
- Fuel injector
- 6. Camshaft position sensor (PHASE)
- 9. Battery current sensor
- 12. Mass air flow sensor (with intake air temperature sensor)

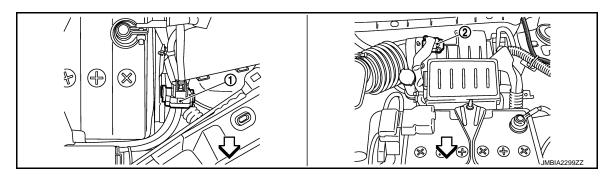


ECM 1.

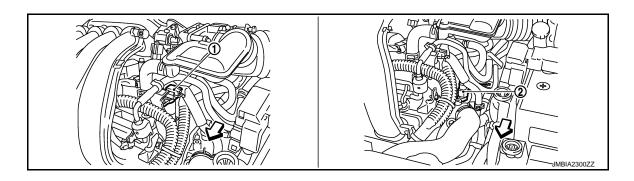
2. IPDM E/R 3. Fuel pump fuse (15 A)



- Electric throttle control actuator (with built-in position sensor, throttle control motor)
- Throttle valve



- Battery current sensor
- Mass air flow sensor (with Intake air temperature sensor)



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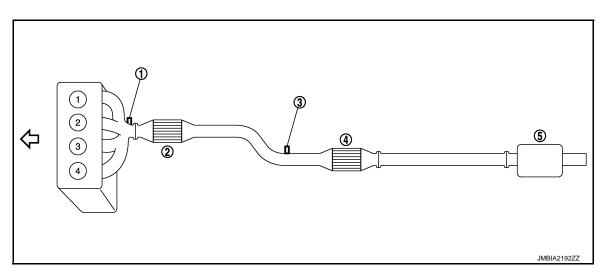
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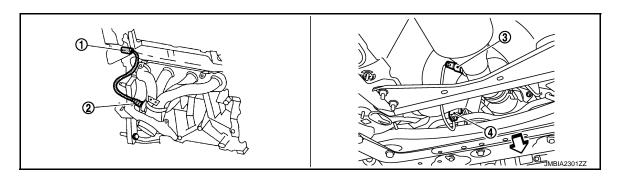
- Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor
- ⟨□ Vehicle front



- Air fuel ratio (A/F) sensor 1
- Three way catalyst (under floor)

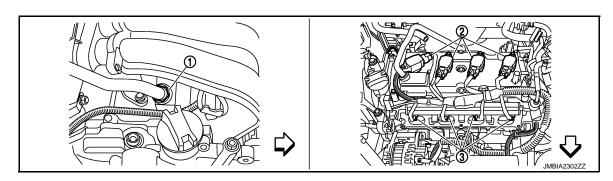
- 2. Three way catalyst (Manifold)
- 5. Muffler

3. Heated oxygen sensor 2



- Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1 connector
- Heated oxygen sensor 2

- Heated oxygen sensor 2 harness connector
- ⟨
 → Vehicle front



PCV valve

- Ignition coil (with power transistor) and spark plug
- Fuel injector

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→ Vehicle front

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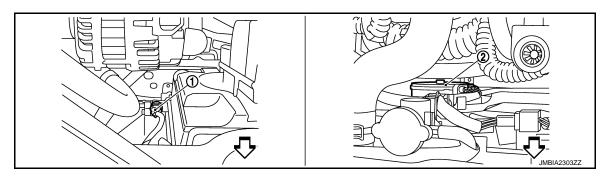
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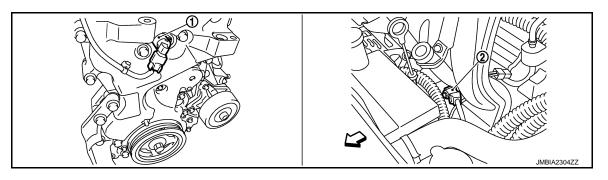
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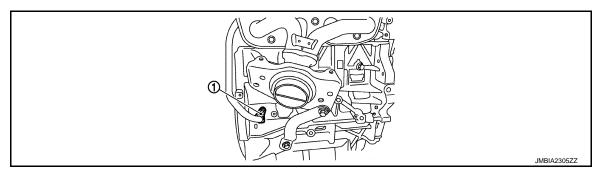
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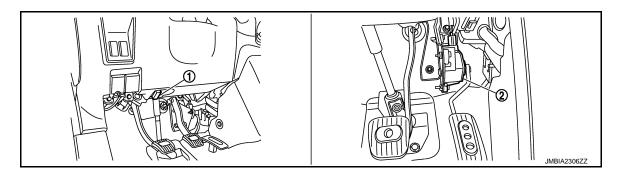
- 1. Refrigerant pressure sensor
- Cooling fan motor



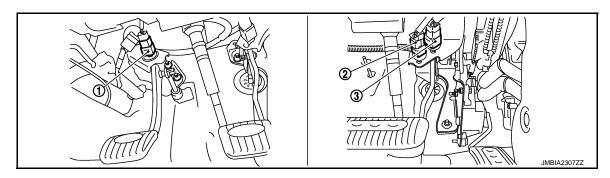
- Intake valve timing control solenoid 2. Knock sensor valve



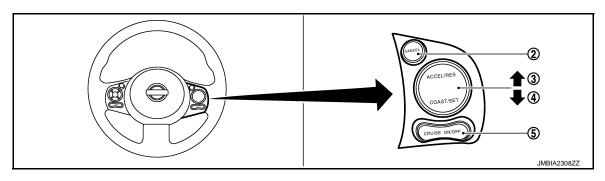
1. Crankshaft position sensor (POS)



- 1. Data link connector
- 2. Accelerator pedal position sensor

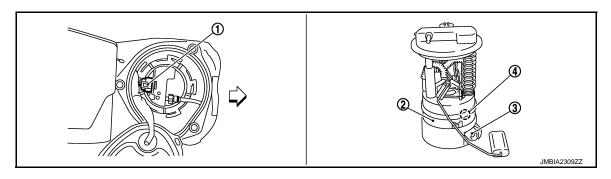


- ASCD clutch switch
- 2. ASCD brake switch
- Stop lamp switch



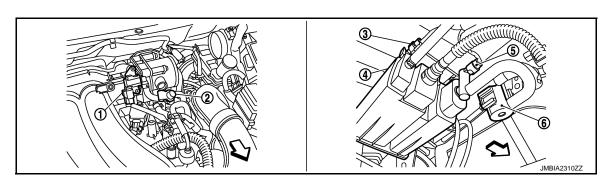
- ASCD steering switch 1.
- SET/COST switch
- CANCEL switch
- MAIN switch

3. RESUME/ACCELERATE switch



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

- Fuel tank temperature sensor



- EVAP canister purge volume control 2. solenoid valve
- **EVAP** service port
- EVAP control system pressure sen-

INTAKE VALVE TIMING CONTROL

< SYSTEM DESCRIPTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

4. EVAP canister

5. EVAP canister vent control valve

6. Drain filter

⟨
→ Vehicle front

Component Description

INFOID:0000000007769962

Component	Reference
Camshaft position sensor (PHASE)	EC-250, "Description"
Crankshaft position sensor (POS)	EC-246, "Description"
Engine coolant temperature sensor	EC-168, "Description"
Intake valve timing control solenoid valve	EC-97, "System Description"

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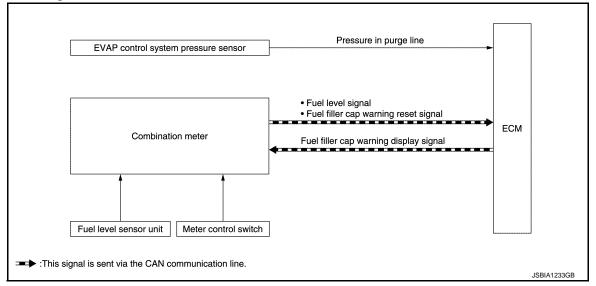
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FUEL FILLER CAP WARNING SYSTEM

System Diagram

INFOID:0000000007769963



System Description

INFOID:0000000007769964

INPUT/OUTPUT SIGNAL CHART

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

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

Output

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

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

SYSTEM DESCRIPTION

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

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

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

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

CAUTION:

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

Reset Operation

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

- Reset operation is performed by operating the meter control switch on the combination meter. Refer to <u>MWI-18</u>, "WARNING LAMPS/INDICATOR LAMPS: System Description".
- When the reset operation is performed, the combination meter transmits a fuel filler cap warning reset signal to ECM via CAN communication. ECM transmits a fuel filler cap warning display signal (request for display OFF) to the combination meter via CAN communication. When receiving the signal, the combination meter turns OFF the fuel filler cap warning display.
- EVAP leak diagnosis result is normal.

FUEL FILLER CAP WARNING SYSTEM

< SYSTEM DESCRIPTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

- Fuel refilled.
- DTC erased by using CONSULT.

NOTE:

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

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ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SYSTEM DESCRIPTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000007769965

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

GST (Generic Scan Tool)

INFOID:0000000007769966

When GST is connected with a data link connector equipped on the vehicle side, it will communicate with the control unit equipped in the vehicle and then enable various kinds of diagnostic tests. Refer to GI-49, "Description".

NOTE:

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

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

DIAGNOSIS SYSTEM (ECM) DIAGNOSIS DESCRIPTION

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

INFOID:0000000007769967

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

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

×: Applicable —: Not applicable

	MIL				DTC		1st trip DTC	
Items	1st trip		2nd trip		1st trip	2nd trip	1st trip	2nd trip
	Blinking	Illuminat- ed	Blinking	Illuminat- ed	displaying		displaying	display- ing
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0304 is being detected	×	_	_	_	_	_	×	_
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0304 is being detected	_	_	×	_	_	×	_	_
One trip detection diagnoses (Refer to EC-463, "DTC Index".)	_	×	_	_	×	_	_	_
Except above	_	_	_	×	_	×	×	_

DIAGNOSIS DESCRIPTION: DTC and Freeze Frame Data

INFOID:0000000007769968

DTC AND 1ST TRIP DTC

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

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

For malfunctions in which 1st trip DTCs are displayed, refer to EC-463, "DTC Index". These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT.

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

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to EC-14, "Work Flow". Then perform DTC Confirmation Procedure or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

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

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

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DIAGNOSIS SYSTEM (ECM)

[MR18DE (EXCEPT FOR CALIFORNIA)]

INFOID:0000000007769969

< SYSTEM DESCRIPTION >

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

Priority	Items			
1	Freeze frame data	Misfire — DTC: P0300 – P0304 Fuel Injection System Function — DTC: P0171		
2		Except the above items		
3	1st trip freeze frame data			

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

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased.

DIAGNOSIS DESCRIPTION: Counter System

RELATIONSHIP BETWEEN MIL, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

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

COUNTER SYSTEM CHART

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

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

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

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

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

[MR18DE (EXCEPT FOR CALIFORNIA)]

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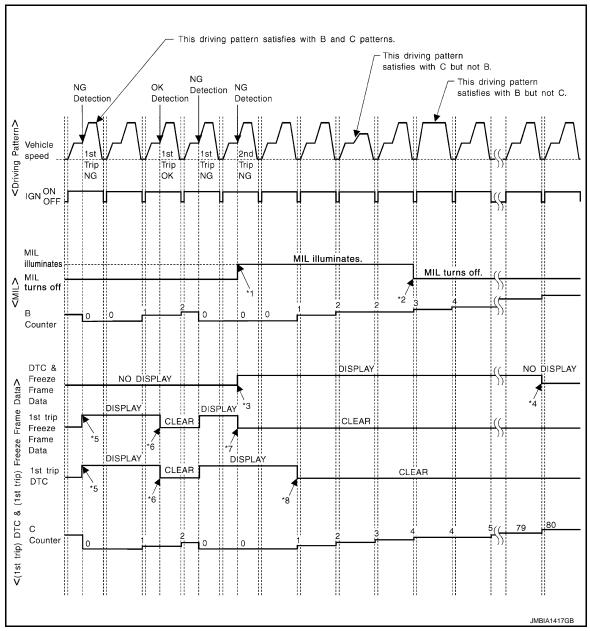
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- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and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

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

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

Driving Pattern B

Refer to EC-111, "DIAGNOSIS DESCRIPTION: Driving Pattern".

Driving Pattern C

Refer to EC-111, "DIAGNOSIS DESCRIPTION: Driving Pattern".

Example:

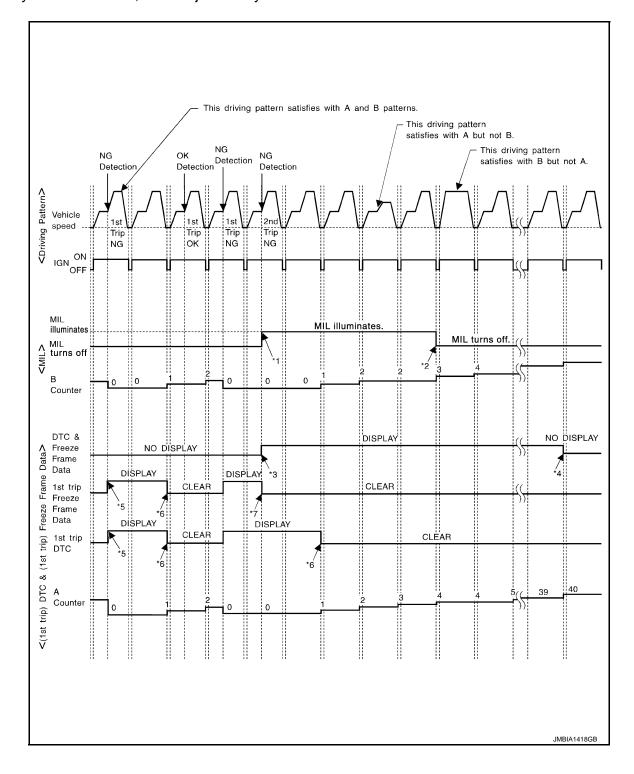
If the stored freeze frame data is as per the following:

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

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

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

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



[MR18DE (EXCEPT FOR CALIFORNIA)]

< SYSTEM DESCRIPTION >

- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

still remain in ECM.)

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

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

Driving Pattern A

Refer to EC-111, "DIAGNOSIS DESCRIPTION: Driving Pattern".

Driving Pattern B

Refer to EC-111, "DIAGNOSIS DESCRIPTION: Driving Pattern".

DIAGNOSIS DESCRIPTION: Driving Pattern

INFOID:0000000007769970

CAUTION:

Always drive at a safe speed.

DRIVING PATTERN A

Driving pattern A means a trip satisfying the following conditions.

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

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

DRIVING PATTERN B

Driving pattern B means a trip satisfying the following conditions.

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

NOTE:

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

DRIVING PATTERN C

Driving pattern C means operating vehicle as per the following:

The following conditions should be satisfied at the same time:

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

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< SYSTEM DESCRIPTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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

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

NOTE:

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

DRIVING PATTERN D

Driving pattern D means a trip satisfying the following conditions.

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

NOTE:

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

DIAGNOSIS DESCRIPTION: System Readiness Test (SRT) Code

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

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

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

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

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

NOTE:

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

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

NOTE:

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

SRT SET TIMING

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

				Example			
Self-diagnosis result		Diagnosis	$\begin{array}{cccccccccccccccccccccccccccccccccccc$				
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 (Consecutiv NG)	
		(1st trip) DTC	1st trip DTC	_	1st trip DTC	DTC (= MIL ON)	
		SRT of EGR	"INCMP"	"INCMP"	"INCMP"	"CMPLT"	

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

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

—: Self-diagnosis is not carried out.

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

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

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

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

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

NOTE:

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

DIAGNOSIS DESCRIPTION: Malfunction Indicator Lamp (MIL)

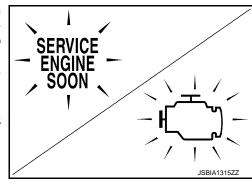
When emission-related ECU detects a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions), it turns on/blinks MIL to inform the driver that a malfunction has been detected.

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

NOTE:

Check the MIL circuit if MIL does not illuminate. Refer to EC-435, "Component Function Check".

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



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DIAGNOSIS SYSTEM (ECM) [MR18DE (EXCEPT FOR CALIFORNIA)]

< SYSTEM DESCRIPTION >

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

On Board Diagnosis Function

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ON BOARD DIAGNOSIS ITEM

The on board diagnostic system has the following functions.

Diagnostic test mode	Function
Bulb check	MIL can be checked.
SRT status	ECM can read if SRT codes are set.
Malfunction warning	If ECM detects a malfunction, it illuminates or blinks MIL to inform the driver that a malfunction has been detected.
Self-diagnostic results	DTCs or 1st trip DTCs stored in ECM can be read.
Accelerator pedal released position learning	ECM can learn the accelerator pedal released position. Refer to EC-24, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to <u>EC-24</u> , "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-25, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".
Mixture ratio self-learning value clear	Mixture ratio self-learning value can be erased. Refer to <u>EC-26</u> , "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".

BULB CHECK MODE

Description

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

Operation Procedure

- 1. Turn ignition switch ON.
- The MIL on the instrument panel should stay ON.
 If it remains OFF, check MIL circuit. Refer to <u>EC-435</u>, "<u>Diagnosis Procedure</u>".

SRT STATUS MODE

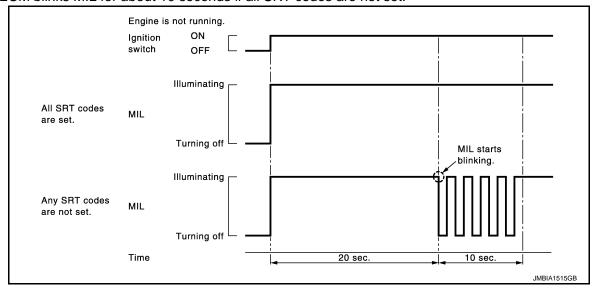
Description

This function allows to read if ECM has completed the self-diagnoses of major emission control systems and components. For SRT, refer to EC-112, "DIAGNOSIS DESCRIPTION: System Readiness Test (SRT) Code".

Operation Procedure

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

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



MALFUNCTION WARNING MODE

Description

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

Operation Procedure

- Turn ignition switch ON.
- Check that MIL illuminates. If it remains OFF, check MIL circuit. Refer to EC-435, "Diagnosis Procedure".
- Start engine and let it idle.
 - For two trip detection logic diagnoses, ECM turns on MIL when it detects the same malfunction twice in the two consecutive driving cycles.
 - For 1st trip detection logic diagnoses, ECM turns on MIL when it detects a malfunction in one driving
 - ECM blinks MIL when it detects a malfunction that may damage the three way catalyst (misfire).

SELF-DIAGNOSTIC RESULTS MODE

Description

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

How to Set Self-diagnostic Results Mode

NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- After ignition switch is turned off, ECM is always released from the "self-diagnostic results" mode.
- Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- Repeat the following procedure quickly five times within 5 seconds.
 - Fully depress the accelerator pedal.
 - Fully release the accelerator pedal.
- 3. Wait 7 seconds, fully depress the accelerator pedal and keep it depressed for approx. 10 seconds until the MIL starts blinking.

NOTE:

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

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

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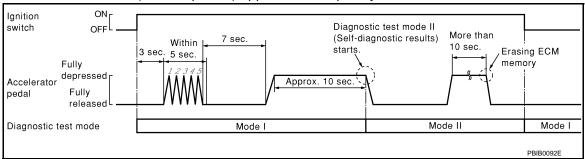
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NOTE:

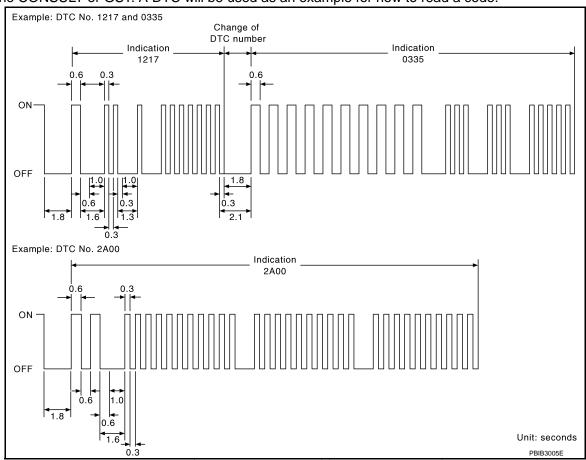
Wait until the same DTC (or 1st trip DTC) appears to completely confirm all DTCs.



How to Read Self-diagnostic Results

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

The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in "malfunction warning" mode, it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT or GST. A DTC will be used as an example for how to read a code.



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

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

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

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

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

[MR18DE (EXCEPT FOR CALIFORNIA)]

< SYSTEM DESCRIPTION >

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. Refer to <u>EC-463</u>, "<u>DTC Index</u>".

How to Erase Self-diagnostic Results

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

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

NOTE:

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

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

CONSULT Function

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 screen.
Self diagnostic result	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/results can be confirmed.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECU Identification	ECM part number can be read.

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

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

WORK SUPPORT MODE

Work Item

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< SYSTEM DESCRIPTION >

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 ratio returns to the original coefficient.	When clearing mixture ratio self- learning value
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 temp. is more than 0°C (32°F). Within 10 minutes after starting "EVAP system close" When trying to execute "EVAP system close" under the condition except above, CONSULT will discontinue it and display appropriate instruction. NOTE: When starting engine, CONSULT may display "Battery voltage is low. Charge battery", even in using charged battery.	When detecting EVAP vapor leak point of EVAP system
VIN REGISTRATION	In this mode, VIN is registered in ECM.	When registering VIN in ECM
TARGET IDLE RPM ADJ*	Idle condition	When setting target idle speed
TARGET IGN TIM ADJ*	Idle condition	When adjusting target ignition timing
CLSD THL POS LEARN	Ignition on and engine stopped.	When learning the throttle valve closed position

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

SELF DIAGNOSTIC RESULT MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-463, "DTC Index".

How to Read DTC and 1st Trip DTC

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

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

How to Erase DTC and 1st Trip DTC

NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
- If the DTC is not for CVT related items (see <u>EC-463</u>, "<u>DTC_Index</u>"), skip step 1.
- 1. Erase DTC in TCM. Refer to TM-179, "DTC Index".
- 2. Select "ENGINE" with CONSULT.
- Select "SELF-DIAG RESULTS".
- 4. Touch "ERASE". (DTC in ECM will be erased.)

Freeze Frame Data and 1st Trip Freeze Frame Data

< SYSTEM DESCRIPTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Freeze frame data item*	Description	A
DTC	The engine control component part/control system has a trouble code that is displayed as DTC. (Refer to EC-463 , "DTC <a <="" a="" href="Index">.)	
FUEL SYS-B1	 "Fuel injection system status" at the moment a malfunction is detected is displayed. One mode in the following is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment) 	EC
	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. The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim. 	Е
S-FUEL TRM-B1 [%]	 "Short-term fuel trim" at the moment a malfunction is detected is displayed. The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule. 	F
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.	G
ABSOL TH-P/S [%]	The throttle valve opening angle at the moment a malfunction is detected is displayed.	
B/FUEL SCHDL [msec]	The base fuel schedule at the moment a malfunction is detected is displayed.	-
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.	
FUEL SYS-B2		
L-FUEL TRM-B2 [%]		
S-FUEL TRM-B2 [%]	These items displayed but are not applicable to this model.	
INT MANI PRES [kPa]		
COMBUST CONDITION		

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

DATA MONITOR MODE

Monitored Item

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	Accuracy becomes poor if engine speed drops below the idle rpm. If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1	V	The signal voltage of the mass air flow sensor is displayed.	 When the engine is stopped, a certain value is indicated. When engine is running specification range is indicated in "SPEC".
B/FUEL SCHDL	ms	"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	%	The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	 When the engine is stopped, a certain value is indicated. This data also includes the data for the air-fuel ratio learning control. When engine is running specification range is indicated in "SPEC".

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Monitored item	Unit	Description	Remarks
COOLAN TEMP/S	°C or °F	The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
A/F SEN1 (B1)	V	• The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed.	
HO2S2 (B1)	V	The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 MNTR(B1)	RICH/LEAN	Display of heated oxygen sensor 2 signal: RICH: means the amount of oxygen after three way catalyst is relatively small. LEAN: means the amount of oxygen after three way catalyst is relatively large.	When the engine is stopped, a certain value is indicated.
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT	V	The power supply voltage of ECM is displayed.	
ACCEL SEN 1		The accelerator pedal position sensor signal voltage is	ACCEL SEN 2 signal is converted ACCEL SEN 2 signal is converted
ACCEL SEN 2	V	displayed.	by ECM internally. Thus, it 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
TP SEN 2-B1	V	played.	by ECM internally. Thus, it differs from ECM terminal voltage signal.
FUEL T/TMP SE	°C or °F	• The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.	
INT/A TEMP SE	°C or °F	The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
EVAP SYS PRES	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 displayed regardless of the starter signal.
CLSD THL POS	ON/OFF	 Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor sig- nal. 	
AIR COND SIG	ON/OFF	Indicates [ON/OFF] condition of the air conditioner switch determined by the air conditioner ON signal.	
P/N POSI SW	ON/OFF	Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal (M/T models) or Transmission range switch signal (CVT models).	
PW/ST SIGNAL	ON/OFF	• [ON/OFF] condition of the power steering system (determined by the signal sent from EPS control unit) 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. 	

< SYSTEM DESCRIPTION >

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Monitored item	Unit	Description	Remarks	Α
BRAKE SW	ON/OFF	Indicates [ON/OFF] condition from the stop lamp switch signal.		
INJ PULSE-B1	msec	Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	When the engine is stopped, a certain computed value is indicat- ed.	EC
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.	С
CAL/LD VALUE	%	"Calculated load value" indicates the value of the current air flow divided by peak air flow.		
MASS AIRFLOW	g/s	Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow sensor.		
PURG VOL C/V	%	 Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. The opening becomes larger as the value increases. 		Е
INT/V TIM(B1)	°CA	Indicates [°CA] of intake camshaft advance angle.		F
INT/V SOL(B1)	%	 The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. The advance angle becomes larger as the value increases. 		G
AIR COND RLY	ON/OFF	The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.		-
FUEL PUMP RLY	ON/OFF	Indicates the fuel pump relay control condition determined by ECM according to the input signals.		
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		J
THRTL RELAY	ON/OFF	Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.		K
COOLING FAN	HI/LOW/ OFF	Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI: High speed operation LOW: Low speed operation OFF: Stop		L
HO2S2 HTR (B1)	ON/OFF	 Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals. 		N
I/P PULLY SPD	rpm	Indicates the engine speed computed from the input shaft revolution signal.		N
VEHICLE SPEED	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.		
IDL A/V LEARN	YET/CMPLT	Display the condition of Idle Air Volume Learning YET: Idle air volume learning has not been performed yet. CMPLT: Idle air volume learning has already been performed successfully.		C F
TRVL AFTER MIL	km or mile	Distance traveled while MIL is activated.		
A/F S1 HTR(B1)	%	 Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals. The current flow to the heater becomes larger as the value increases. 		

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Monitored item	Unit	Description	Remarks
AC PRESS SEN	V	The signal voltage from the refrigerant pressure sensor is displayed.	
A/F ADJ-B1	_	Indicates the correction of factor stored in ECM. The factor is calculated from the difference between the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 signal.	
BUT 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.	
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.	
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
SET VHCL SPD	km/h or mph	The preset vehicle speed is displayed.	
MAIN SW	ON/OFF	Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW	ON/OFF	Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW	ON/OFF	Indicates [ON/OFF] condition from RESUME/ACC switch signal.	
SET SW	ON/OFF	Indicates [ON/OFF] condition from SET switch signal.	
BRAKE SW1	ON/OFF	Indicates [ON/OFF] condition from ASCD brake switch signal and ASCD clutch switch signal (M/T models).	
BRAKE SW2	ON/OFF	Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT	NON/CUT	Indicates the vehicle cruse 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 cruse 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 CVT O/D according to the input signal from the TCM.	
AT OD CANCEL	ON/OFF	Indicates [ON/OFF] condition of CVT O/D cancel request signal from the TCM.	
CRUISE LAMP	ON/OFF	Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP	ON/OFF	Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
THRTL STK CNT B1*	_	_	

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Monitored item	Unit	Description	Remarks
EVAP LEAK DIAG	YET/CMPLT	Indicates the condition of EVAP leak diagnosis. YET: EVAP leak diagnosis has not been performed yet. CMPLT: EVAP leak diagnosis has been performed successfully.	P
EVAP DIAG READY	ON/OFF	Indicates the ready condition of EVAP leak diagnosis. ON: Diagnosis has been ready condition. OFF: Diagnosis has not been ready condition.	
HO2 S2 DIAG1 (B1)	INCMP/CM- PLT	Indicates DTC P0139 self-diagnosis (delayed response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	
HO2 S2 DIAG2 (B1)	INCMP/CM- PLT	Indicates DTC P0139 self-diagnosis (slow response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	
A/F SEN1 DIAG2(B1)	INCMP/CM- PLT	Indicates DTC P014C or P014D self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	
A/F SEN1 DIAG3(B1)	ABSNT/ PRSNT	Indicates DTC P014C, P014D, P015A or P015B self-diagnosis condition. ABSNT: The vehicle condition is not within the diagnosis range. PRSNT: The vehicle condition is within the diagnosis range. Output Description:	
SYSTEM 1 DIAG- NOSIS A B1	INCMP/CM- PLT	Indicates DTC P117A self-daiagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	
SYSTEM 1 DIAG- NOSIS B B1	ABSENT/ PRSENT	Indicates DTC P117A self-daiagnosis condition. ABSENT: Self-diagnosis standby PRSENT: Under self-diagnosis	

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

NOTE:

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

ACTIVE TEST MODE

Test Item

Test item	Condition	Judgment	Check item (Remedy)	M
FUEL INJECTION	Engine: Return to the original trouble condition Change the amount of fuel injection using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	Harness and connectors Fuel injector Air fuel ratio (A/F) sensor 1	N
IGNITION TIMING	 Engine: Return to the original trouble condition Timing light: Set Retard the ignition timing using CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	Perform Idle Air Volume Learning.	0
POWER BALANCE	 Engine: After warming up, idle the engine. A/C switch OFF Selector lever: P or N position (CVT), Neutral position (M/T) Cut off each fuel injector signal one at a time using CONSULT. 	Engine runs rough or dies.	Harness and connectors Compression Fuel injector Power transistor Spark plug Ignition coil	Р

< SYSTEM DESCRIPTION >

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Test item	Condition	Judgment	Check item (Remedy)	
COOLING FAN*	Ignition switch: ON Turn the cooling fan "LOW", "HI" and "OFF" using CONSULT.	Cooling fan moves and stops.	Harness and connectors IPDM E/R (Cooling fan relay) Cooling fan motor	
ENG COOLANT TEMP	 Engine: Return to the original trouble condition Change the engine coolant tem- perature using CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	Harness and connectors Engine coolant temperature sensor Fuel injector	
FUEL PUMP RELAY	Ignition switch: ON (Engine stopped) Turn the fuel pump relay "ON" and "OFF" using CONSULT and listen to operating sound.	Fuel pump relay makes the operating sound.	Harness and connectors Fuel pump relay	
PURG VOL CONT/V	 Engine: After warming up, run engine at 1,500 rpm. Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT. 	Engine speed changes according to the opening percent.	Harness and connectors Solenoid valve	
FUEL/T TEMP SEN	Change the fuel tank temperature using CONSULT.			
VENT CONTROL/V	Ignition switch: ON (Engine stopped) Turn solenoid valve "ON" and "OFF" using the CONSULT and listen to operating sound.	Solenoid valve makes an operating sound.	Harness and connectors Solenoid valve	
V/T ASSIGN ANGLE	 Engine: Return to the original trouble condition Change intake valve timing us- ing CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	Harness and connectors Intake valve timing control solenoid valve	
ALTERNATOR DUTY	Engine: idle. Change duty ratio using CON- SULT.	Battery voltage charges.	Harness and connectors IPDM E/R Alternator	

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

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

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

PERMANENT DTC STATUS Mode

How to display permanent DTC status

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 5. Select "PERMANENT DTC STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

NOTE:

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

CAUTION:

< SYSTEM DESCRIPTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Since the "PERMANENT DTC STATUS" screen displays the previous trip information, repeat the following twice to update the information: "Ignition switch OFF", "Wait for more than 10 seconds" and "Ignition switch ON".

CAUTION: Turn ignition switch from O status screen.	N to OFF twice to update the informa	ation on the
PERMANENT DTC	DRIVING PATTERN B	DRIVING PATTERN D
xxxx	INCMP	INCMP
xxxx	CMPLT	INCMP
xxxx	INCMP	CMPLT
xxxx	CMPLT	INCMP
XXXX	INCMP	INCMP
XXXX	INCMP	INCMP

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NOTE:

This mode is not used in regions that permanent DTCs are not regulated by law.

SRT WORK SUPPORT Mode

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

PERMANENT DTC WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to complete the driving pattern that is required for erasing permanent DTC.

NOTE:

This mode is not used in regions that permanent DTCs are not regulated by law.

DTC WORK SUPPORT Mode

Test mode	Test item	Corresponding DTC No.	Reference page
	EVP SML LEAK P0442/P1442*	P0455	EC-303
	EVP V/S LEAK P0456/P1456*	P0442	EC-265
EVAPORATIVE SYSTEM	EVP V/S LEAK P0436/P1436	P0456	EC-309
	PURG VOL CN/V P1444	P0443	EC-272
	PURG FLOW P0441	P0441	EC-259
A/F SEN1	A/F SEN1 (B1) P1278/P1279	_	_
	A/F SEN1 (B1) P1276	P0130	EC-185
	HO2S2 (B1) P1146	P0138	EC-201
HO2S2	HO2S2 (B1) P1147	P0137	EC-195
	HO2S2 (B1) P139	P0139	EC-209

^{*:} DTC P1442, P1456 does not apply to this model but appears in DTC Work Support Mode screens.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

DTC/CIRCUIT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description INFOID:000000007769975

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

The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MII

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 (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)

Component Function Check

INFOID:0000000007769976

1.START

Make sure that all of the following conditions are satisfied.

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 104.3 kPa (1.003 1.064 kg/cm², 14.25 15.12 psi)
- Atmospheric temperature: 20 30°C (68 86°F)
- Engine coolant temperature: 75 95°C (167 203°F)
- Transmission: Warmed-up
- CVT models: After the engine is warmed up to normal operating temperature, drive vehicle until "FLUID TEMP SE" (CVT fluid temperature sensor signal) indicates more than 60°C (140°F).
- M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied
- Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.
- · Engine speed: Idle

>> GO TO 2.

2.PERFORM "SPEC" OF "DATA MONITOR" MODE

(P)With CONSULT

NOTE:

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

- 1. Perform EC-19, "BASIC INSPECTION: Special Repair Requirement".
- Select "B/FUEL SCHDL", "A/F ALPHA-B1" and "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode with CONSULT.
- 3. Make sure that monitor items are within the SP value.

Is the inspection result normal?

YES >> END

NO >> Go to EC-127, "Diagnosis Procedure".

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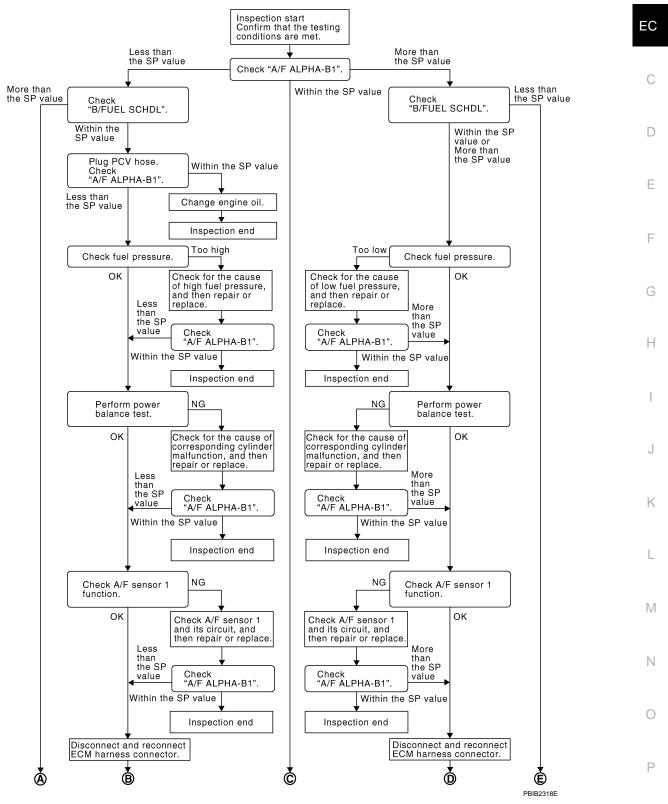
[MR18DE (EXCEPT FOR CALIFORNIA)]

Diagnosis Procedure

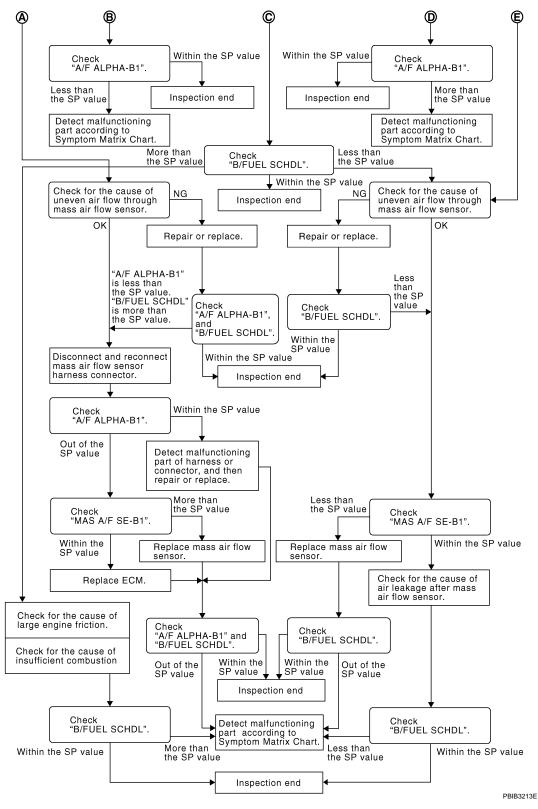
INFOID:0000000007769977

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OVERALL SEQUENCE



[MR18DE (EXCEPT FOR CALIFORNIA)]



DETAILED PROCEDURE

1.CHECK "A/F ALPHA-B1"

(I) With CONSULT

- Start engine
- Confirm that the testing conditions are met. Refer to <u>EC-126, "Component Function Check"</u>.
- 3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

< DTC/CIRCUIT DIAGNOSIS >

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NOTE:

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

Is the measurement value within the SP value?

YES >> GO TO 17.

NO-1 >> Less than the SP value: GO TO 2.

NO-2 >> More than the SP value: GO TO 3.

2.CHECK "B/FUEL SCHDL"

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

Is the measurement value within the SP value?

YES >> GO TO 4.

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

3.CHECK "B/FUEL SCHDL"

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

Is the measurement value within the SP value?

YES >> GO TO 6.

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

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

4.CHECK "A/F ALPHA-B1"

Stop the engine.

Disconnect PCV hose, and then plug it. 2.

3. Start engine.

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

Is the measurement value within the SP value?

YES >> GO TO 5.

NO >> GO TO 6.

5. CHANGE ENGINE OIL

Stop the engine.

2. Change engine oil.

NOTE:

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

>> INSPECTION END

$\mathbf{6}.$ CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-485, "Inspection".)

Is the inspection result normal?

YES >> GO TO 9.

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

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

.DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging

Is the inspection result normal?

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

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

 $oldsymbol{8}.$ CHECK "A/F ALPHA-B1"

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> 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.

- Ignition coil and its circuit (Refer to EC-430, "Component Function Check".)
- Fuel injector and its circuit (Refer to EC-424, "Component Function Check".)
- Intake air leakage
- Low compression pressure (Refer to EM-21, "Inspection".)

Is the inspection result normal?

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

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

11. CHECK "A/F ALPHA-B1"

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> GO TO 12.

12.CHECK A/F SENSOR 1 FUNCTION

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

- For DTC P0130, refer to <u>EC-185, "DTC Logic"</u>.
 For DTC P0131, refer to <u>EC-189, "DTC Logic"</u>.
- For DTC P0132, refer to <u>EC-192, "DTC Logic"</u>.
- For DTC P014C, P014D, P015A and P015B, refer to EC-215, "DTC Logic".
- For DTC P2A00, refer to <u>EC-411, "DTC Logic"</u>.

Is any DTC detected?

YES >> GO TO 15.

NO >> GO TO 13.

13. CHECK A/F SENSOR 1 CIRCUIT

Perform DIAGNOSTIC PROCEDURE according to corresponding DTC.

>> GO TO 14.

14.CHECK "A/F ALPHA-B1"

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

Is the measurement value within the SP value?

YES >> INSPECTION END

>> GO TO 15. NO

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

Stop the engine.

< DTC/CIRCUIT DIAGNOSIS >

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

>> GO TO 16.

16.CHECK "A/F ALPHA-B1"

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to EC-473, "Symptom Table".

17. CHECK "B/FUEL SCHDL"

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

Is the measurement value within the SP value?

YES >> INSPECTION END

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

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

18.detect malfunctioning part

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

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

19. CHECK INTAKE SYSTEM

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

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

Is the inspection result normal?

YES >> GO TO 21.

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

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

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

Is the measurement value within the SP value?

YES >> INSPECTION END

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

21.disconnect and reconnect mass air flow sensor harness connector

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

>> GO TO 22.

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< DTC/CIRCUIT DIAGNOSIS >

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

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

Is the measurement value within the SP value?

YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-152, "DTC Logic". Then GO TO 29.

NO >> GO TO 23.

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

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

Is the measurement value within the SP value?

YES >> GO TO 24.

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

24.REPLACE ECM

- 1. Replace ECM.
- Perform <u>EC-22</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Special Repair Requirement".

>> GO TO 29.

25. CHECK INTAKE SYSTEM

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

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

Is the inspection result normal?

YES >> GO TO 27.

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

26.CHECK "B/FUEL SCHDL"

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

Is the measurement value within the SP value?

YES >> INSPECTION END

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

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

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

Is the measurement value within the SP value?

YES >> GO TO 28.

NO >> Less than the SP value: Replace 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 of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

• Malfunctioning seal of intake air system, etc.

>> GO TO 30.

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

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to EC-473, "Symptom Table".

30. CHECK "B/FUEL SCHDL"

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to EC-473, "Symptom Table".

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POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000007769978

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

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

ECM		Ground	Continuity
Connector	Terminal	Glound	Continuity
F7	11		
	107		Existed
F40	108	Ground	
E16	109		
	112		

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 F1, E8
- · 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 connectors.
- 2. Turn ignition switch ON.
- Check the voltage between ECM harness connector and ground.

E	CM	Ground	Voltage
Connector Terminal		Ground	vollage
E16	93	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO \Rightarrow GO TO 5. 5. DETECT MALFUNCTIONING PART

Check the following.

- 15 A fuse (No. 62)
- Harness for open or short between ECM and fuse
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

6. CHECK ECM POWER SUPPLY CIRCUIT-II

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

ECM		Ground	Voltage
Connector	Terminal	- Ground voltage	
E16	105	Ground	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0 V.

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 9.

7.CHECK ECM POWER SUPPLY CIRCUIT-III

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

IPDN	M E/R	Ground	Voltage	
Connector	Terminal	Glound		
E14	44	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 8.

>> Replace IPDM E/R. Refer to PCS-33, "Removal and Installation" (With I-KEY) or PCS-62, NO "Removal and Installation" (Without I-KEY).

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

9. CHECK ECM POWER SUPPLY CIRCUIT-IV

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

E	CM	Ground	Voltage
Connector Terminal		Glound	voltage
F7	32	Ground	Battery voltage

Is the inspection result normal?

>> GO TO 13. YES

NO >> GO TO 10.

10.CHECK ECM POWER SUPPLY CIRCUIT-V

- Disconnect ECM harness connector.
- 2. Disconnect IPDM E/R harness connector E14.
- Check the continuity between ECM harness connector and IPDM E/R harness connector.

E	СМ	IPDI	M E/R	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F7	32	E14	40	Existed

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

Is the inspection result normal?

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POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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

11. DETECT MALFUNCTIONING PART

Check the following.

- · Harness connectors E8, F1
- 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 FUSE

- 1. Disconnect 20 A fuse (No. 43) 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-VI

- 1. Disconnect ECM harness connector.
- 2. Disconnect IPDM E/R harness connector E14.
- 3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

E	СМ	IPDI	M E/R	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E16	105	E14	43	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 E8, F1
- Harness for open or short between ECM and IPDM E/R
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to <u>PCS-33, "Removal and Installation"</u> (With I-KEY) or <u>PCS-62, "Removal and Installation"</u> (Without I-KEY).

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

U0101 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

U0101 CAN COMM CIRCUIT

Description INFOID:0000000007769979

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

DTC Logic INFOID:0000000007769980

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> EC-137, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

Go to LAN-13, "Trouble Diagnosis Flow Chart".

INFOID:0000000007769981

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U1001 CAN COMM CIRCUIT

[MR18DE (EXCEPT FOR CALIFORNIA)]

INFOID:0000000007769987

U1001 CAN COMM CIRCUIT

Description INFOID:0000000007769985

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-138, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

Go to LAN-13, "Trouble Diagnosis Flow Chart".

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[MR18DE (EXCEPT FOR CALIFORNIA)]

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P0011 IVT CONTROL

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for EC-333, "DTC Logic".

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

(P)With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- 3. 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
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 4.2 msec
Selector lever	P or N position (CVT) Neutral position (M/T)

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

⊕With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-140, "Diagnosis Procedure".

NO >> GO TO 3.

3.perform dtc confirmation procedure-ii

(I) With CONSULT

1. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,200 - 3,175 rpm (A constant rotation is maintained.)	
COOLAN TEMP/S	More than 65°C (149°F)	

P0011 IVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Selector lever	1st or 2nd position
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:

Always drive at a safe speed.

Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-140, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007769989

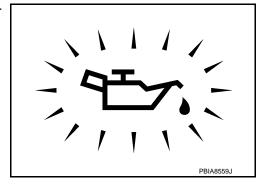
1. CHECK OIL PRESSURE WARNING LAMP

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

Is oil pressure warning lamp illuminated?

YES >> Go to <u>LU-13</u>, "Inspection".

NO >> GO TO 2.



$2. \mathsf{CHECK}$ INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-141, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace intake valve timing control solenoid valve. Refer to EM-44, "Exploded View".

3. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-249, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace crankshaft position sensor (POS). Refer to EM-88, "Exploded View".

4. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-252, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace camshaft position sensor (PHASE). Refer to EM-55, "Exploded View".

CHECK CAMSHAFT (INTAKE)

Check the following.

P0011 IVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

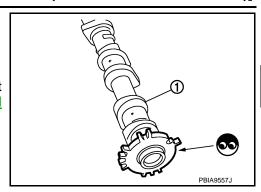
- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end

Is the inspection result normal?

YES >> GO TO 6.

NO

>> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-56, "Removal and Installation".



6. CHECK TIMING CHAIN INSTALLATION

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

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

YES >> Check timing chain installation. Refer to EM-45, "Removal and Installation".

NO >> GO TO 7.

7.CHECK LUBRICATION CIRCUIT

Refer to LU-7, "Inspection", "INSPECTION AFTER INSTALLATION".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007769990

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

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

Terminals	Resistance	
1 and 2	6.7 - 7.7 Ω [at 20°C (68°F)]	
1 or 2 and ground	$\stackrel{\sim}{\sim} \Omega$ (Continuity should not exist)	

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace intake valve timing control solenoid valve. Refer to EM-44, "Exploded View".

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

Remove intake valve timing control solenoid valve. Refer to <u>EM-44, "Exploded View"</u>.

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

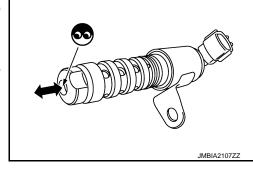
CAUTION:

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

NOTE:

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

Is the inspection result normal?



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YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve. Refer to EM-44, "Exploded View".

P0031, P0032 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P0031, P0032 A/F SENSOR 1 HEATER

Description INFOID:0000000007769991

SYSTEM DESCRIPTION

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

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

DTC Logic INFOID:0000000007769992

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0031	Air fuel ratio (A/F) sensor 1 heater 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 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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Go to EC-143, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

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

- Disconnect air fuel ratio (A/F) sensor 1 harness connector.
- Turn ignition switch ON.

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P0031, P0032 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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

A/F sensor 1		Ground	Voltage	
Connector	Terminal	Glound	voltage	
F50	4	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 E8, F1
- IPDM E/R harness connector E15
- 15 A fuse (No. 61)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

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

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

A/F sensor 1		ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
F50	3	F7	8	Existed	

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

Is the inspection result normal?

YES >> GO TO 5.

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

5. CHECK A/F SENSOR 1 HEATER

Refer to EC-145, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

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

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".

CAUTION:

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

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

>> Repair or replace.

P0031, P0032 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Component Inspection

INFOID:0000000007769994

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.

Terminals	Resistance
3 and 4	1.8 - 2.44 Ω [at 20°C (68°F)]
	= [= 0 0 (00 1/]
3 and 1, 2	0
o and 1, 2	$\infty \Omega$
4 and 1, 2	(Continuity should not exist)
→ and 1, Z	, , , , , , , , , , , , , , , , , , , ,

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

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

Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

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[MR18DE (EXCEPT FOR CALIFORNIA)]

P0037, P0038 HO2S2 HEATER

Description INFOID:000000007769995

SYSTEM DESCRIPTION

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

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

OPERATION

Engine speed	Heated oxygen sensor 2 heater
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

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037	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. (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 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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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

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

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

P0037, P0038 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

YES >> Go to EC-147, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

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1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK HO2S2 POWER SUPPLY CIRCUIT

- 1. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
- Turn ignition switch ON.
- 3. Check the voltage between HO2S2 harness connector and ground.

HO2S2		Ground	Voltage	
Connector	Terminal	Glound	voltage	
F30	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 E8, F1
- IPDM E/R connector E15
- 15 A fuse (No. 61)
- Harness for open or short between heated oxygen sensor 2 and fuse

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

4. CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

НО	HO2S2		ECM	
Connector	Terminal	Connector	Terminal	Continuity
F30	3	F7	5	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

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

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

Refer to EC-148. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

O.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

P0037, P0038 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007769998

1. CHECK HEATED OXYGEN SENSOR 2 HEATER

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
- 3. Check resistance between HO2S2 terminals as per the following.

Terminals	Resistance
2 and 3	3.3 - 4.4 Ω [at 25°C (77°F)]
1 and 2, 3, 4	∞ Ω
4 and 1, 2, 3	(Continuity should not exist)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

P0075 IVT CONTROL SOLENOID VALVE

Description

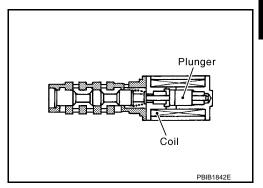
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

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

The longer pulse width advances valve angle.

The shorter pulse width retards valve angle.

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



DTC Logic

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DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO2.

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-149, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770001

1.check intake valve timing control solenoid valve power supply circuit

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

IVT control solenoid valve		Ground	Voltage	
Connector	Terminal	Glound	voltage	
F41	1	Ground	Battery voltage	

Is the inspection result normal?

>> GO TO 2.

YES >> GO TO 3.

NO

2. DETECT MALFUNCTIONING PART

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P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Check the following.

- Harness connectors E8, F1
- IPDM E/R connector E14
- Harness for open or short between IVT control solenoid valve and IPDM E/R
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

${f 3.}$ CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between IVT control solenoid valve harness connector and ECM harness connector.

IVT control s	solenoid valve	E(CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F41	2	F8	73	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

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

4. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-150, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace intake valve timing control solenoid valve. Refer to EM-44, "Exploded View".

5. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770002

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

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

Terminals	Resistance
1 and 2	6.7 - 7.7 Ω [at 20°C (68°F)]
1 or 2 and ground	$\stackrel{\sim}{\sim} \Omega$ (Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace intake valve timing control solenoid valve. Refer to EM-44, "Exploded View".

2.check intake valve timing control solenoid valve-ii $\,$

1. Remove intake valve timing control solenoid valve. Refer to EM-44, "Exploded View".

P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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

CAUTION:

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

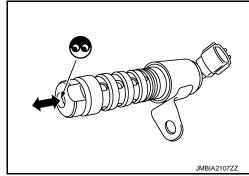
NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve. Refer to EM-44, "Exploded View".



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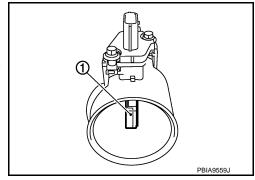
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Description INFOID:000000007770003

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

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



INFOID:0000000007770004

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
		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	Mass air flow sensor cir- cuit 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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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

>> GO TO 2.

2.perform dtc confirmation procedure for malfunction a

- 1. Start engine and warm it up to normal operating temperature.
- 2. Run engine for at least 10 seconds at idle speed.
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-154, "Diagnosis Procedure".

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

NO-2 >> Without CONSULT: GO TO 5.

3.check mass air flow sensor function

- 1. Turn ignition switch ON.
- 2. Start engine and warm it up to normal operating temperature.

 If engine cannot be started, go to EC-154, "Diagnosis Procedure".

< DTC/CIRCUIT DIAGNOSIS >

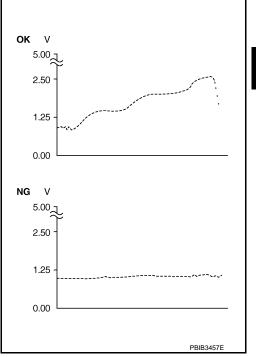
[MR18DE (EXCEPT FOR CALIFORNIA)]

- Select "DATA MONITOR" mode with CONSULT.
- Check the voltage of "MAS A/F SE-B1" with "DATA MONITOR".
- Increases engine speed to about 4,000 rpm.
- Monitor the linear voltage rise in response to engine speed increases.

Is the inspection result normal?

YES >> GO TO 4.

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



4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
TP SEN 1-B1	More than 1.5 V
TP SEN 2-B1	More than 1.5 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.

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-154, "Diagnosis Procedure".

NO >> INSPECTION END

${f 5}$.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to EC-153, "Component Function Check".

NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

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

Component Function Check

1. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

With GST

- Start engine and warm it up to normal operating temperature.
- Select Service \$01 with GST.

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< DTC/CIRCUIT DIAGNOSIS >

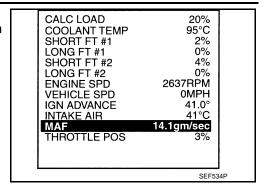
[MR18DE (EXCEPT FOR CALIFORNIA)]

- 3. Check the mass air flow sensor signal with Service \$01.
- 4. Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.

Is the inspection result normal?

YES >> INSPECTION END

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



Diagnosis Procedure

INFOID:0000000007770006

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-152, "DTC Logic".

Which malfunction is detected?

A >> GO TO 3.

B >> GO TO 2.

2. CHECK INTAKE SYSTEM

Check the following for connection.

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

Is the inspection result normal?

YES >> GO TO 3.

NO >> Reconnect the parts.

3.check ground connection

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace ground connection.

4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

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

MAF sensor		Ground	Voltage
Connector	Terminal	Giodila	Voltage
F4	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- · 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

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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

MAF	MAF sensor		ECM	
Connector	Terminal	Connector	Terminal	Continuity
F4	4	F8	52	Existed

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

Is the inspection result normal?

YES >> GO TO 7.

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

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

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

MAF	MAF sensor		ECM	
Connector	Terminal	Connector	Terminal	Continuity
F4	3	F8	45	Existed

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

Is the inspection result normal?

YES >> GO TO 8.

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

$oldsymbol{8}.$ CHECK INTAKE AIR TEMPERATURE SENSOR

Check intake air temperature sensor.

Refer to EC-167, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

>> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-24, "Exploded NO View".

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-291, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace EVAP control system pressure sensor.

10. CHECK MASS AIR FLOW SENSOR

Refer to EC-155. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace mass air flow sensor. Refer to EM-24, "Exploded View".

11. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

1.CHECK MASS AIR FLOW SENSOR-I

(P)With CONSULT

Turn ignition switch OFF.

Component Inspection

Reconnect all harness connectors disconnected.

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INFOID:0000000007770007

- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT and select "DATA MONITOR" mode.
- 5. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	MAS A/F SE-B1
	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
MAG AT GE-BT	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
	Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

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

⋈Without CONSULT

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

E	ECM		Ground Condition	
Connector	Terminal	Giodila	Condition	Voltage
			Ignition switch ON (Engine stopped.)	Approx. 0.4 V
Eo	45 (MAE consor	Ground	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
го	F8 (MAF sensor Ground signal)		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
			Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MASS AIR FLOW SENSOR

- Turn ignition switch OFF.
- 2. Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK MASS AIR FLOW SENSOR-II

(P)With CONSULT

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

Monitor item	Condition	MAS A/F SE-B1
	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
MAS A/F SE-B1	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
	Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

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

⋈Without CONSULT

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

E	ECM		Ground Condition	
Connector	Terminal	Ground	Condition	Voltage
			Ignition switch ON (Engine stopped.)	Approx. 0.4 V
F8	45 (MAE sonsor	or Ground	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
10	F8 (MAF sensor Ground signal)		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
		Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*	

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4.CHECK MASS AIR FLOW SENSOR-III

(I) With CONSULT

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

Monitor item	Condition	MAS A/F SE-B1
	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
WAS AT SE-BT	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
	Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

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

♥Without CONSULT

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

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[MR18DE (EXCEPT FOR CALIFORNIA)]

E	ECM		Condition	Valtage
Connector	Terminal	Ground	Condition	Voltage
		Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
EQ	45 (MAE sonsor		Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
10	F8 (MAF sensor signal)		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
			Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

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

Is the inspection result normal?

YES >> INSPECTION END

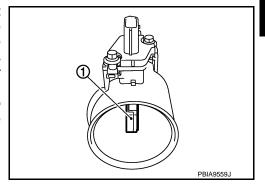
NO >> Clean or replace mass air flow sensor. Refer to EM-24, "Exploded View".

P0102, P0103 MAF SENSOR

Description

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

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



DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102	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 leaks Mass air flow sensor
P0103	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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

Which DTC is detected?

P0102 >> GO TO 2.

P0103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

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

Is DTC detected?

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

NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-I

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

Is DTC detected?

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

NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-II

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

Is DTC detected?

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

NO >> INSPECTION END

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Diagnosis Procedure

INFOID:0000000007770010

1. INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

P0102 >> GO TO 2.

P0103 >> GO TO 3.

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.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace ground connection.

4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

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

MAF sensor		Ground	Voltage	
Connector	Terminal	Glound	voltage	
F4	5	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

${f 5.}$ DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- 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.
- Disconnect ECM harness connector.
- 3. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF	MAF sensor		ECM	
Connector	Terminal	Connector	Terminal	Continuity
F4	4	F8	52	Existed

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

Is the inspection result normal?

P0102, P0103 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

YES >> GO TO 7.

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

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

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

MAF	MAF sensor ECM		ECM	
Connector	Terminal	Connector	Terminal	Continuity
F4	3	F8	45	Existed

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

Is the inspection result normal?

YES >> GO TO 8.

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

8.CHECK MASS AIR FLOW SENSOR

Refer to EC-161, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace mass air flow sensor. Refer to EM-24, "Exploded View".

9. CHECK INTERMITTENT INCIDENT

Refer to GI-41. "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK MASS AIR FLOW SENSOR-I

(P)With CONSULT

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

Monitor item	Condition	MAS A/F SE-B1
	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
MAS AT SE-BT	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
	Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

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

(R) Without CONSULT

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

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INFOID:0000000007770011

E	ECM		Ground Condition	
Connector	Terminal	Giodila	Condition	Voltage
			Ignition switch ON (Engine stopped.)	Approx. 0.4 V
F8	45 (MAE sonsor	Ground	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
10	F8 (MAF sensor Ground signal)		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
		Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*	

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MASS AIR FLOW SENSOR

- Turn ignition switch OFF.
- 2. Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

Is the inspection result normal?

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

3.CHECK MASS AIR FLOW SENSOR-II

(P)With CONSULT

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

Monitor item	Condition	MAS A/F SE-B1
	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
MAS A/F SE-BT	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
	Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

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

⊗Without CONSULT

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

[MR18DE (EXCEPT FOR CALIFORNIA)]

E	ECM		Condition	Voltage
Connector	Terminal	Ground	Ground	
			Ignition switch ON (Engine stopped.)	Approx. 0.4 V
F8	45 (MAE sonsor	45 (MAF sensor Ground signal)	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
10	(2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
		Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*	

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4. CHECK MASS AIR FLOW SENSOR-III

(P)With CONSULT

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

Monitor item	Condition	MAS A/F SE-B1
	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
MAS AT SE-BT	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
	Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

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

♥Without CONSULT

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

E	ECM		Condition	Voltage
Connector	Terminal	Ground	Condition	voltage
			Ignition switch ON (Engine stopped.)	Approx. 0.4 V
F8	45 (MAF sensor Ground signal)	Crownd	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
10		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V	
		Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*	

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

Is the inspection result normal?

Revision: 2011 November

YES >> INSPECTION END

NO >> Clean or replace mass air flow sensor. Refer to EM-24, "Exploded View".

> **EC-163** 2012 CUBE

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P0111 IAT SENSOR

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0111	IAT SENSOR 1 B1 [Intake air temperature (IAT) sensor circuit range/performance]	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor and FTT sensor, CVT fluid temperature sensor) shows that the voltage signal of the IAT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	Harness or connectors (High or low resistance in the IAT sensor circuit) IAT sensor

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 3.

NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-165, "Component Function Check".

NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-165, "Diagnosis Procedure".

3. PRECONDITIONING

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

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

TESTING CONDITION:

- Before performing the following procedure, do not add fuel.
- Before performing the following procedure, check that fuel level is between 1/4 and 4/4.
- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE

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

NOTE:

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

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

CAUTION:

Never turn ignition switch ON during soaking.

NOTE:

The vehicle must be cooled with the food open.

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

CAUTION:

Never turn ignition switch OFF during idling.

P0111 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

DTC/CIRCUIT	DIAGNOSIS >	[MR18DE (EXCEPT FOR CALIFORNIA)]
5. Check 1st trip	DTC.	
<u>ls 1st trip DTC de</u>		
	eed to <u>EC-165, "Diagnosis Proced</u> PECTION END	<u>lure"</u> .
Component F	unction Check	INFOID:000000000777001
1. CHECK INTAI	KE AIR TEMPERATURE (IAT) SEI	NSOR
1. Turn ignition	switch OFF.	
	nass air flow sensor harness conn ance between mass air flow senso	
J. Check resista	ance between mass an now senso	of terminals as follows.
Terminals	Condition	Resistance (k Ω)
1 and 2	Temperature [°C (°F)] 25 (77)	1.800 – 2.200
Is the inspection	result normal?	
YES >> GO T		lure"
_	eed to <u>EC-165, "Diagnosis Proced</u> RMITTENT INCIDENT	dure .
	nt incident. Refer to <u>GI-41, "Intermi</u> result permal?	<u>ittent Incident"</u> .
Is the inspection YES >> INSP	PECTION END	
	eed to <u>EC-165, "Diagnosis Proced</u>	dure".
Diagnosis Pro	ocedure	INFOID:00000000777001
I .CHECK INTAK	KE AIR TEMPERATURE (IAT) SEI	NSOR
	temperature sensor. Refer to <u>EC-1</u>	165, "Component Inspection".
Is the inspection		
YES >> GO T NO >> Repla		ntake air temperature sensor). Refer to EM-24, "Exploded
View	 -	
	RMITTENT INCIDENT	
Check intermitten	nt incident. Refer to GI-41, "Intermi	<u>ittent Incident"</u> .
. INOT	DECTION END	
_	PECTION END	
Component Ir	Ispection	INFOID:00000000777001
1. CHECK INTAK	KE AIR TEMPERATURE (IAT) SEI	NSOR
	KE AIR TEMPERATURE (IAT) SEI switch OFF.	NSOR
 Turn ignition Disconnect m 	switch OFF. nass air flow sensor harness conn	ector.
 Turn ignition Disconnect m 	switch OFF.	ector.
 Turn ignition Disconnect n Check resista 	switch OFF. nass air flow sensor harness conn ance between mass air flow senso	ector. or terminals as follows.
 Turn ignition Disconnect m 	switch OFF. nass air flow sensor harness conn	ector.

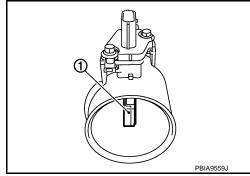
NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to <u>EM-24, "Exploded View"</u>.

P0112, P0113 IAT SENSOR

Description INFOID:000000007770016

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

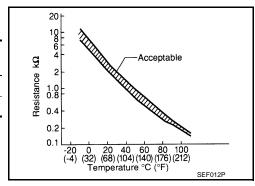
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

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

^{*:} These data are reference values and are measured between ECM terminal 46 (Intake air temperature sensor) and ground.



DTC Logic

UNFOID: 00000000007770017

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> 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-166, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770018

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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

MAF sensor		Ground	Voltage
Connector	Terminal	Glound	voltage
F4	5	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.

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

3.CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
F4	4	F8	52	Existed

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

Is the inspection result normal?

>> GO TO 4. YES

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

f 4.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-167, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-24, "Exploded View".

5. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK INTAKE AIR TEMPERATURE SENSOR

- Turn ignition switch OFF.
- Disconnect mass air flow sensor harness connector.
- Check resistance between mass air flow sensor terminals as per the following.

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-24, "Exploded View".

EC-167 Revision: 2011 November 2012 CUBE

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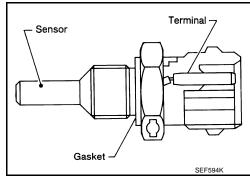
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INFOID:0000000007770019

P0116 ECT SENSOR

Description INFOID:0000000007770020

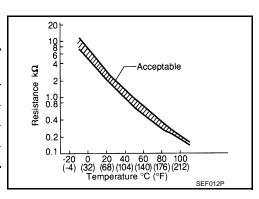
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

^{*:} These data are reference values and are measured between ECM terminal 38 (Engine coolant temperature sensor) and ground.



INFOID:0000000007770021

DTC Logic

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Is it necessary to erase permanent DTC?

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

2. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-169, "Component Function Check".

NOTE

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

Is the inspection result normal?

YES >> INSPECTION END

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

P0116 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

3. PRECONDITIONING

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

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

TESTING CONDITION:

- Before performing the following procedure, do not add fuel.
- Before performing the following procedure, check that fuel level is between 1/4 and 4/4.
- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE

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

NOTE:

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

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

CAUTION:

Never turn ignition switch ON during soaking.

NOTE:

The vehicle must be cooled with the food open.

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

CAUTION:

Never turn ignition switch OFF during idling.

5. Check 1st trip DTC.

Is 1st trip DTC detected?

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

NO >> INSPECTION END

Component Function Check

1.CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

- Turn ignition switch OFF.
- 2. Disconnect ECT sensor harness connector.
- 3. Remove ECT sensor. Refer to CO-24, "Exploded View".
- 4. Check resistance between ECT sensor terminals by heating with hot water as shown in the figure.

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

Is the inspection result normal?

YES >> GO TO 2.

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

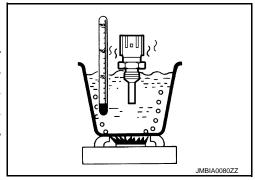
2. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTION END

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



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EC-169 Revision: 2011 November 2012 CUBE

P0116 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Diagnosis Procedure

INFOID:0000000007770023

1. CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

Check ECT sensor. Refer to EC-170, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace ECT sensor. Refer to CO-24, "Exploded View".

2. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770024

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor. Refer to CO-24. "Exploded View".
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-24, "Exploded View"</u>.

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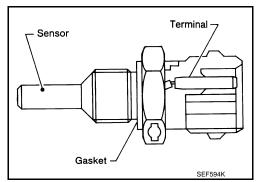
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P0117, P0118 ECT SENSOR

Description INFOID:0000000007770025

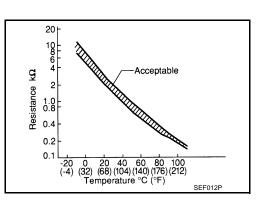
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

^{*:} These data are reference values and are measured between ECM terminal 38 (Engine coolant temperature sensor) and ground.



DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The sensor circuit is open or shorted.)
P0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> 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-171, "Diagnosis Procedure".

>> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

Turn ignition switch OFF.

INFOID:0000000007770027

INFOID:00000000007770026

EC-171

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT

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

ECT sensor		Ground	Voltage	
Connector	Terminal	Glound	vollage	
F28	1	Ground	Approx. 5 V	

Is the inspection result normal?

YES >> GO TO 3.

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

${f 3.}$ CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

ECT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F28	2	F8	44	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

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

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-172, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace engine coolant temperature sensor. Refer to CO-24, "Exploded View".

5. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770028

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor. Refer to CO-24, "Exploded View".
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

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

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor. Refer to CO-24, "Exploded View".

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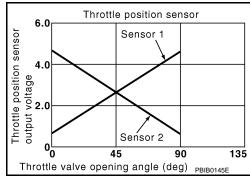
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P0122, P0123 TP SENSOR

Description INFOID:0000000007770029

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

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



DTC Logic

INFOID:0000000007770030

DTC DETECTION LOGIC

NOTE:

If DTC P0122 or P0123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-333, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	Harness or connectors (TP sensor 2 circuit is open or shorted.)
P0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	Electric throttle control actuator (TP sensor 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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 let it idle for 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-174, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770031

CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

- Disconnect electric throttle control actuator harness connector.
- Turn ignition switch ON.

P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle	control actuator	Ground	Voltage
Connector	Terminal	Glound	
F29	2	Ground	Approx. 5 V

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Is the inspection result normal?

YES >> GO TO 3.

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

3.check throttle position sensor 2 ground circuit for open and short

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F29	4	F8	36	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

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

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

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

Electric throttle	control actuator	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F29	3	F8	34	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

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

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-176, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace electric throttle control actuator.
- Perform <u>EC-176</u>, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Component Inspection

INFOID:0000000007770032

1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D (CVT) or 1st (M/T) position.
- 6. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal	Ground	Condition		voltage
	33 (TP sensor			Fully released	More than 0.36V
F8	1 signal)	Ground	Accelerator pedal	Fully de- pressed	Less than 4.75V
	34	Oround		Fully released	Less than 4.75V
	(TP sensor 2 signal)			Fully de- pressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace electric throttle control actuator.
- 2. Perform EC-176, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007770033

2012 CUBE

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

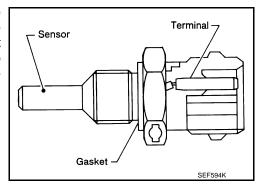
Refer to EC-25, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> END

P0125 ECT SENSOR

Description INFOID:0000000007770034

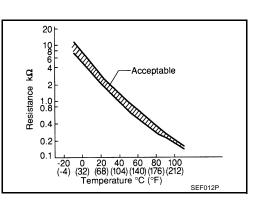
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

^{*:} These data are reference values and are measured between ECM terminal 38 (Engine coolant temperature sensor) and ground.



DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P0125 is displayed with P0116, first perform the trouble diagnosis for DTC P0116. Refer to EC-168, "DTC Logic".
- If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to EC-171, "DTC Logic".

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR FUNCTION

(P)With CONSULT

Turn ignition switch ON.

>> GO TO 2.

- Select "DATA MONITOR" mode with CONSULT.
- Check that "COOLAN TEMP/S" is above 10°C (50°F).

With GST

EC-177 Revision: 2011 November 2012 CUBE

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P0125 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Follow the procedure "With CONSULT" above.

Is it above 5°C (41°F)?

YES >> INSPECTION END

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT

- 1. Start engine and run it for 65 minutes at idle speed.
- 2. Check 1st tip DTC.

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.

CAUTION:

Be careful not to overheat engine.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> EC-178, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770036

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-178, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-24, "Exploded View"</u>.

3.CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace thermostat. Refer to <u>CO-22, "Removal and Installation"</u>.

4. CHECK INTERMITTENT INCIDENT

Refer to GI-41. "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770037

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

- Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- Remove engine coolant temperature sensor. Refer to CO-24, "Exploded View".
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

P0125 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Terminals	Condition		Resistance
		20 (68)	
1 and 2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00 kΩ
		90 (194) 0.236 - 0.2	

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Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor. Refer to CO-24. "Exploded View".

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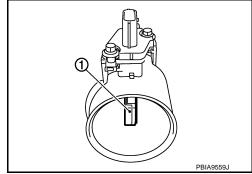
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P0127 IAT SENSOR

Description INFOID.000000007770038

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

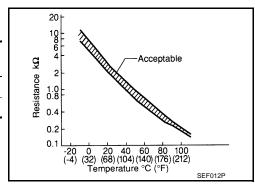
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

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

^{*:} These data are reference values and are measured between ECM terminal 46 (Intake air temperature sensor) and ground.



INFOID:0000000007770039

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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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

(P)With CONSULT

- 1. Wait until engine coolant temperature is less than 96°C (205°F)
- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT.
- Check the engine coolant temperature.
- 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).

[MR18DE (EXCEPT FOR CALIFORNIA)]

P0127 IAT SENSOR < DTC/CIRCUIT DIAGNOSIS > Turn ignition switch ON. Select "DATA MONITOR" mode with CONSULT. 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. Check 1st trip DTC. With GST Follow the procedure "With CONSULT" above. Is 1st trip DTC detected? >> Go to EC-181, "Diagnosis Procedure". >> INSPECTION END NO Diagnosis Procedure 1. CHECK GROUND CONNECTION Turn ignition switch OFF. Check ground connection E38. Refer to GI-44, "Circuit Inspection". Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace ground connection. 2.CHECK INTAKE AIR TEMPERATURE SENSOR Refer to EC-181, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-24, "Exploded View".

3.check intermittent incident

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK INTAKE AIR TEMPERATURE SENSOR

- Turn ignition switch OFF.
- Disconnect mass air flow sensor harness connector. 2.
- Check resistance between mass air flow sensor terminals as per the following.

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-24, "Exploded View".

EC-181 Revision: 2011 November 2012 CUBE

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P0128 THERMOSTAT FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P0128 THERMOSTAT FUNCTION

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0128 is displayed with DTC P0300, P0301, P0302, P0303 or P0304, first perform the trouble diagnosis for DTC P0300, P0301, P0302, P0303, P0304. Refer to <u>EC-238</u>, "DTC Logic".

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

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	ThermostatLeakage from sealing portion of thermostatEngine coolant temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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 52°C (126°F).
- Before performing the following procedure, do not fill with the fuel.

>> GO TO 2.

2.PRECONDITIONING-II

(P)With CONSULT

- 1. Turn ignition switch ON.
- 2. Check the following conditions:

Ambient temperature	-10°C (14°F) or more	
A/C switch	OFF	
Blower fan switch	OFF	

- 3. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- Check the following conditions:

COOLAN TEMP/S	-10°C - 52°C (14 - 126°F)

Is the condition satisfied?

YES >> GO TO 3.

NO >> 1. Satisfy the condition.

2. GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

(P)With CONSULT

- 1. Start engine.
- 2. Drive the vehicle until the following condition is satisfied.

CAUTION:

Always drive vehicle at safe speed.

STEP 1

Drive the vehicle under the conditions instructed below until the difference between "COOLAN TEMP/S" and "FUEL T/TMP SE" becomes at least 24°C (43°F).

P0128 THERMOSTAT FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

COOLAN TEMP/S	65°C (149°F) or less	
FUEL T/TMP SE	Less than the value calculated by subtracting 24°C (43°F) from "COOLAN TEMP/S".*	
*: Example		
COOLAN TEMP/S	FUEL T/TMP SE	
70°C (158°F)	46°C (115°F) or less	
65°C (149°F)	41°C (106°F) or less	
60°C (140°F)	36°C (97°F) or less	
T/TMP SE" maintained at STEP 2 (CVT models) Drive the vehicle at 50 km/h T/TMP SE" maintained at NOTE:	(32 MPH) or more with the difference between "COOLAN TEMP/S" and "FUEL 24°C (43°F) or more.	
STEP 3 (MT models)	as steady as possible during cruising. (37 MPH) or more until "COOLAN TEMP/S" increases by 6°C (11°F).	
Drive the vehicle at 50 km/h NOTE :	(32 MPH) or more until "COOLAN TEMP/S" increases by 6°C (11°F).	
YES >> GO TO 4. NO >> GO TO 1.	MATION DROOFDURE II	
PERFORM DTC CONFIRM With CONSULT Drive the vehicle until the	following condition is satisfied.	
COOLAN TEMP/S	65°C (149°F) or more (MT models) 59°C (139°F) or more (CVT models)	
CAUTION: Always drive vehicle at s Check 1st trip DTC. s 1st trip DTC detected? YES >> Proceed to EC-18: NO >> INSPECTION ENI	3, "Diagnosis Procedure".	
Diagnosis Procedure	INFOID:0000000007770043	
	T TEMPERATURE SENSOR	
tefer to EC-184, "Component to the inspection result normal" YES >> GO TO 2. NO >> Replace engine co	·	
Refer to <u>CO-23, "Inspection"</u> . s the inspection result normal' YES >> INSPECTION ENI		

>> Replace thermostat. Refer to CO-22, "Removal and Installation".

NO

P0128 THERMOSTAT FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Component Inspection

INFOID:0000000007770044

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor. Refer to CO-24, "Exploded View".
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor. Refer to CO-24, "Exploded View".

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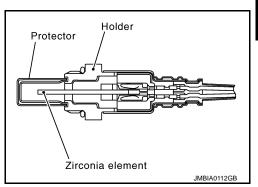
P0130 A/F SENSOR 1

Description

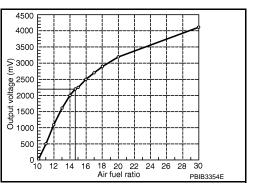
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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

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



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



DTC Logic

DTC DETECTION LOGIC

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

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

(P)With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Let it idle for 2 minutes.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-187, "Diagnosis Procedure".

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P0130 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

INFOID:0000000007770047

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

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

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

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

Does the indication fluctuates around 2.2 V?

YES >> GO TO 4.

NO >> Go to EC-187, "Diagnosis Procedure".

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

- Select "A/F SEN1 (B1) P1276" of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT.
- 2. Touch "START".
- 3. When the following conditions are met, "TESTING" will be displayed on the CONSULT screen.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 64 km/h (40 mph)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	D position (CVT) 5th position (M/T)

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

CAUTION:

Always drive vehicle at a safe speed.

Is "TESTING" displayed on CONSULT screen?

YES >> GO TO 5.

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

5.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-II

Release accelerator pedal fully.

NOTE:

Never apply brake during releasing the accelerator pedal.

Which does "TESTING" change to?

COMPLETED>>GO TO 6.

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

6.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-III

Touch "SELF-DIAG RESULT"

Which is displayed on CONSULT screen?

YES >> INSPECTION END

NO >> Go to EC-187, "Diagnosis Procedure".

7.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform Component Function Check. Refer to EC-186, "Component Function Check".

NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-187, "Diagnosis Procedure".

Component Function Check

1. PERFORM COMPONENT FUNCTION CHECK

With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.

P0130 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Shift the selector lever to the D position (CVT) or 1st position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (31 MPH).

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

Never apply brake during releasing the accelerator pedal.

- 4. Repeat steps 2 to 3 for five times.
- 5. Stop the vehicle and turn ignition switch OFF.
- 6. Wait at least 10 seconds and restart engine.
- 7. Repeat steps 2 to 3 for five times.
- 8. Stop the vehicle.
- Check 1st trip DTC.

Is 1st trip DTC detected?

>> Go to EC-187, "Diagnosis Procedure". YES

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK GROUND CONNECTION

Turn ignition switch OFF.

Check ground connection E38. Refer to GI-44, "Circuit Inspection". 2.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

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

- Disconnect A/F sensor 1 harness connector.
- Turn ignition switch ON. 2.
- Check the voltage between A/F sensor 1 harness connector and ground.

A/F se	ensor 1	Ground	Voltage	
Connector	Terminal		voltage	
F50	4	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 E8. F1
- IPDM E/R harness connector E15
- 15 A fuse (No. 61)
- 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.
- Disconnect ECM harness connector.
- Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
F50	1	F8	49	Existed	
F30	2	ГО	53	Existed	

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P0130 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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

A/F se	ensor 1	Ground	Continuity	
Connector	Terminal		Continuity	
F50	1	Ground	Not existed	
	2	Glound	NOT EXISTED	

E	CM	Ground	Continuity	
Connector	Terminal	Glound	Continuity	
F8	49	Ground Not exis	Not existed	
	53	Glound	Not existed	

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

5. CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace.

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

Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

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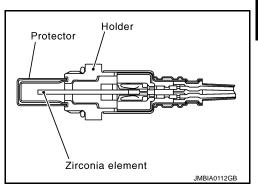
P0131 A/F SENSOR 1

Description

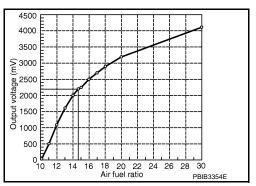
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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

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



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



DTC Logic

DTC DETECTION LOGIC

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

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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

(II) With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Select "A/F SEN1 (B1)" in "DATA MONITOR" mode with CONSULT.
- 3. Check "A/F SEN1 (B1)" indication.

With GST

Follow the procedure "With CONSULT" above.

Is the indication constantly approx. 0 V?

Revision: 2011 November EC-189 2012 CUBE

P0131 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

YES >> Go to EC-190, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

(I) With CONSULT

- 1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
- Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.

Always drive vehicle at a safe speed.

3. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	Suitable position

NOTE:

- Keep the accelerator pedal as steady as possible during the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 1, return to step 1.
- 4. Check 1st trip DTC.

®With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-190, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770051

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

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

- 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.

A/F se	ensor 1	Ground	Voltage
Connector Terminal		Glound	vollage
F50	4	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 E8. F1
- IPDM E/R harness connector E15
- 15 A fuse (No. 61)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

P0131 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

A/F sensor 1		E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F50	1	F8	49	Existed
1 30	2	10	53	LAISIGU

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

A/F se	ensor 1	Ground	Continuity	
Connector Terminal		Giodila	Continuity	
F50	1	Ground	Not existed	
1 30	2	Giodila	Not existed	

E	CM	Ground	Continuity
Connector Terminal		Ground	Continuity
F8	49	Ground	Not existed
10	53	Glound	Not existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

5.CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace.

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

Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

EC-191

>> INSPECTION END

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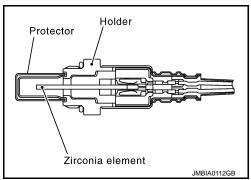
P0132 A/F SENSOR 1

Description

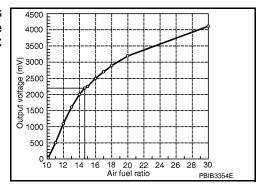
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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

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



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



DTC Logic

DTC DETECTION LOGIC

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	Air fuel ratio (A/F) sensor 1 circuit high voltage	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5 V.	Harness or connectors (The A/F sensor 1 circuit is open or shorted.) A/F sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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

(II) With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Select "A/F SEN1 (B1)" in "DATA MONITOR" mode with CONSULT.
- 3. Check "A/F SEN1 (B1)" indication.

With GST

Follow the procedure "With CONSULT" above.

Is the indication constantly approx. 5 V?

P0132 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

YES >> Go to EC-193, "Diagnosis Procedure". NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT

Turn ignition switch OFF, wait at least 10 seconds and then restart engine.

2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine. CAUTION:

Always drive vehicle at a safe speed.

3. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	Suitable position

NOTE:

- Keep the accelerator pedal as steady as possible during the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 1, return to step
- 4. Check 1st trip DTC.

Follow the procedure "With CONSULT" above.

Is 1st trip DTC is detected?

YES >> Go to EC-193, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

Turn ignition switch OFF.

Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

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

- Disconnect A/F sensor 1 harness connector.
- Turn ignition switch ON.
- Check the voltage between A/F sensor 1 harness connector and ground.

A/F se	ensor 1	Ground	Voltage	
Connector Terminal		Glound	voltage	
F50	4	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 E8. F1
- IPDM E/R harness connector E15
- 15 A fuse (No. 61)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

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4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

A/F sensor 1		E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F50	1	F8	49	Existed
1 30	2	1-0	53	LAISIEU

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

A/F se	ensor 1	Ground	Continuity
Connector Terminal		Glound	Continuity
F50	1	Ground	Not existed
1 30	2	Glound	Not existed

E	CM	Ground	Continuity
Connector Terminal		Giodila	Continuity
F8	49	Ground	Not existed
1-0	53	Ground	Not existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

5. CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace.

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

Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

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P0137 H02S2

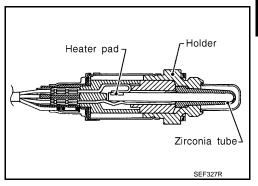
Description

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.

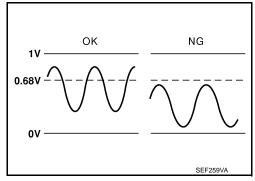
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



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 (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0137	Heated oxygen sensor 2 circuit low voltage	The maximum 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 Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 5.

2.PRECONDITIONING

If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

P0137 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).

If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).

- 7. Open engine hood.
- 8. Select "HO2S2 (B1) P1147" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT.
- 9. Follow the instruction of CONSULT.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

10. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to EC-197, "Diagnosis Procedure".

CAN NOT BE DIAGNOSED>>GO TO 4.

f 4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- 1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- 2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-196. "Component Function Check".

NOTE:

Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-197, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007770057

1.PERFORM COMPONENT FUNCTION CHECK-I

♥Without CONSULT

- 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. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage	
Connector	Terminal	Ground	Condition	vollage	
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure.	

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 and ground under the following condition.

[MR18DE (EXCEPT FOR CALIFORNIA)]

ECM		Ground	Condition	Voltage	
Connector	Terminal	Glound	Condition	vollage	
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at 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 and ground under the following condition.

E	ECM		Condition	Voltage
Connector	Terminal	Ground	Condition	vollage
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

>> Go to EC-197, "Diagnosis Procedure". NO

Diagnosis Procedure

1. CHECK GROUND CONNECTION

Turn ignition switch OFF.

Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to EC-26, "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 detected? Is it difficult to start engine?

>> Perform trouble diagnosis for DTC P0171. Refer to EC-220, "DTC Logic".

NO >> GO TO 3.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect heated oxygen sensor 2 (HO2S2) harness connector. 2.
- Disconnect ECM harness connector.
- Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
F30	1	F8	59	Existed	

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

Is the inspection result normal?

YES >> GO TO 4.

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

EC-197

$oldsymbol{4}.$ CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

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HO2S2		E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F30	4	F8	50	Existed

Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

НО	2S2	Ground	Continuity
Connector Terminal		Giodila	Continuity
F30 4		Ground	Not existed

E	CM	Ground	Continuity
Connector	Terminal	Glound	Continuity
F8	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

5.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-198, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770059

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

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

2.CHECK HEATED OXYGEN SENSOR 2

(I) With CONSULT

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

[MR18DE (EXCEPT FOR CALIFORNIA)]

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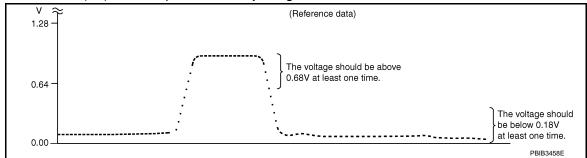
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- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT.
- 7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to ± 25%.



"HO2S2 (B1)" should be above 0.68 V at least once when the "FUEL INJECTION" is + 25%. "HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is - 25%.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector and ground under the following condition.

E	ECM		Condition	Voltage
Connector	Terminal	Ground	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

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 and ground under the following condition.

E	ECM		Condition	Voltage
Connector	Terminal	Ground	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

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 and ground under the following condition.

P0137 H02S2

[MR18DE (EXCEPT FOR CALIFORNIA)]

E	ECM		Condition	Voltage
Connector	Terminal	Ground	Condition Voltage	
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

P0138 H02S2

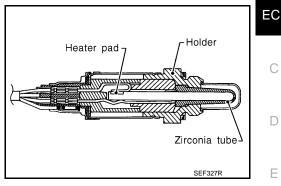
Description INFOID:0000000007770060

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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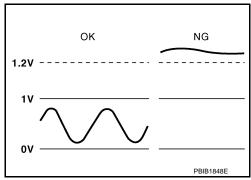
DTC Logic INFOID:0000000007770061

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/ F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time.

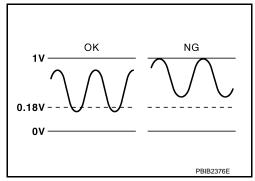
MALFUNCTION A

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



MALFUNCTION B

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
		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	Heated oxygen sensor 2 circuit high voltage	В)	The minimum voltage from the sensor is not reached to the specified voltage.	Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 Fuel pressure Fuel injector

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION 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.
- 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 2 minutes.
- 5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-203, "Diagnosis Procedure".

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

NO-2 >> Without CONSULT: GO TO 5.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

NOTE:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Make sure 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.
- 8. Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT.
- 9. Follow the instruction of CONSULT.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

10. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT

OK >> INSPECTION END

NG >> Go to <u>EC-203, "Diagnosis Procedure"</u>.

CAN NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B AGAIN

- Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- 2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

5. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to EC-203, "Diagnosis Procedure".

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-203, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007770062

1.PERFORM COMPONENT FUNCTION CHECK-I

[MR18DE (EXCEPT FOR CALIFORNIA)]

Without CONSULT

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal	Ground	Condition	vollage
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.18 V at least once during this procedure.

Is the inspection result normal?

>> INSPECTION END YES

NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal	Glound	Condition	vollage
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.18 V at 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 and ground under the following condition.

E	ECM		Condition	Voltage
Connector	Terminal	Ground	Condition	vollage
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-203, "Diagnosis Procedure".

Diagnosis Procedure

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-201, "DTC Logic".

Which malfunction is detected?

Α >> GO TO 2.

В >> GO TO 9.

2.CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3.CHECK HO2S2 CONNECTOR FOR WATER

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- Disconnect heated oxygen sensor 2 harness connector.
- Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace harness or connectors.

4. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect ECM harness connector.
- 2. Check the continuity between HO2S2 harness connector and ECM harness connector.

НО	HO2S2		ECM		
Connector	Terminal	Connector	Terminal	Continuity	
F30	1	F8	59	Existed	

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

Is the inspection result normal?

YES >> GO TO 5.

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

5.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F30	4	F8	50	Existed

Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

НО	2S2	Ground	Continuity	
Connector	Terminal	Giodila	Continuity	
F30	4	Ground	Not existed	

E	CM	Ground	Continuity
Connector	Terminal	Glound	Continuity
F8	50	Ground	Not 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 ground or short to power in harness or connectors.

6.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-206, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 7.

7.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

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

[MR18DE (EXCEPT FOR CALIFORNIA)]

 Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner service tool).

[commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial

>> INSPECTION END

8.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

9. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace ground connection.

10.clear the mixture ratio self-learning value

- Clear the mixture ratio self-learning value. Refer to EC-26, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

>> Perform trouble diagnosis for DTC P0172. Refer to EC-224. "DTC Logic".

NO >> GO TO 11.

11. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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

HO2S2		E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F30	1	F8	59	Existed

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

Is the inspection result normal?

YES >> GO TO 12.

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

12.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

НО	HO2S2		ECM		
Connector	Terminal	Connector	Terminal	Continuity	
F30	4	F8	50	Existed	

Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

НО	2S2	Ground	Continuity
Connector	Terminal	Glound	Continuity
F30	4	Ground	Not existed

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E	CM	Ground	Continuity
Connector	Terminal	Glound	Continuity
F8	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 13.

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

13. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-206, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15. NO >> GO TO 14.

14. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

15. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

(P)With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT.

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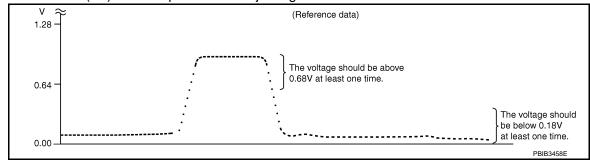
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7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to \pm 25%.



"HO2S2 (B1)" should be above 0.68 V at least once when the "FUEL INJECTION" is + 25%. "HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is – 25%.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector and ground under the following condition.

EC	ECM		Condition	Voltage
Connector	Terminal	Ground	Condition	vollage
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

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 and ground under the following condition.

E	ECM		Condition	Voltage
Connector	Terminal	Ground	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

CHECK HEATED OXYGEN SENSOR 2-III.

Check the voltage between ECM harness connector and ground under the following condition.

P0138 HO2S2

[MR18DE (EXCEPT FOR CALIFORNIA)]

E	ECM		Condition	Voltage	
Connector	Terminal	Ground	Condition	Voltage	
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

P0139 H02S2

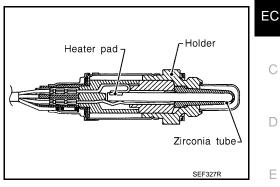
Description INFOID:0000000007770065

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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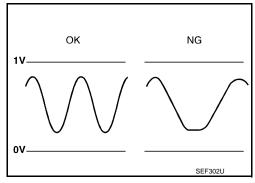
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DTC Logic INFOID:0000000007770066

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst 1 causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during various driving conditions such as fuel cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139	Heated oxygen sensor 2 (bank 1) circuit slow response	The switching time between rich and lean of a heated oxygen sensor 2 signal delays more than the specified time computed by ECM.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 Fuel system EVAP system Intake air system

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 7.

2.PRECONDITIONING

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

- 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 better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

(A) With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- 6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 7. Let engine idle for 1 minute.
- 8. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
- 9. Drive the vehicle in a proper at 60 km/h (38MPH) and maintain the speed.

CAUTION:

Always drive vehicle at a safe speed.

10. Release the accelerator pedal fully at least 5 seconds.

CAUTION:

- Enable engine brake.
- · Always drive carefully.
- · Never apply brake when releasing the accelerator pedal.
- 11. Repeat step 9 and 10 at least 8 times.
- 12. Check the following item of "DATA MONITOR".

Data monitor item	Status
HO2 S2 DIAG1 (B1)	CMPLT
HO2 S2 DIAG2 (B1)	CIVIFLI

Is "CMPLT" displayed on CONSULT screen?

YES >> GO TO 6.

NO-1: "CMPLT" is not displayed on DIAG 1>>Perform DTC confirmation procedure again.

NO-2: "CMPLT" is not displayed on DIAG 2>>GO TO 4.

f 4.PERFORM DTC WORK SUPPORT

- Open engine hood.
- Select "HO2S2 (B1) P0139" in "DTC WORK SUPPORT" mode with CONSULT.
- Start engine and follow the instruction of CONSULT display.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

Is "COMPLETED" displayed on CONSULT screen?

YES >> GO TO 6.

NO >> GO TO 5.

${f 5}$ PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- 1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- 2. Perform DTC confirmation procedure again.

>> GO TO 3.

6.PERFORM SELF-DIAGNOSIS

(P)With CONSULT

Perform ECM self-diagnosis.

Is DTC "P0139" detected?

YES >> Proceed to EC-211, "Diagnosis Procedure".

NO >> INSPECTION END

7.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-211, "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.

P0139 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-211, "Diagnosis Procedure".

Component Function Check

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1.PERFORM COMPONENT FUNCTION CHECK-I

♥Without CONSULT

- Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage	
Connector	Terminal	Glound	Condition	voltage	
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.8 V at 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 and ground under the following condition.

ECM		Ground	Condition	Voltage	
Connector	Terminal	Giodila	Condition	voltage	
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.8 V at 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 and ground under the following condition.

ECM		Ground Condition		Voltage
Connector	Terminal	Glodila	Condition	vollage
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.8 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-211, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

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2.clear the mixture ratio self-learning value

- Clear the mixture ratio self-learning value. Refer to <u>EC-26</u>, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- 2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to <u>EC-220, "DTC Logic"</u> or <u>EC-224, "DTC Logic"</u>.

NO >> GO TO 3.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F30	1	F8	59	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

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

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

НО	2S2	E(CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F30	4	F8	50	Existed

Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

НО	2S2	Ground	Continuity
Connector	Connector Terminal		Continuity
F30	4	Ground	Not existed

E	CM	Ground	Continuity
Connector	Connector Terminal		Continuity
F8	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-213, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

O. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5. "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

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>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.INSPECTION START Do you have CONSULT?

Do you have CONSULT?

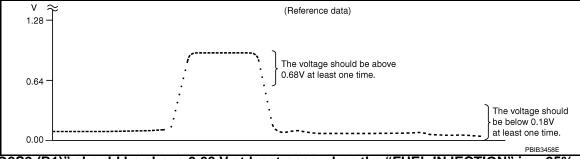
YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

(P)With CONSULT

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- Start engine and warm it up to normal operating temperature. 2.
- Turn ignition switch OFF and wait at least 10 seconds.
- 4 Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT.
- 7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to ± 25%.



"HO2S2 (B1)" should be above 0.68 V at least once when the "FUEL INJECTION" is + 25%. "HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is – 25%.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-I

®Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- Check the voltage between ECM harness connector and ground under the following condition.

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[MR18DE (EXCEPT FOR CALIFORNIA)]

E	ECM		Condition	Voltage
Connector	Terminal	Ground	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

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 and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal	Glound	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

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 and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal	Giodila	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

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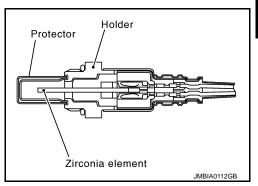
P014C, P014D, P015A, P015B, A/F SENSOR 1

Description

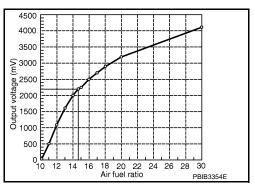
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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

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



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



DTC Logic

DTC DETECTION LOGIC

To judge malfunctions, this diagnosis measures response time of the A/F signal computed by ECM from the A/F sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the A/F sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P014C	Air fuel ratio (A/F) sensor 1		
P014D	(bank 1) circuit slow re- sponse	 The response time of a A/F sensor 1 signal de- lays more than the specified time computed by ECM. 	 Harness or connectors (The A/F sensor 1 circuit is open or
P015A	Air fuel ratio (A/F) sensor 1		shorted.) • A/F sensor 1
P015B	(bank 1) circuit delayed response		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

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

Do you have CONSULT?

YES >> GO TO 2. NO >> GO TO 6.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

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P014C, P014D, P015A, P015B, A/F SENSOR 1

[MR18DE (EXCEPT FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS >

(P)With CONSULT

- 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 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. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds.
- 8. Fully release accelerator pedal and then let engine idle for about 1 minute.
- 9. Check the items status of "DATA MONITOR" as follows.

NOTE:

If "PRSNT" changed to "ABSNT", refer to EC-126, "Component Function Check".

Data monitor item	Status	
A/F SEN1 DIAG3 (B1)	PRSNT	

Is "PRSNT" displayed on CONSULT screen?

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

3.PERFORM DTC CONFIRMATION PROCEDURE-2

(P)With CONSULT

Perform DTC confirmation procedure-1 again.

Is "PRSNT" displayed on CONSULT screen?

YES >> GO TO 4.

NO >> Refer to EC-126, "Component Function Check".

4. PERFORM DTC CONFIRMATION PROCEDURE-2

(P)With CONSULT

- 1. Wait for about 20 seconds at idle.
- 2. Check the items status of "DATA MONITOR" as follows.

NOTE:

If "CMPLT" changed to "INCMP", refer to EC-126, "Component Function Check".

Data monitor item	Status
A/F SEN1 DIAG1 (B1)	CMPLT
A/F SEN1 DIAG2 (B1)	

Is "CMPLT" displayed on CONSULT screen?

YES >> GO TO 5.

NO >> Refer to EC-126, "Component Function Check".

5. PERFORM SELF-DIAGNOSIS

(R) With CONSULT

Check the "SELF-DIAG RESULT".

Is any DTC detected?

YES >> Proceed to EC-217, "Diagnosis Procedure".

NO >> INSPECTION END

6. 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.
- 3. Calculate the total value of "Short term fuel trim" and "Long term fuel trim" indications.

Is the total percentage within ±15%?

YES >> GO TO 8. NO >> GO TO 7.

P014C, P014D, P015A, P015B, A/F SENSOR 1 [MR18DE (EXCEPT FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS >

7. DETECT MALFUNCTIONING PART

Check the following.

- · Intake air leaks
- · Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Fuel injector
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor

>> Repair or replace malfunctioning part.

8.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON. 2.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. 4.
- 5. Let engine idle for 1 minute.
- Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds.
- Fully release accelerator pedal and then let engine idle for about 1 minute.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-217, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

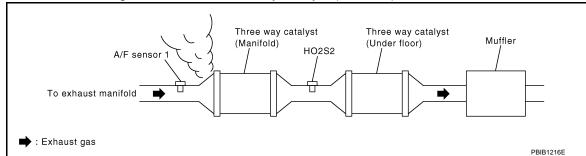
2.RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1. Refer to EM-30, "Exploded View".

>> GO TO 3.

3. CHECK EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.

NO >> GO TO 4.

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P014C, P014D, P015A, P015B, A/F SENSOR 1

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< DTC/CIRCUIT DIAGNOSIS > 4.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 5.

5. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to <u>EC-26, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement"</u>.
- 2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to <u>EC-220, "DTC Logic"</u> or <u>EC-224, "DTC Logic"</u>.

NO >> GO TO 6.

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

- 1. Disconnect A/F sensor 1 harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F se	ensor 1	Ground	Voltage	
Connector	Connector Terminal		voltage	
F50	F50 4		Battery voltage	

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 7.

1. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- IPDM E/R harness connector E15
- 15 A fuse (No. 61)
- 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.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F50	1	F8	49	Existed
1 30	2	10	53	LAISIGU

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

A/F sensor 1		Ground	Continuity
Connector	Connector Terminal		Continuity
F50	1	Ground	Not existed
1 30	2	Glound	NOT EXISTED

P014C, P014D, P015A, P015B, A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

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Connector Terminal ### 49	Also check harness for short to power. the inspection result normal? ES > GO TO 9. O > Repair open circuit or short to ground or short to power in harness or connectors. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER ofer to EC-145. "Component Inspection". the inspection result normal? ES > GO TO 10. O > GO TO 10. CHECK MASS AIR FLOW SENSOR offer to EC-155. "Component Inspection". the inspection result normal? ES > GO TO 11. CHECK MASS AIR FLOW SENSOR offer to EC-155. "Component Inspection". the inspection result normal? ES > GO TO 11. No > Replace mass air flow sensor. Refer to EM-24. "Exploded View". 1. CHECK PCV VALVE offer to EC-442. "Component Inspection". the inspection result normal? ES > GO TO 12. No > Repair or replace PCV valve. Refer to EM-42. "Exploded View". 2. CHECK INTERMITTENT INCIDENT artiform GI-41. "Intermittent Incident". the inspection result normal? ES > GO TO 13. No > Repair or replace. 3. REPLACE AIR FUEL RATIO (A/F) SENSOR 1 splace air fuel ratio (A/F) sensor 1. Refer to EM-30. "Exploded View". AUTION: Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner (commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).	EC	M	Craund	Continuity	
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Refer to EC-155, "Component Inspection". Is the inspection result normal? YES >> GO TO 11. NO >> Replace mass air flow sensor. Refer to EM-24, "Exploded View". I.CHECK PCV VALVE Refer to EC-442, "Component Inspection". Is the inspection result normal? YES >> GO TO 12. NO >> Repair or replace PCV valve. Refer to EM-42, "Exploded View". I.CHECK INTERMITTENT INCIDENT Perform GI-41, "Intermittent Incident". Is the inspection result normal? YES >> GO TO 13. NO >> Repair or replace. I.G. REPLACE AIR FUEL RATIO (A/F) SENSOR 1 Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View". Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [Commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).	seter to EC-155. "Component Inspection". the inspection result normal? YES >> GO TO 11. YES >> GO TO 11. YES >> Replace mass air flow sensor. Refer to EM-24. "Exploded View". 1. CHECK PCV VALVE Seter to EC-442. "Component Inspection". The inspection result normal? YES >> GO TO 12. YES >> GO TO 12. YES >> Repair or replace PCV valve. Refer to EM-42. "Exploded View". 2. CHECK INTERMITTENT INCIDENT Set or GI-41. "Intermittent Incident". The inspection result normal? YES >> GO TO 13. YES >> GO TO 14. YES >> GO TO 15. YES >> GO TO 15.			I SENSOD		
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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171	Fuel injection system too lean	 Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.) 	 Intake air leaks A/F sensor 1 Fuel injector Exhaust gas leaks Incorrect fuel pressure Lack of fuel Mass air flow sensor Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

- Clear the mixture ratio self-learning value. Refer to <u>EC-26</u>, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- 2. Start engine.

<u>Is it difficult to start engine?</u>

YES >> GO TO 3.

NO >> GO TO 4.

3. RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.

Crank engine while depressing accelerator pedal.

NOTE:

When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Go to EC-221, "Diagnosis Procedure".

NO >> Check exhaust and intake air leak visually.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. Start engine and let it idle for at least 5 minutes.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-221, "Diagnosis Procedure".

NO >> GO TO 5.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

5. PERFORM DTC CONFIRMATION PROCEDURE-III

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Start engine.
- 3. Maintain the following conditions for at least 10 consecutive minutes. Hold the accelerator pedal as steady as possible.

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VHCL SPEED SE 50 - 120 km/h (31 - 75 MPH)

CAUTION:

Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-221, "Diagnosis Procedure".

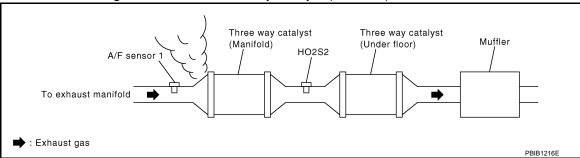
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770074

1. CHECK EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.

NO >> GO TO 2.

2. CHECK FOR INTAKE AIR LEAK

- 1. Listen for an intake air leak after the mass air flow sensor.
- Check PCV hose connection.

Intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 3.

${f 3.}$ CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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

A/F sensor 1		ECM		Continuity	
Connector	Terminal	Connector Terminal		Continuity	
F50	1	F8	49	Existed	
1 30	2	10	53	LAISIEU	

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

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

A/F sensor 1		Ground	Continuity
Connector	Connector Terminal		Continuity
F50	1	Ground	Not existed
1 30	2	Giodila	Not existed

ECM		Ground	Continuity	
Connector Terminal		Glound		
F8	49	Ground	Not existed	
	53	Glound	Not existed	

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

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

4. CHECK FUEL PRESSURE

1. Check fuel pressure. Refer to EC-485, "Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly". Refer to FL-5, "Exploded View".

NO >> Repair or replace

6.CHECK MASS AIR FLOW SENSOR

(P)With CONSULT

- 1. Install all removed parts.
- Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.
- 3. For specification, refer to EC-489, "Mass Air Flow Sensor".

- 1. Install all removed parts.
- Check mass air flow sensor signal in Service \$01 with GST.
- 3. For specification, refer to EC-489, "Mass Air Flow Sensor".

Is the measurement value within the specification?

YES >> GO TO 7.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to <u>EC-152</u>, "<u>DTC Logic</u>".

7.CHECK FUNCTION OF FUEL INJECTOR

(P)With CONSULT

- Start engine.
- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- Make sure that each circuit produces a momentary engine speed drop.

♥Without CONSULT

1. Let engine idle.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Listen to each fuel injector operating sound.

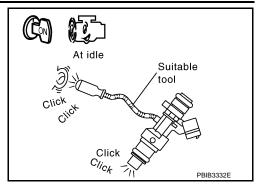
Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Perform 1

>> Perform trouble diagnosis for FUEL INJECTOR, refer to <u>EC-424, "Component Function Check"</u>.



8. CHECK FUEL INJECTOR

- Turn ignition switch OFF.
- 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- 4. Remove fuel tube assembly. Refer to EM-37, "Removal and Installation". Keep fuel hose and all fuel injectors connected to fuel tube.
- 5. Disconnect all ignition coil harness connectors.
- 6. Prepare pans or saucers under each fuel injector.
- 7. Crank engine for about 3 seconds.

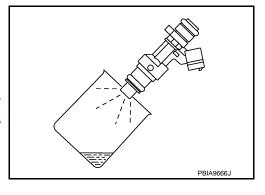
Fuel should be sprayed evenly for each fuel injector.

Is the inspection result normal?

YES >> GO TO 9.

NO >

>> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones. Refer to EM-37, "Removal and Installation".



9. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172	Fuel injection system too rich	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 leaks Incorrect fuel pressure Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

- Clear the mixture ratio self-learning value. Refer to <u>EC-26</u>, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- 2. Start engine.

Is it difficult to start engine?

YES >> GO TO 3.

NO >> GO TO 4.

3. RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.

Crank engine while depressing accelerator pedal.

NOTE:

When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Go to EC-225, "Diagnosis Procedure".

NO >> Check exhaust and intake air leak visually.

f 4.PERFORM DTC CONFIRMATION PROCEDURE-II

- Start engine and let it idle for at least 5 minutes.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-225, "Diagnosis Procedure".

NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE-III

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

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Maintain the following conditions for at least 10 consecutive minutes. Hold the accelerator pedal as steady as possible.

VHCL SPEED SE 50 - 120 km/h (31 - 75 MPH)

CAUTION:

Always drive vehicle at a safe speed.

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-225, "Diagnosis Procedure".

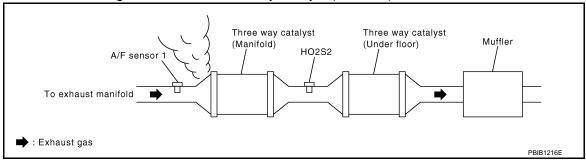
NO >> INSPECTION END

Diagnosis Procedure

1. CHECK EXHAUST GAS LEAK

Start engine and run it at idle.

Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.

NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

>> Repair or replace. YES

NO >> GO TO 3.

3.check a/f sensor 1 input signal circuit

Turn ignition switch OFF.

- 2. Disconnect corresponding A/F sensor 1 harness connector.
- Disconnect ECM harness connector.

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F50	1	F8	49	Existed
1 30	2		53	Laisted

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

A/F sensor 1		Ground	Continuity	
Connector	Terminal	Glound	Continuity	
F50	1	Ground	Not existed	
1 30	2	Ground	Not existed	

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[MR18DE (EXCEPT FOR CALIFORNIA)]

ECM		Ground	Continuity	
Connector	Terminal	Glound	Continuity	
F8	49	Ground	Not existed	
10	53	Giodila	Not existed	

Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

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

4. CHECK FUEL PRESSURE

Check fuel pressure. Refer to <u>EC-485, "Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly". Refer to FL-5, "Exploded View".

NO >> Repair or replace

6. CHECK MASS AIR FLOW SENSOR

(P)With CONSULT

- 1. Install all removed parts.
- Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.
- 3. For specification, refer to EC-489, "Mass Air Flow Sensor".

With GST

- 1. Install all removed parts.
- Check mass air flow sensor signal in "Service \$01" with GST.
- 3. For specification, refer to EC-489, "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-152, "DTC Logic".

7. CHECK FUNCTION OF FUEL INJECTOR

(P)With CONSULT

- Start engine.
- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- 3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT

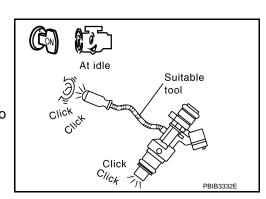
- 1. Let engine idle.
- Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-424, "Component Function Check".



< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

8. CHECK FUEL INJECTOR

1. Remove fuel injector assembly. Refer to EM-37, "Removal and Installation". Keep fuel hose and all fuel injectors connected to fuel tube.

- 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- 4. Disconnect all ignition coil harness connectors.
- 5. Prepare pans or saucers under each fuel injectors.
- 6. Crank engine for about 3 seconds.

Make sure fuel does not drip from fuel injector.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one. Refer to EM-37, "Exploded View".

9. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

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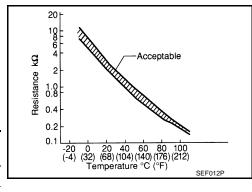
P0181 FTT SENSOR

Description

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

<Reference data>

Fluid temperature [°C (°F)]	Voltage* [V]	Resistance [kΩ]
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90



^{*:} These data are reference values and are measured between ECM terminal 43 (Fuel tank temperature sensor) and ground.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition		Possible cause
		A)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from ECT sensor and intake air temperature sensor.	Harness or connectors (The FTT sensor circuit is open or shorted) FTT sensor Combination meter
P0181	FTT SENSOR [Fuel tank temperature (FTT) sensor circuit range/performance]	B)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor and FTT sensor, CVT fluid temperature sensor) shows that the voltage signal of the FTT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	Harness or connectors (High or low resistance in the FTT sensor circuit) FTT sensor

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 7.

NO >> GO TO 2.

2.PRECONDITIONING

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

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

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-I

- 1. Turn ignition switch ON and wait at least 10 seconds.
- 2. Check 1st trip DTC.

P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Is 1st trip DTC detected?	
YES >> Proceed to <u>EC-230, "Diagnosis Procedure"</u> . NO >> GO TO 4.	Α
4. CHECK ENGINE COOLANT TEMPERATURE	EC
 With CONSULT Select "COOLAN TEMP/S" in "DATA MONITOR" with CONSULT. Check "COOLAN TEMP/S" value. With GST Follow the procedure "With CONSULT" above. 	С
"COOLAN TEMP/S" less than 60°C (140°F)? YES >> INSPECTION END NO >> GO TO 5.	D
5.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-II	Е
 With CONSULT 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 	F
Follow the procedure "With CONSULT" above. Is 1st trip DTC detected?	G
YES >> Proceed to <u>EC-230, "Diagnosis Procedure"</u> . NO >> GO TO 6.	Н
6.PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)	
Perform component function check. Refer to EC-230 , "Component Function Check". NOTE: Use the component function check to check the overall function of the FTT sensor circuit. During this check, a 1st trip DTC might not be confirmed.	I
Is the inspection result normal?	J
YES >> INSPECTION END NO >> Proceed to EC-230, "Diagnosis Procedure".	
7.PRECONDITIONING	K
If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following proce-	
dure before conducting the next test. 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch ON.	L
 3. Turn ignition switch OFF and wait at least 10 seconds. TESTING CONDITION: Before performing the following procedure, do not add fuel. 	M
 Before performing the following procedure, check that fuel level is between 1/4 and 4/4. Before performing the following procedure, confirm that battery voltage is 11 V or more at idle. 	Ν
>> GO TO 8.	
8. PERFORM DTC CONFIRMATION PROCEDURE B	0
 Start engine and let it idle for 60 minutes. Move the vehicle to a cool place. NOTE: 	Р
Cool the vehicle in an environment of ambient air temperature between –10°C (14°F) and 35°C (95°F). 3. Turn ignition switch OFF and soak the vehicle for 12 hours. CAUTION:	'
Never turn ignition switch ON during soaking. NOTE:	
The vehicle must be cooled with the food open.	

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

< DTC/CIRCUIT DIAGNOSIS >

CAUTION:

Never turn ignition switch OFF during idling.

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-230, "Diagnosis Procedure".

NO >> INSPECTION END

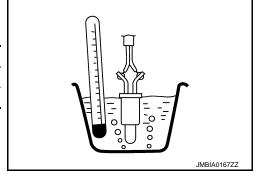
Component Function Check

INFOID:0000000007770079

1. CHECK FUEL TANK TEMPERATURE (FTT) SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect fuel level sensor unit and fuel pump harness connector.
- 3. Remove fuel level sensor unit. Refer to FL-5, "Removal and Installation".
- 4. Check resistance between fuel level sensor unit and fuel pump terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance ($k\Omega$)
4 and 5	Temperature [°C (°F)]	20 (68)	2.3 – 2.7
4 and 5	remperature [C (F)]	50 (122)	0.79 - 0.90



Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to <u>EC-230</u>, "<u>Diagnosis Procedure</u>".

2. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-230, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007770080

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Turn ignition switch ON.
- Check the voltage between "fuel level sensor unit and fuel pump" harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage	
Connector	Terminal	Giodila	voltage	
B40	4	Ground	Approx. 5 V	

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B4, M79
- Harness connectors M77, E105

P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

- · Harness connectors E8, F1
- Harness for open or short between ECM and "fuel level sensor unit and fuel pump"

 \rightarrow Repair open circuit or short to ground or short to power in harness or connector. 4.CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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- Turn ignition switch OFF.
- 2. Disconnect combination meter harness connector.
- Check the continuity between "fuel level sensor unit and fuel pump" harness connector and ECM harness connector.

Fuel level sensor unit and fuel pump		Combination meter		Continuity
Connector	Terminal	Connector	Terminal	Continuity
B40	5	M34	24	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 M79. B4
- Harness for open or short between "fuel level sensor unit and fuel pump" and combination meter

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

6.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-231, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace "fuel level sensor unit and fuel pump". Refer to FL-5, "Exploded View".

.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

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1. CHECK FUEL TANK TEMPERATURE SENSOR

- Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Remove fuel level sensor unit. Refer to FL-5, "Exploded View".
- 4. Check resistance between "fuel level sensor unit and fuel pump" terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance
4 and 5	Temperature [°C (°F)]	20 (68)	2.3 - 2.7 kΩ
4 and 3		50 (122)	0.79 - 0.90 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump". Refer to FL-5, "Exploded View".

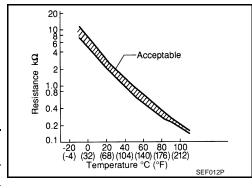
P0182, P0183 FTT SENSOR

Description

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

<Reference data>

Fluid temperature [°C (°F)]	Voltage* [V]	Resistance $[k\Omega]$
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90



^{*:} These data are reference values and are measured between ECM terminal 43 (Fuel tank temperature sensor) and 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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> 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-232, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770084

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Turn ignition switch ON.
- Check the voltage between "fuel level sensor unit and fuel pump" harness connector and ground.

P0182, P0183 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Fuel level sensor unit and fuel pu	ımp			
Connector Terminal	Ground	Voltage		
B40 4	Ground	Approx. 5 V		
s the inspection result norr	nal?			
YES >> GO TO 4. NO >> GO TO 3.				
DETECT MALFUNCTIO	NING PART			
heck the following. Harness connectors B4, I Harness connectors M77	, E105			
Harness connectors E8, F Harness for open or short		d "fuel level sen	sor unit and fue	el pump"
>> Repair open ci	rcuit or short to gro	ound or short to p	oower in harnes	ss or connector.
CHECK FUEL TANK TE	MPERATURE SE	NSOR GROUND	CIRCUIT FO	R OPEN AND SHORT
. Turn ignition switch OF				
 Disconnect combinatio Check the continuity be 			uel numn" harr	ess connector and ECM harness
connector.	AWOON NUCLIEVELS	onioor unit and i	aoi puilip Ilall	1000 CONTROCTOR AND LOW HATHESS
Fuel level sensor unit and fuel pu	ımp Combina	tion meter	Continuity	
Connector Terminal	Connector	Terminal	Containancy	
B40 5	M34	24	Existed	
. Also check harness for	short to ground ar	nd short to powe	er.	
s the inspection result norr	nal?			
YES >> GO TO 6. NO >> GO TO 5.				
D.DETECT MALFUNCTIO	MINO DADT			
	NING PART			
Check the following. Harness connectors M79	R/I			
Harness for open or short		el sensor unit ar	nd fuel pump" a	nd combination meter
·				
>> Repair open cir	rcuit or short to gro	und or short to	power in harne:	ss or connector.
CHECK FUEL TANK TE	MPERATURE SE	NSOR		
efer to EC-233, "Compon	ent Inspection".			
the inspection result norr				
YES >> GO TO 7.				
	evel sensor unit an	d fuel pump". R	efer to <u>FL-5, "E</u>	xploded View".
.CHECK INTERMITTEN	T INCIDENT			
efer to GI-41, "Intermitten	t Incident".			
>> INSPECTION I	END			
Component Inspectio	n			
omponom mopodao				INFOID:0000000007770085
.CHECK FUEL TANK TE		NSOR		INFOID:00000000077770085

Disconnect "fuel level sensor unit and fuel pump" harness connector.
 Remove fuel level sensor unit. Refer to <u>FL-5</u>, "<u>Exploded View</u>".

P0182, P0183 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

4. Check resistance between "fuel level sensor unit and fuel pump" terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance
4 and 5	Temperature [°C (°F)]	20 (68)	2.3 - 2.7 kΩ
4 and 3		50 (122)	0.79 - 0.90 kΩ

Is the inspection result normal?

YES >> INSPECTION END

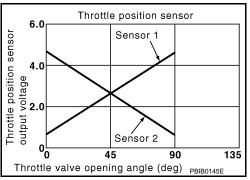
NO >> Replace "fuel level sensor unit and fuel pump". Refer to FL-5, "Exploded View".

P0222, P0223 TP SENSOR

Description INFOID:0000000007770086

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

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



DTC Logic INFOID:0000000007770087

DTC DETECTION LOGIC

NOTE:

If DTC P0222 or P0223 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-250, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	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	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	Electric throttle control actuator (TP sensor 1)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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 let it idle for 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-235, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.check throttle position sensor 1 power supply circuit

- Disconnect electric throttle control actuator harness connector.
- Turn ignition switch ON.

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P0222, P0223 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle	control actuator	Ground	Voltage
Connector Terminal		Glound	voltage
F29	2	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.

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

3.check throttle position sensor 1 ground circuit for open and short

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F29	4	F8	36	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

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

4.CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
F29	1	F8	33	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

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

${f 5}.$ CHECK THROTTLE POSITION SENSOR

Refer to EC-237, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace electric throttle control actuator.
- Perform <u>EC-237</u>, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

P0222, P0223 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Component Inspection

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1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D (CVT) or 1st (M/T) position.
- 6. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage	
Connector	Terminal	Cround	001	Tallott	vollage	
	33 (TP sensor	- Ground			Fully released	More than 0.36V
F8 -	1 signal)		Accelerator	Fully de- pressed	Less than 4.75V	
	34 (TP sensor		Cround	pedal	Fully released	Less than 4.75V
	2 signal)		Fully de- pressed	More than 0.36V		

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.replace electric throttle control actuator

- 1. Replace electric throttle control actuator.
- 2. Perform EC-406, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007770090

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-25, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> END

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crank-shaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

One Trip Detection Logic (Three Way Catalyst Damage)

On the 1st trip, when a misfire condition occurs that can damage the three way catalyst (TWC) due to 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 light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.

A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300	Multiple cylinder misfire detected	Multiple cylinders misfire.	Improper spark plug
P0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	Insufficient compression Incorrect fuel pressure
P0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	The fuel injector circuit is open or shorted
P0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	Fuel injector Intake air leak
P0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	The ignition signal circuit is open or shorted Lack of fuel Signal plate A/F sensor 1 Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Restart engine and let it idle for about 15 minutes.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-239, "Diagnosis Procedure".

NO >> GO TO 3.

3.perform dtc confirmation procedure-ii

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

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.

Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

CAUTION:

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

Engine speed	Engine speed in the freeze frame data $\pm400~\text{rpm}$		
Vehicle speed in the freeze frame data \pm 10 km/h (6 MPH)			
Base fuel schedule	Base fuel schedule in freeze frame data \times (1 \pm 0.1)		
Engine coolant temperature (T)	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).		
condition	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).		

The time to driving varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

Check 1st trip DTC.

Is 1st trip DTC detected?

>> Go to EC-239, "Diagnosis Procedure". YES

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

- Start engine and run it at idle speed.
- Listen for the sound of the intake air leak.
- Check PCV hose connection.

Is intake air leak detected?

YES >> Discover air leak location and repair.

NO >> GO TO 2.

2.check for exhaust system clogging

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 3.

YES-2 >> Without CONSULT: GO TO 4.

NO >> Repair or replace it.

3.PERFORM POWER BALANCE TEST

(I) With CONSULT

- Start engine.
- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- 3. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 9.

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NO >> GO TO 4.

4. CHECK FUNCTION OF FUEL INJECTOR

Start engine and let engine idle.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Listen to each fuel injector operating sound.

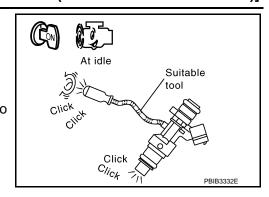
Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to

EC-425. "Component Inspection".



$\mathbf{5}$. CHECK FUNCTION OF IGNITION COIL-I

Do the following procedure in the place where ventilation is good without the combustible.

- Turn ignition switch OFF.
- Remove fuel pump fuse in IPDM E/R to release fuel pressure.

Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

- Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- Turn ignition switch OFF.
- 6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 7. Remove ignition coil and spark plug of the cylinder to be checked.
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- Connect spark plug and harness connector to ignition coil.
- 10. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 -0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal por-

Spark should be generated.

CAUTION:

- During the operation, always stay 0.5 m (19.7 in) away from the spark plug and the ignition coil within. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 6.

6. CHECK FUNCTION OF IGNITION COIL-II

- Turn ignition switch OFF.
- Disconnect spark plug and connect a known-good spark plug.
- Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

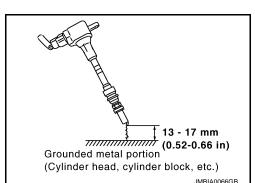
Spark should be generated.

Is the inspection result normal?

YES >> GO TO 7.

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>> Check ignition coil, power transistor and their circuits. Refer to EC-430, "Component Function NO Check".



< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

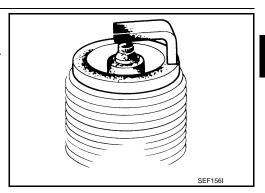
7. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-115, "Spark Plug".

NO >> Repair or clean spark plug. Then GO TO 8.



8. CHECK FUNCTION OF IGNITION COIL-III

Reconnect the initial spark plugs.

2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-115, "Spark Plug".

9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-21, "Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10. CHECK FUEL PRESSURE

Install all removed parts.

Check fuel pressure. Refer to EC-485, "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?

>> Replace "fuel filter and fuel pump assembly". Refer to FL-5, "Exploded View". YES

NO >> Repair or replace.

12.check ignition timing

Check the following items. Refer to EC-19, "BASIC INSPECTION: Special Repair Requirement". For specification, refer to EC-489, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Follow the EC-19, "BASIC INSPECTION: Special Repair Requirement".

13.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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

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A/F se	A/F sensor 1		ECM	
Connector	Terminal	Connector Terminal		Continuity
F50	1	F8	49	Existed
1 30	2	10	53	LAISIEU

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

A/F sensor 1		Ground	Continuity	
Connector	Terminal	Glound	Continuity	
F50	1	Ground	Not existed	
1 30	2	Glound	inot existed	

E	CM	Ground	Continuity	
Connector	Terminal	Glound	Continuity	
F8	49	Ground	Not existed	
10	53	Glound	140t existed	

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 14.

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

14.CHECK A/F SENSOR 1 HEATER

Refer to EC-145, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace A/F sensor 1. Refer to EM-30, "Exploded View".

15. CHECK MASS AIR FLOW SENSOR

(P)With CONSULT

Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.

For specification, refer to EC-489, "Mass Air Flow Sensor".

With GST

Check mass air flow sensor signal in Service \$01 with GST.

For specification, refer to EC-489, "Mass Air Flow Sensor".

Is the measurement value within the specification?

YES >> GO TO 16.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to <u>EC-152</u>, "<u>DTC Logic</u>".

16. CHECK SYMPTOM TABLE

Check items on the rough idle symptom in EC-473, "Symptom Table".

Is the inspection result normal?

YES >> GO TO 17.

NO >> Repair or replace.

17.ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.

Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to <u>EC-114, "On Board Diagnosis Function"</u> or <u>EC-117, "CONSULT Function"</u>.

>> GO TO 18.

P0300, P0301, P0302, P0303, P0304 MISFIRE [MR18DE (EXCEPT FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS >

18.CHECK INTERMITTENT INCIDENT

>> INSPECTION END

Refer to GI-41, "Intermittent Incident".

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P0327, P0328 KS

Description INFOID:000000007770093

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detected condition	Possible cause
P0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The sensor circuit is open or shorted.)
P0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Knock sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and run it for at least 5 seconds at idle speed.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-244, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Knock	sensor	E(CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F12	2	F8	40	Existed

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

Is the inspection result normal?

YES >> GO TO 3.

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

P0327, P0328 KS

[MR18DE (EXCEPT FOR CALIFORNIA)]

${f 3.}$ CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Knock	sensor	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F12	1	F8	37	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

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

4. CHECK KNOCK SENSOR

Refer to EC-245, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace knock sensor. Refer to EM-88, "Exploded View".

5. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK KNOCK SENSOR

- 1. Turn ignition switch OFF.
- 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 Ω .

Terminals	Resistance	
1 and 2	Approx. 532 - 588 kΩ [at 20°C (68°F)]	

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace knock sensor. Refer to EM-88, "Exploded View".

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Description INFOID:0000000007770097

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet and Hall IC.

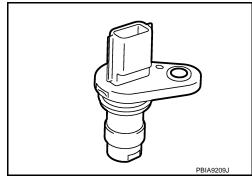
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

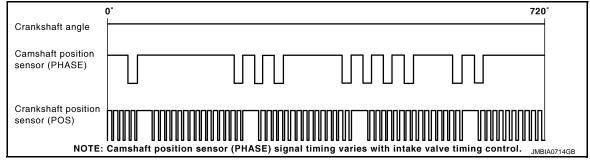
The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

ECM receives the signals as shown in the figure.





DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (POS) circuit	 The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. The crankshaft position sensor (POS) signal is not in the normal pattern during engine running. 	Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Refrigerant pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Battery current sensor circuit is shorted.) Crankshaft position sensor (POS) Refrigerant pressure sensor Accelerator pedal position sensor EVAP control system pressure sensor Signal plate Battery current sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

>> GO TO 2.

[MR18DE (EXCEPT FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS >

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.

Check 1st trip DTC.

Is 1st trip DTC detected?

>> Go to EC-247, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.check crankshaft position (ckp) sensor (pos) power supply circuit-i

- Disconnect crankshaft position (CKP) sensor (POS) harness connector.
- Turn ignition switch ON. 2.
- Check the voltage between CKP sensor (POS) harness connector and ground.

CKP sensor (POS)		Ground	Voltage	
Connector	Terminal	Glound	voltage	
F20	1	Ground	Approx. 5 V	

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 3.

3.CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT-II

- Turn ignition switch ON.
- 2. Disconnect ECM harness connector.
- Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sen	sor (POS)	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F20	1	F8	75	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

f 4.CHECK CKP SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

E	СМ	Sensor		
Connector	Terminal	Name	Connector	Terminal
	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
F8	76	EVAP control system pressure sensor	B21	3
	77	Battery current sensor	F53	1
E16	102	APP sensor	E110	5

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[MR18DE (EXCEPT FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS > 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.

- Buttery current sensor (Refer to EC-355, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-291, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-443, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning components.

6. CHECK APP SENSOR

Refer to EC-399, "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. Perform EC-399, "Special Repair Requirement".

>> INSPECTION END

8.CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sen	sor (POS)	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F20	2	F8	62	Existed

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

Is the inspection result normal?

YES >> GO TO 9.

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

9.CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Disconnect ECM harness connector.
- Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sen	sor (POS)	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F20	3	F8	61	Existed

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

Is the inspection result normal?

YES >> GO TO 10.

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

10. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-249, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace crankshaft position sensor (POS). Refer to EM-88, "Exploded View".

[MR18DE (EXCEPT FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS >

11. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace the signal plate. Refer to <u>EM-88</u>, "<u>Exploded View</u>".

12. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

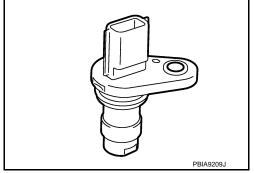
1. CHECK CRANKSHAFT POSITION SENSOR (POS)-I

- 1. Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect crankshaft position sensor (POS) harness connector.
- 4. Remove the sensor. Refer to EM-88, "Exploded View".
- 5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace crankshaft position sensor (POS). Refer to EM-88, "Exploded View".



2.CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as per the following.

Terminals (Polarity)	Resistance [Ω at 25°C (77°F)]
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or ∞
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace crankshaft position sensor (POS). Refer to EM-88, "Exploded View".

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P0340 CMP SENSOR (PHASE)

Description INFOID:0000000007770101

The camshaft position sensor (PHASE) senses the retraction of camshaft (INT) to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.

When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

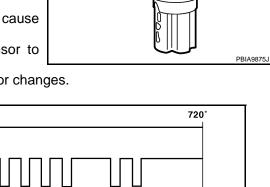
The sensor consists of a permanent magnet and Hall IC.

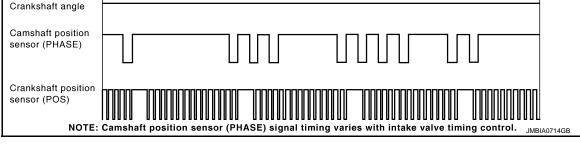
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

ECM receives the signals as shown in the figure.





DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0340 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-333, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340	Camshaft position sensor (PHASE) circuit	 The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. The cylinder No. signal is not sent to ECM during engine running. The cylinder No. signal is not in the normal pattern during engine running. 	 Harness or connectors (The sensor circuit is open or shorted) Camshaft position sensor (PHASE) Camshaft (INT) Starter motor Starting system circuit Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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.
- Check 1st trip DTC.

P0340 CMP SENSOR (PHASE)

[MR18DE (EXCEPT FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS > Is 1st trip DTC detected? Α YES >> Go to EC-251, "Diagnosis Procedure". >> GO TO 3. NO 3.perform dtc confirmation procedure-i EC Maintaining engine speed at more than 800 rpm for at least 5 seconds. 2. Check 1st trip DTC. Is 1st trip DTC detected? YES >> Go to EC-251, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure D INFOID:0000000007770103 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 STR-2, "Work Flow".). 2.check ground connection Turn ignition switch OFF. Check ground connection E38. Refer to GI-44, "Circuit Inspection". Is the inspection result normal? YES >> GO TO 3. NO >> Repair or replace ground connection. 3.check camshaft position (cmp) sensor (phase) power supply circuit Disconnect camshaft position (CMP) sensor (PHASE) harness connector. Turn ignition switch ON. 2. 3. Check the voltage between CMP sensor (PHASE) harness connector and ground. CMP sensor (PHASE) Ground Voltage Connector Terminal F26 Ground Approx. 5 V Is the inspection result normal? YES >> GO TO 4. >> Repair open circuit or short to ground or short to power in harness or connectors. NO $oldsymbol{4}.$ CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT Turn ignition switch OFF. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector. N

CMP sens	or (PHASE)	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F26	2	F8	63	Existed

Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

${f 5.}$ CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Disconnect ECM harness connector.
- Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

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< DTC/CIRCUIT DIAGNOSIS >

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F26	3	F8	65	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

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

6.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-252, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace camshaft position sensor (PHASE). Refer to EM-55, "Exploded View".

7.CHECK CAMSHAFT (INT)

Check the following.

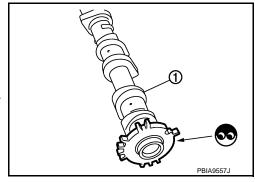
- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end

Is the inspection result normal?

YES >> GO TO 8.

NO

>> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-56, "Removal and Installation".



8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

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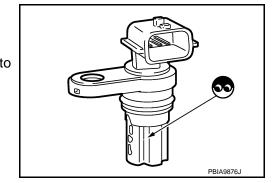
1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

- Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect camshaft position sensor (PHASE) harness connector.
- 4. Remove the sensor. Refer to EM-55, "Exploded View".
- Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace camshaft position sensor (PHASE). Refer to <u>EM-55, "Exploded View"</u>.



2. CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check resistance camshaft position sensor (PHASE) terminals as per the following.

P0340 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

[MR18DÉ (EXCEPT FOR CALIFORNIA)]

		1	
	als (Polarity)	Resistance [Ω at 25°C (77°F)]	
1 (-	+) - 2 (-)		_
1 (+) - 3 (-)	Except 0 or ∞	E
2 (-	+) - 3 (-)		
s the inspecti	ion result normal	?	
YES >> IN	NSPECTION EN	D (5).14.05) 5 ((
NO >> R	eplace camshaft	t position sensor (PHASE). Ref	er to <u>EM-55, "Exploded View"</u> .
			1

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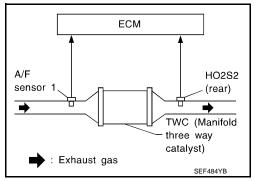
DTC Logic

DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2.

A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.

When the frequency ratio of A/F sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420	Catalyst system efficiency below threshold	Three way catalyst (manifold) does not operate properly. Three way catalyst (manifold) does not have enough oxygen storage capacity.	Three way catalyst (manifold) Exhaust tube Intake air leaks Fuel injector Fuel injector leaks Spark plug Improper ignition timing

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 7.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Do not hold engine speed for more than the specified minutes below.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

(P)With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Make sure 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).
- Open engine hood.
- 8. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT.
- Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
- 10. Check the indication of "CATALYST".

Which is displayed on CONSULT screen?

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

CMPLT>> GO TO 6. INCMP >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

Wait 5 seconds at idle.

2. Rev engine up to 2,000 to 3,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take approximately 5 minutes).

Does the indication change to "CMPLT"?

YES >> GO TO 6. NO >> GO TO 5.

${f 5.}$ PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- Stop engine and cool it down to less than 70°C (158°F).
- Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3

O.PERFORM DTC CONFIRMATION PROCEDURE-III

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-255, "Diagnosis Procedure".

NO >> INSPECTION END

7 .PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-255, "Component Function Check".

NOTE:

Use component function check to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-255, "Diagnosis Procedure".

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK

WWithout CONSULT

- 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.
- Open engine hood. 5.
- Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal	Glound	Condition	vollage
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at 2,500 rpm constant under no load	The voltage fluctuation cycle takes more than 5 seconds. 1 cycle: 0.6 - $1.0 \rightarrow 0$ - $0.3 \rightarrow 0.6$ - 1.0

Is the inspection result normal?

YES >> INSPECTION END

>> Go to EC-255, "Diagnosis Procedure". NO

Diagnosis Procedure

1. CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dent.

EC-255 Revision: 2011 November 2012 CUBE

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

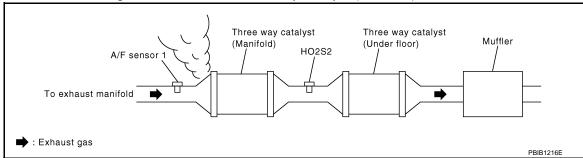
Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

2. CHECK EXHAUST GAS LEAK

- Start engine and run it at idle.
- Listen for an exhaust gas leak before the three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.

NO >> GO TO 3.

3. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 4.

4. CHECK IDLE SPEED AND IGNITION TIMING

For procedure, refer to EC-23, "IGNITION TIMING: Special Repair Requirement".

For specification, refer to EC-489, "Idle Speed" and EC-489, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Follow the instruction of EC-19, "BASIC INSPECTION: Special Repair Requirement".

5. CHECK FUEL INJECTOR

- Stop engine and then turn ignition switch ON.
- 2. Check the voltage between ECM harness connector and ground.

E	CM	Ground	Voltage	
Connector Terminal		Glound	voltage	
	25	Ground	Battery voltage	
F7	29			
ГΙ	30			
	31			

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform <u>EC-424</u>, "<u>Diagnosis Procedure</u>".

6.CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

- Turn ignition switch OFF.
- 2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

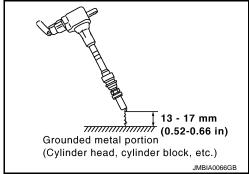
NOTE:

Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

- 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 (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- During the operation, always stay 0.5 m (19.7 in) away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.
 NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 7.

7.CHECK FUNCTION OF IGNITION COIL-II

- Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a known-good spark plug.
- 3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Check ignition coil, power transistor and their circuits. Refer to EC-430, "Diagnosis Procedure".

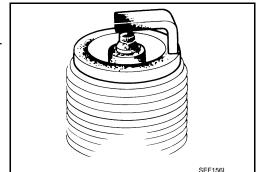
8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-115, "Spark Plug".

NO >> Repair or clean spark plug. Then GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

- Reconnect the initial spark plugs.
- Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-115, "Spark Plug"</u>.

10. CHECK FUEL INJECTOR

- 1. Turn ignition switch OFF. Refer to EM-37, "Removal and Installation".
- Remove fuel injector assembly. Refer to <u>EM-37</u>. "<u>Exploded View</u>".
 Keep fuel hose and all fuel injectors connected to fuel tube.
- 3. Disconnect all ignition coil harness connectors.
- 4. Reconnect all fuel injector harness connectors disconnected.
- 5. Turn ignition switch ON.

Does fuel drip from fuel injector?

YES >> GO TO 11.

NO >> Replace the fuel injector(s) from which fuel is dripping. Refer to EM-37, "Exploded View".

11. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

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

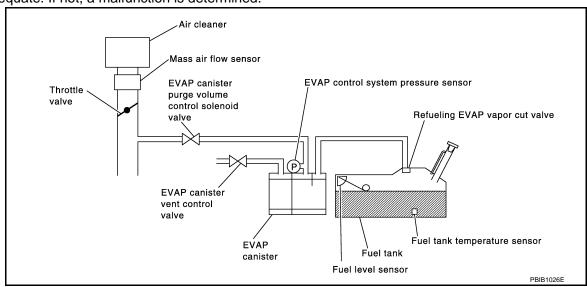
DTC DETECTION LOGIC

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 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 Drain filter

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 6.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

(P)With CONSULT

- 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 70 seconds.
- Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CON-SULT.
- 5. Touch "START".

Is COMPLETED displayed on CONSULT screen?

YES >> GO TO 5.

NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Selector lever	Suitable position	
VHCL SPEED SE	32 - 120 km/h (20 - 75 mph)	
ENG SPEED	500 - 3,800 rpm	
B/FUEL SCHDL	1.0 - 10.0 msec	
COOLAN TEMP/S	More than 0°C (32°F)	

CAUTION:

Always drive vehicle at a safe speed.

If "TESTING" is not changed for a long time, retry from step 2.

Is "COMPLETED" displayed on CONSULT screen?

YES >> GO TO 5.

NO >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 3.

${f 5}$ PERFORM DTC CONFIRMATION PROCEDURE-II

Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to EC-261, "Diagnosis Procedure".

6.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-260, "Component Function Check".

NOTE:

Use component function check to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-261, "Diagnosis Procedure".

Component Function Check

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1. PERFORM COMPONENT FUNCTION CHECK

⋈Without CONSULT

- 1. Lift up drive wheels.
- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and wait at least 70 seconds.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

5. Set voltmeter probes to ECM harness connector and ground.

	Ground		
Connector	Connector Terminal		
F8	42 (EVAP control system pressure sensor signal)	Ground	

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- Check EVAP control system pressure sensor value at idle speed and note it.
- 7. 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	Any position other than P, N or R

8. 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-261, "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: GO TO 2.

YES-2 >> Without CONSULT: GO TO 3.

NO >> Replace EVAP canister. Refer to FL-14, "Removal and Installation".

2.CHECK PURGE FLOW

(P)With CONSULT

- 1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-87, "System <a href="Description".
- 2. Start engine and let it idle.
- 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT.
- 4. Rev engine up to 2,000 rpm.
- 5. Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL C/V" opening and check vacuum existence.

PURG VOL C/V	Vacuum
100%	Existed
0%	Not existed

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 4.

3. CHECK PURGE FLOW

⋈ Without CONSULT

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

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-87, "System Description".
- Start engine and let it idle.

Do not depress accelerator pedal even slightly.

5. Check vacuum gauge indication before 60 seconds passed after starting engine.

Vacuum should not exist.

6. Revving engine up to 2,000rpm after 100 seconds passed after starting engine.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 4.

4. CHECK EVAP PURGE LINE

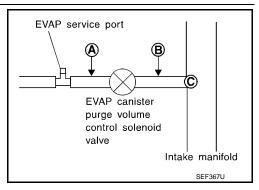
- 1. Turn ignition switch OFF.
- 2. Check EVAP purge line for improper connection or disconnection. Refer to <u>EC-87</u>, "System Description".

Is the inspection result normal?

YES >> GO TO 5. NO >> Repair it.

${f 5.}$ CHECK EVAP PURGE HOSE AND PURGE PORT

- Disconnect purge hoses connected to EVAP service port A and EVAP canister purge volume control solenoid valve B.
- 2. Blow air into each hose and EVAP purge port C.

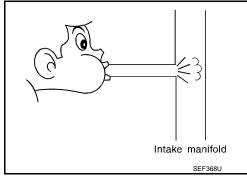


3. Check that air flows freely.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 6. YES-2 >> Without CONSULT: GO TO 7.

NO >> Repair or clean hoses and/or purge port.



6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

(P)With CONSULT

- Start engine.
- 2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 7.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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7.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	Λ
Refer to EC-275, "Component Inspection".	A
Is the inspection result normal?	
YES >> GO TO 8. NO >> Replace EVAP canister purge volume control solenoid valve.	EC
8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
Disconnect EVAP control system pressure sensor harness connector.	— С
 Check connectors for water. 	
Water should not exist.	D
Is the inspection result normal?	
YES >> GO TO 9.	E
NO >> Replace EVAP control system pressure sensor.	
9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
Refer to EC-292, "DTC Logic" for DTC P0452, EC-297, "DTC Logic" for DTC P0453.	F
Is the inspection result normal?	
YES >> GO TO 10. NO >> Replace EVAP control system pressure sensor.	G
10. CHECK RUBBER TUBE FOR CLOGGING	
Disconnect rubber tube connected to EVAP canister vent control valve.	— Н
Check the rubber tube for clogging. Is the inspection result normal?	
YES >> GO TO 11.	
NO >> Clean the rubber tube using an air blower.	I
11.CHECK DRAIN FILTER	
Refer to EC-264, "Component Inspection (Drain filter)".	J
Is the inspection result normal?	
YES >> GO TO 12. NO >> Replace drain filter.	K
12. CHECK EVAP CANISTER VENT CONTROL VALVE	
Refer to EC-282, "Component Inspection".	L
Is the inspection result normal?	
YES >> GO TO 13. NO >> Replace EVAP canister vent control valve.	M
13. CHECK EVAP PURGE LINE	IVI
Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.	
Refer to EC-487, "Inspection".	N
Is the inspection result normal?	
YES >> GO TO 14. NO >> Replace it.	0
14.CLEAN EVAP PURGE LINE	
Clean EVAP purge line (pipe and rubber tube) using air blower.	P
00 T0 45	
>> GO TO 15. 15. CHECK INTERMITTENT INCIDENT	
Refer to GI-41, "Intermittent Incident".	

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

>> INSPECTION END

Component Inspection (Drain filter)

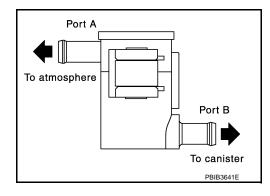
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1. CHECK DRAIN FILTER

- 1. Check visually for insect nests in the drain filter air inlet.
- 2. Check visually for cracks or flaws in the appearance.
- 3. Check visually for cracks or flaws in the hose.
- 4. Blow air into port A and check that it flows freely out of port B.
- 5. Block port B.
- 6. Blow air into port A and check that there is no leakage.

Is the inspection result normal?

YES >> INSPECTION END NO >> Replace drain filter.



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P0442 EVAP CONTROL SYSTEM

DTC Logic

DTC DETECTION LOGIC

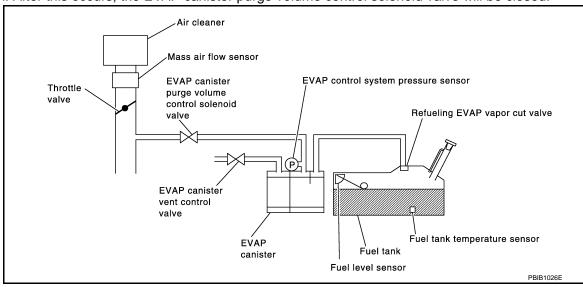
NOTE:

If DTC P0442 is displayed with DTC P0456, first perform the trouble diagnosis for DTC P0456. Refer to <u>EC-309</u>, "DTC Logic".

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 small le	ak detected co	VAP control system has a leak, EVAP ontrol system does not operate prop- ly.	Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Fuel filler cap remains open or fails to close. Foreign matter caught in fuel filler cap. Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. Foreign matter caught in EVAP canister vent control valve. EVAP canister or fuel tank leaks EVAP purge line (pipe and rubber tube) leaks EVAP purge line rubber tube bent Loose or disconnected rubber tube EVAP canister vent control valve and the circuit EVAP canister purge volume control solenoid valve and the circuit Fuel tank temperature sensor O-ring of EVAP canister vent control valve is missing or damaged EVAP canister is saturated with water EVAP control system pressure sensor Fuel level sensor and the circuit Refueling EVAP vapor cut valve ORVR system leaks Drain filter

CAUTION:

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Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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:

- Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Always perform test at a temperature of 0 to 30°C (32 to 86°F).

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

Do you have CONSULT?

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

2. PERFORM DTC CONFIRMATION PROCEDURE

(I) With CONSULT

- 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.
- 4. Make sure that the following conditions are met.

COOLAN TEMP/S: 0 - 70°C (32 - 158°F)

INT/A TEMP SE: 0 - 30°C (32 - 86°F)

 Select "EVP V/S LEAK P0456/P1456" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.

Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT screen, go to <u>EC-19</u>, "BASIC INSPECTION: Special Repair Requirement".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to EC-266, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

With GST

NOTE:

Be sure to read the explanation of DRIVING PATTERN in <u>EC-29</u>, "<u>SRT Set Driving Pattern</u>" before driving vehicle.

- 1. Start engine.
- Drive vehicle according to DRIVING PATTERN.
- Stop vehicle.
- 4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- Select Service \$07 with GST.

Is 1st trip DTC displayed?

YES-1 >> P0441: Go to <u>EC-261</u>, "<u>Diagnosis Procedure</u>". YES-2 >> P0442: Go to <u>EC-266</u>, "<u>Diagnosis Procedure</u>". NO >> INSPECTION END

Diagnosis Procedure

1. CHECK FUEL FILLER CAP DESIGN

Turn ignition switch OFF.

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< DTC/CIRCUIT DIAGNOSIS >

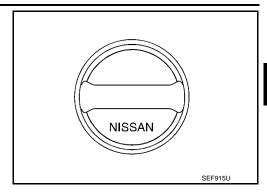
[MR18DE (EXCEPT FOR CALIFORNIA)]

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. Then retighten until ratcheting sound is heard.

3.CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

f 4.CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-270, "Component Inspection (Fuel filler cap)".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel filler cap with a genuine one.

CHECK FOR EVAP LEAK

Refer to EC-487, "Inspection".

Is there any leak in EVAP line?

YES >> Repair or replace.

NO >> GO TO 6.

6.CHECK DRAIN FILTER

Refer to EC-270, "Component Inspection (Drain filter)".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace drain filter.

.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

 EVAP canister vent control valve is installed properly. Refer to FL-14, "Exploded View".

EVAP canister vent control valve.

Refer to EC-282, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace EVAP canister vent control valve and O-ring.

8.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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< DTC/CIRCUIT DIAGNOSIS >

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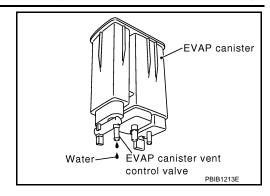
2. Does water drain from the EVAP canister?

Does water drain from the EVAP canister?

YES >> GO TO 9.

NO-1 >> With CONSULT: GO TO 11.

NO-2 >> Without CONSULT: GO TO 12.



9. 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 1.9 kg (4.2 lb).

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 11.

YES-2 >> Without CONSULT: GO TO 12.

NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-14, "Exploded View".

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

(P)With CONSULT

- 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 2. Start engine.
- 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
- 4. Touch "Qu" on CONSULT screen to increase "PURG VOL C/V" opening to 100%.
- 5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 13.

12. Check evap canister purge volume control solenoid valve operation

⋈Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Stop engine.
- 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 4. Start engine and let it idle for at least 80 seconds.
- 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 13.

13. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to <u>EC-87</u>, "System Description". Is the inspection result normal?

Revision: 2011 November EC-268 2012 CUBE

< DTC/CIRCUIT DIAGNOSIS >	[MR18DE (EXCEPT FOR CALIFORNIA)]
YES >> GO TO 14. NO >> Repair or reconnect the hose.	,
14. CHECK EVAP CANISTER PURGE VOLUME CONTROL	SOLENOID VALVE
Refer to EC-275. "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 15. NO >> Replace EVAP canister purge volume control sole	anoid valve
15. CHECK FUEL TANK TEMPERATURE SENSOR	shou valve.
Refer to EC-231, "Component Inspection".	1
Is the inspection result normal? YES >> GO TO 16.	
NO >> Replace fuel level sensor unit. Refer to FL-5, "Exp	bloded View".
16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSO	r
Refer to EC-288, "DTC Logic".	
Is the inspection result normal?	F
YES >> GO TO 17.	'
NO >> Replace EVAP control system pressure sensor.	
17. CHECK EVAP PURGE LINE	
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAF	canister) for cracks or improper connection.
Refer to EC-87, "System Description".	
Is the inspection result normal?	ı
YES >> GO TO 18.	
NO >> Repair or reconnect the hose.	
18.clean evap purge line	
Clean EVAP purge line (pipe and rubber tube) using air blowe	
>> GO TO 19.	
19.CHECK EVAP/ORVR LINE	
Check EVAP/ORVR line between EVAP canister and fuel tank nection. For location, refer to EC-436 , "Description".	for clogging, kink, looseness and improper con-
Is the inspection result normal?	I
YES >> GO TO 20.	
NO >> Repair or replace hoses and tubes.	
20. CHECK RECIRCULATION LINE	
Check recirculation line between fuel filler tube and fuel to	ank for clogging, kink, cracks, looseness and
improper connection. Is the inspection result normal?	
YES >> GO TO 21.	
NO >> Repair or replace hose, tube or fuel filler tube.	
21. CHECK REFUELING EVAP VAPOR CUT VALVE	
Refer to EC-439, "Component Inspection (Refueling EVAP var	por cut valve)"
Is the inspection result normal?	<u>por cut valve)</u> .
YES >> GO TO 22.	,
NO >> Replace refueling EVAP vapor cut valve with fuel	tank.
22. CHECK FUEL LEVEL SENSOR	
Refer to MWI-42, "Component Function Check".	
Is the inspection result normal?	
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YES >> GO TO 23.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

NO >> Replace fuel level sensor unit. Refer to FL-5, "Exploded View".

23. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Fuel filler cap)

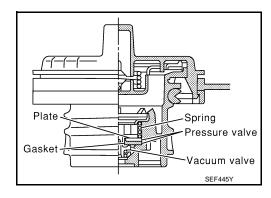
INFOID:0000000007770114

Vacuum/

SEF943S

1. CHECK FUEL FILLER CAP

- 1. Turn ignition switch OFF.
- 2. Remove fuel filler cap.
- 3. Wipe clean valve housing.



-Vacuum/Pressure gauge

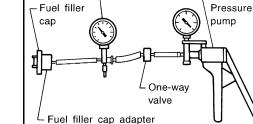
- 4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.
- 5. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22

- 2.90 psi)

Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm²,

-0.87 to -0.48 psi)



Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE FUEL FILLER CAP

Replace fuel filler cap.

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 Inspection (Drain filter)

INFOID:0000000007770115

1. CHECK DRAIN FILTER

- 1. Check visually for insect nests in the drain filter air inlet.
- 2. Check visually for cracks or flaws in the appearance.
- 3. Check visually for cracks or flaws in the hose.

< DTC/CIRCUIT DIAGNOSIS >

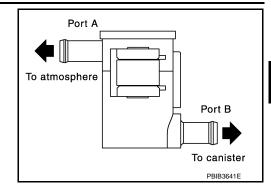
[MR18DE (EXCEPT FOR CALIFORNIA)]

- 4. Blow air into port A and check that it flows freely out of port B.
- 5. Block port B.
- 6. Blow air into port A and check that there is no leakage.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace drain filter.



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P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

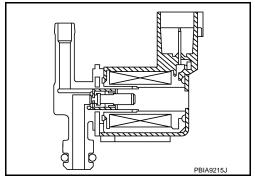
< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description INFOID:000000007770116

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:0000000007770117

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0443	EVAP canister purge volume control solenoid	Α	The canister purge flow is detected during the vehicle is stopped while the engine is running, even when EVAP canister purge volume control solenoid valve is completely closed.	 EVAP control system pressure sensor EVAP canister purge volume control solenoid valve (The valve is stuck open.) EVAP canister vent control valve
	valve	В	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 Hoses (Hoses are connected incorrectly or clogged.)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- Perform DTC CONFIRMATION PROCEDURE when the fuel is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Always perform test at a temperature of 5 to 60°C (41 to 140°F).
- Cool the vehicle so that engine coolant temperature becomes same level as ambient temperature.

Do you have CONSULT

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

2.PERFORM DTC CONFIRMATION PROCEDURE A

(I) With CONSULT

- 1. Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT.
- 3. Check that the following condition are met. FUEL T/TMP SE: 0 35°C (32 95°F)
- 4. Start engine and wait at least 60 seconds.
- 5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-273, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE B

(I) With CONSULT

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [MR18DE (EXCEPT FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS >

l	Start engine	and warm it u	in to normal	lonerating	temperature
٠.	Start Griging	and wann it t	וווטוווטו טו ענ	Detailing	temperature.

- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
- Touch "START".
- Start engine and let it idle until "TESTING" on CONSULT changes to "COMPLETED". (It will take approximately 10 seconds.)

If "TESTING" is not displayed after 5 minutes, retry from step 2.

Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT?

OK >> INSPECTION END

NG >> Go to EC-273, "Diagnosis Procedure".

f 4.PERFORM DTC CONFIRMATION PROCEDURE A

■With GST

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

	ECM	Ground	Voltage (V)
Connector	Connector Terminal		voltage (v)
F8	43 (Fuel tank temperature sensor signal)	Ground	3.1 - 4.0

- Start engine and wait at least 60 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-273, "Diagnosis Procedure".

NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE

■With GST

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and let it idle for at least 20 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

>> Go to EC-273, "Diagnosis Procedure". YES

NO >> INSPECTION END

Diagnosis Procedure

${f 1}$.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect EVAP canister purge volume control solenoid valve harness connector. 2.
- Turn ignition switch ON.
- 4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

•	rge volume control id valve	Ground	Voltage
Connector	Terminal		
F32	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

EC-273 Revision: 2011 November 2012 CUBE

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P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [MR18DE (EXCEPT FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS >

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- IPDM E/R harness connector E14
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- · Harness for open or short between EVAP canister purge volume control solenoid valve and ECM
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

3.check evap canister purge volume control solenoid valve output signal circuit FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volume control solenoid valve		E	Continuity	
Connector	Terminal	Connector	Terminal	
F32	2	F7	9	Existed

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

Is the inspection result normal?

YFS >> GO TO 4.

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

4.CHECK 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 5.

>> Replace EVAP control system pressure sensor. NO

${f 5.}$ CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-291, "Component Inspection".

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 6.

YES-2 >> Without CONSULT: GO TO 7.

>> Replace EVAP control system pressure sensor.

6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

(P)With CONSULT

- Turn ignition switch OFF.
- Reconnect harness connectors disconnected.
- Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 7.

.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-275, "Component Inspection".

Is the inspection result normal?

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [MR18DE (EXCEPT FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS >

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.
- 2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Clean the rubber tube using an air blower.

9. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-282, "Component Inspection".

Is the inspection result normal?

>> GO TO 10. YES

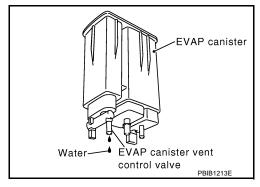
NO >> Replace EVAP canister vent control valve.

10.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- Check if water will drain from EVAP canister.

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 1.9 kg (4.2 lb).

Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-14, "Exploded View".

13. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

(P)With CONSULT

- Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.

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EC-275 Revision: 2011 November 2012 CUBE

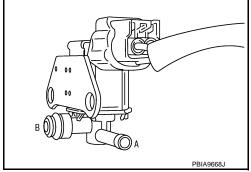
P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

- 4. Turn ignition switch ON.
- 5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT.
- Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

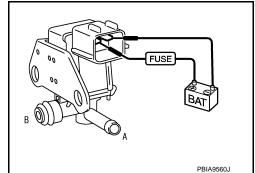
Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)	
100%	Existed	
0%	Not existed	



Without CONSULT

- Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 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

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID **VALVE**

< DTC/CIRCUIT DIAGNOSIS >

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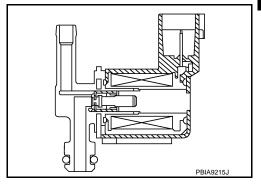
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INFOID:0000000007770122

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description INFOID:0000000007770120

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:0000000007770121

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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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

>> GO TO 2.

2.perform dtc confirmation procedure

- Start engine and let it idle for at least 13 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-277, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.

- Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

Disconnect EVAP canister purge volume control solenoid valve harness connector. Turn ignition switch ON.

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P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID **VALVE**

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

•	rge volume control id valve	Ground	Voltage
Connector	Terminal		
F32	1	Ground	Battery voltage

Is the inspection result normal?

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

2.DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R harness connector E14
- Harness connectors E8. F1
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volume control solenoid valve		E	Continuity	
Connector	Terminal	Connector	Terminal	
F32	2	F7	9	Existed

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

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 4.

YES-2 >> Without CONSULT: GO TO 5.

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

f 4.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

(P)With CONSULT

- Reconnect all harness connectors disconnected.
- Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

f 5.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-279, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace EVAP canister purge volume control solenoid valve.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID **VALVE**

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Component Inspection

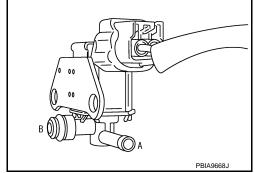
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1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

(P)With CONSULT

- Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- Turn ignition switch ON.
- Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT.
- Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

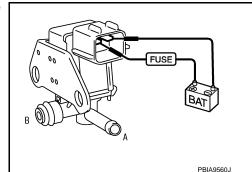
Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



⋈Without CONSULT

- Turn ignition switch OFF.
- Disconnect EVAP canister purge volume control solenoid valve harness connector. 2.
- Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 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

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[MR18DE (EXCEPT FOR CALIFORNIA)]

P0447 EVAP CANISTER VENT CONTROL VALVE

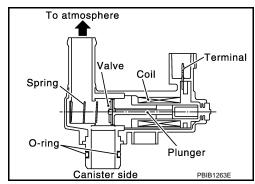
Description INFOID:000000007770124

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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and wait at least 8 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-280, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770126

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

(P)With CONSULT

- 1. Turn ignition switch OFF and then turn ON.
- Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT.
- 3. Touch "ON/OFF" on CONSULT screen.
- 4. Check for operating sound of the valve.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Clicking sound should be heard. Α Is the inspection result normal? >> GO TO 7. YES EC NO >> GO TO 3. ${f 3.}$ CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT 1. Turn ignition switch OFF. Disconnect EVAP canister vent control valve harness connector. 2. Turn ignition switch ON. Check the voltage between EVAP canister vent control valve harness connector and ground. D EVAP canister vent control valve Ground Voltage Connector Terminal Е B20 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 E8, F1 Harness connectors E105, M77 Harness connectors B1. M18 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. Disconnect ECM harness connector. 3. Check the continuity between EVAP canister vent control valve harness connector and ECM harness connector. **ECM** EVAP canister vent control valve Continuity Connector **Terminal** Connector **Terminal** F7 B20 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. N $\mathbf{6}.$ DETECT MALFUNCTIONING PART Check the following. Junction block connector E8. F1 Harness connectors E105, M77 Harness connectors M79, B4 Harness for open or short between EVAP canister vent control valve and ECM Р

7.CHECK RUBBER TUBE FOR CLOGGING

- 1. Disconnect rubber tube connected to EVAP canister vent control valve.
- Check the rubber tube for clogging.

Is the inspection result normal?

Revision: 2011 November EC-281 2012 CUBE

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

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

YES >> GO TO 8.

NO >> Clean the rubber tube using an air blower.

8.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-282, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP canister vent control valve.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770127

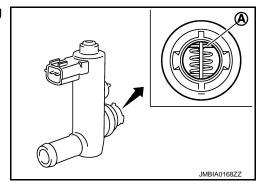
1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister.
- Check portion (A) of EVAP canister vent control valve for being rusted.

Is it rusted?

YES >> Replace EVAP canister vent control valve.

NO >> GO TO 2.



2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

(F) With CONSULT

- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 4. Check air passage continuity and operation delay time.

Make sure new O-ring is installed properly.

VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

♥Without CONSULT

Check air passage continuity and operation delay time under the following conditions.

Make sure new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

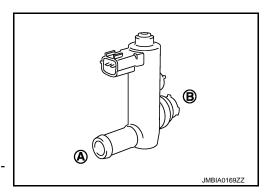
Operation takes less than 1 second.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace EVAP canister vent control valve.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

3. CHECK EVAP CANISTER VENT CONTROL VALVE-III

(P)With CONSULT

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- Check air passage continuity and operation delay time.
 Make sure new O-ring is installed properly.

VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

⋈Without CONSULT

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Check air passage continuity and operation delay time under the following conditions.

Make sure new O-ring is installed properly.

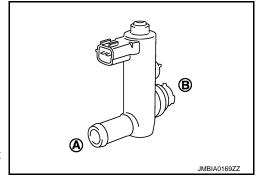
Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve.



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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P0448 EVAP CANISTER VENT CONTROL VALVE

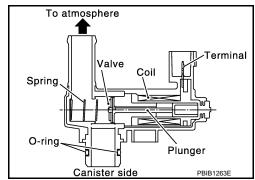
Description INFOID:000000007770128

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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- 1. Turn ignition switch ON and wait at least 5 seconds.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 4. Start engine and let it idle for at least 1 minute.
- 5. Repeat next procedures three times.
- Increase the engine speed up to 3,000 to 3,500 rpm and keep it for 2 minutes and 50 seconds to 3 minutes.

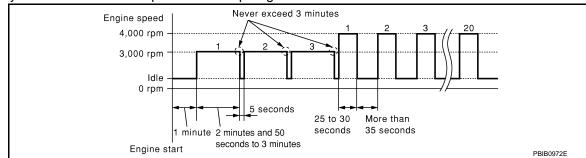
Never exceed 3 minutes.

- Fully released accelerator pedal and keep engine idle for about 5 seconds.
- 6. Repeat next procedure 20 times.
- Quickly increase the engine speed up to 4,000 to 4,500 rpm or more and keep it for 25 to 30 seconds.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Fully released accelerator pedal and keep engine idle for at least 35 seconds.



7. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-285, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK RUBBER TUBE

- Turn ignition switch OFF.
- Disconnect rubber tube connected to EVAP canister vent control valve.
- Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Clean rubber tube using an air blower.

2.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-286, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace EVAP canister vent control valve.

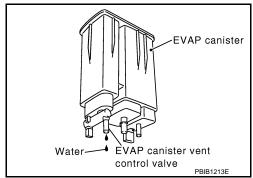
${f 3.}$ CHECK IF EVAP CANISTER IS SATURATED WITH WATER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- Check if water will drain from the EVAP canister.

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 1.9 kg (4.2 lb).

Is the inspection result normal?

YES >> GO TO 6.

>> GO TO 5. NO

${f 5.}$ DETECT MALFUNCTIONING PART

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-14, "Exploded View".

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-291, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP control system pressure sensor.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770131

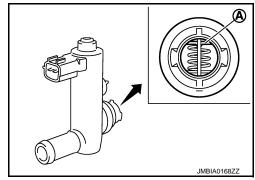
1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister.
- 3. Check portion (A) of EVAP canister vent control valve for being rusted.

Is it rusted?

YES >> Replace EVAP canister vent control valve.

NO >> GO TO 2.



2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

(P)With CONSULT

- 1. Reconnect harness connectors disconnected.
- Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

4. Check air passage continuity and operation delay time.

Make sure new O-ring is installed properly.

VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

⋈Without CONSULT

Check air passage continuity and operation delay time under the following conditions.

Make sure new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace EVAP canister vent control valve.

3.CHECK EVAP CANISTER VENT CONTROL VALVE-III

(P)With CONSULT

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 3. Check air passage continuity and operation delay time.

Make sure new O-ring is installed properly.

VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

⋈Without CONSULT

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- Check air passage continuity and operation delay time under the following conditions.

Make sure new O-ring is installed properly.

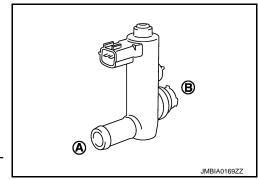
Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve.



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P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

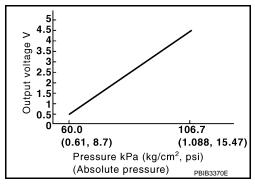
< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description INFOID:0000000007770132

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:0000000007770133

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 sensor (POS) circuit is shorted.] (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Battery current sensor circuit is shorted.) EVAP control system pressure sensor Crankshaft position sensor (POS) Accelerator pedal position sensor Refrigerant pressure sensor Battery current sensor

DTC CONFIRMATION PROCEDURE

Never remove fuel filler cap during DTC confirmation procedure.

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

(P)With CONSULT>>GO TO 2.

®Without CONSULT>>GO TO 5.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

(P)With CONSULT

Start engine and let it idle for least 40 seconds.

NOTE:

Do not depress accelerator pedal even slightly.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-289, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

 With CONSULT Select "EVAP DIAG READY" in "DATA MONITOR" mode o Let it idle until "OFF" of "EVAP DIAG READY" changes to " 	
NOTE: It will take at most 2 hours until "OFF" of "EVAP DIAG 3. Turn ignition switch OFF and wait at least 90 minutes. NOTE:	READY" changes to "ON".
Never turn ignition switch ON during 90 minutes. 4. Turn ignition switch ON. 5. Select "EVAP LEAK DIAG" in "DATA MONITOR" mode of " 6. Check that "EVAP LEAK DIAG" indication.	ENGINE".
Which is displayed on CONSULT? CMPLT>> GO TO 4. YET >> 1. Perform DTC CONFIRMATION PROCEDURE	again
2. GO TO 1. 4. PERFORM DTC CONFIRMATION PROCEDURE-3	agaii.
With CONSULT	
Check 1st trip DTC.	
Is 1st trip DTC detected? YES >> Proceed to EC-289, "Diagnosis Procedure". NO >> INSPECTION END	
5. PERFORM DTC CONFIRMATION PROCEDURE-4	
 With GST Start engine and let it idle for least 40 seconds. NOTE: Do not depress accelerator pedal even slightly. Check 1st trip DTC. 	
Is 1st trip DTC detected? YES >> Proceed to EC-289, "Diagnosis Procedure". NO >> GO TO 6.	
6.PERFORM DTC CONFIRMATION PROCEDURE-5	
 With GST Let it idle for at least 2 hours. Turn ignition switch OFF and wait at least 90 minutes. NOTE: Never turn ignition switch ON during 90 minutes. 	
3. Turn ignition switch ON.4. Check 1st trip DTC.	
Is 1st trip DTC detected? YES >> Proceed to EC-289, "Diagnosis Procedure". NO >> INSPECTION END	
Diagnosis Procedure	INFOID:000000007770134
1. CHECK GROUND CONNECTION	
Turn ignition switch OFF.	
2. Check ground connection E38. Refer to GI-44, "Circuit Inspection result normal?	Dection".
•	
YES >> GO TO 2.	
YES >> GO TO 2. NO >> Repair or replace ground connection. 2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	

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2. Check sensor harness connector for water.

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR [MR18DE (EXCEPT FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS >

Water should not exist.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness connector.

${f 3.}$ CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

- Turn ignition switch ON.
- 2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

•	tem pressure sen- or	Ground	Voltage
Connector	Terminal		
B21	3	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 4.

4. CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

E	СМ	Sensor		
Connector	Terminal	Name	Connector	Terminal
	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
F8	76	EVAP control system pressure sensor	B21	3
	77	Battery current sensor	F53	1
E16	102	APP sensor	E110	5

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.

- Battery current sensor (Refer to EC-355, "Component Inspection".)
- Crankshaft position sensor (POS) (Refer to EC-249, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-443, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to EC-399, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly
- Perform <u>EC-399</u>, "Special Repair Requirement".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-291, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP control system pressure sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

- Turn ignition switch OFF.
- 2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. Always replace O-ring with a new one.
- 3. Install a vacuum pump to EVAP control system pressure sensor.
- 4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

	ECM	Condition	Voltage
Connector	Terminal	[Applied vacuum kPa (kg/cm², psi)	voltage
	42	Not applied	1.8 - 4.8 V
F8	(EVAP control system pressure sensor signal)	-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 below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/ cm², 14.69 psi).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP control system pressure sensor

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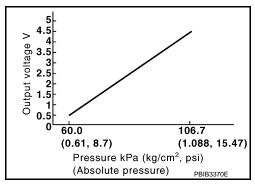
< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description INFOID:000000007770136

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



INFOID:0000000007770137

DTC Logic

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 sensor (POS) circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Battery current sensor circuit is shorted.) EVAP control system pressure sensor Crankshaft position sensor (POS) Accelerator pedal position sensor Refrigerant pressure sensor Battery current sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Select "DATA MONITOR" mode with CONSULT.
- 5. Make sure 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.

- 1. Start engine and warm it up to normal operating temperature.
- Set voltmeter probes to ECM harness connector and ground as per the following.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

	EC	• • • • • • • • • • • • • • • • • • • •			
Connector		Terminal		Ground	
Connector					-
F8	(Fuel tank	43 temperature sens	sor signal)	Ground	
. Turn ignition	that the voltage n switch OFF ar e and wait at lea rip DTC.	nd wait at least	10 seconds.		•
	detected? to <u>EC-293, "Dia</u> PECTION END		l <u>ure"</u> .		
iagnosis P	rocedure				INFOID:0000000007770138
.CHECK GRO	OUND CONNEC	CTION			
	n switch OFF.				
_	ınd connection l n result normal?		GI-44, "Circuit In	spection".	
YES >> GO	TO 2.	•			
	pair or replace g	round connect	ion.		
CHECK CON					
	EVAP control s sor harness con		e sensor harnes er.	s connector.	
Water	hould not exis	•			
	nould not exis				
YES >> GO		•			
	pair or replace h				
3. CHECK EVA	AP CONTROL S	YSTEM PRES	SURE SENSOR	R POWER SUF	PPLY CIRCUIT-I
•	n switch ON. voltage betweer	EVAP control	system pressur	e sensor harne	ess connector and ground.
	_				
-	tem pressure sen- or	Ground	Voltage		
Connector	Terminal	Giodila	voltage		
B21	3	Ground	Approx. 5 V		
s the inspection	n result normal?		1		
	TO 10.				
4		VSTEM DDES	SLIBE SEVISOR	S DUMED SHE	PPLY CIRCUIT-II
		TOTEWIT INCO	SOIL SLINGOI	VI OVVLIV OUF	T ET OIIXOUTT-II
2. Disconnect	•		trol system pre	ssure sensor h	arness connector and ECM har-
EVAP control syst	-	E ⁽	CM	0 " "	
	or		T	Continuity	

Is the inspection result normal?

Terminal

Connector

F8

Connector

B21

Terminal

76

Existed

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

YES >> GO TO 6. NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B4, M79
- Harness connectors M77, E105
- Harness connectors E8, F1
- Harness for open or short between EVAP control system pressure sensor and ECM

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

6. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

E	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
F8	76	EVAP control system pressure sensor	B21	3
	77	Battery current sensor	F53	1
E16	102	APP sensor	E110	5

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.

- Battery current sensor (Refer to <u>EC-355</u>, "Component Inspection".)
- Crankshaft position sensor (POS) (Refer to EC-249, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-443, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace malfunctioning component.

8. CHECK APP SENSOR

Refer to EC-399, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly
- 2. Perform EC-399, "Special Repair Requirement".

>> INSPECTION END

10.check evap control system pressure sensor ground circuit for open and short

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

< DTC/CIRCUIT DIAGNOSIS >

>> INSPECTION END

[MR18DE (EXCEPT FOR CALIFORNIA)]

Connector Terminal Connector Terminal Existed Also check harness for short to ground and short to power. the inspection result normal? (ES >> GO TO 12. 1. DETECT MALFUNCTIONING PART heck the following. Harness connectors B4, M79 Harness connectors B7, E105 Harness connectors E8, F1 Harness connectors E8, F1 Harness connectors E8, F1 Check the continuity between EVAP control system pressure sensor and ECM >> Repair open circuit or short to ground or short to power in harness connector and ECM harness connector. 2. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND HORT Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector. EVAP control system pressure sensor between EVAP control system pressure sensor harness connector and ECM harness connector. EVAP control system pressure sensor between EVAP control system pressure sensor harness connector and ECM harness connectors. Also check harness for short to ground and short to power. the inspection result normal? (ES >> GO TO 14. 3. DETECT MALFUNCTIONING PART heack the following. Harness connectors B4, M79 Harness connectors B4, M79 Harness connectors B4, M79 Harness connectors B5, F1 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. 4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR efer to EC-296. "Component Inspection". the inspection result normal? (FS >> GO TO 15. SC OT 05 (CM CONTROL SYSTEM PRESSURE SENSOR) efer to EC-296. "Component Inspection". the inspection result normal? (FS >> RO TO 15. CHECK INTERMITTENT INCIDENT efer to GI-41, "Intermittent Incident".	SC	em pressure sen-	ECM		Continuity	
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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Component Inspection

INFOID:0000000007770139

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.
- 4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

	ECM	Condition	Voltage
Connector	Terminal	[Applied vacuum kPa (kg/cm², psi)	voltage
	42	Not applied	1.8 - 4.8 V
F8	(EVAP control system pressure sensor signal)	-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 below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP control system pressure sensor

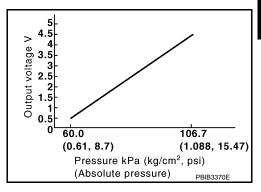
< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description INFOID:0000000007770140

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



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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 sensor (POS) circuit is shorted.] (Accelerator pedal circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Battery current sensor circuit is shorted.) (Battery current sensor circuit is shorted.) EVAP control system pressure sensor Crankshaft position sensor (POS) Accelerator pedal position sensor Refrigerant pressure sensor EVAP canister vent control valve EVAP canister Rubber hose from EVAP canister vent control valve to vehicle frame Battery current sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

(I) With CONSULT

- 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.
- Select "DATA MONITOR" mode with CONSULT.
- Make sure that "FUEL T/TMP SE" indication is more than 0°C (32°F).
- Start engine and wait at least 20 seconds.
- 7. Check 1st trip DTC.

®With GST

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

- 1. Start engine and warm it up to normal operating temperature.
- Set voltmeter probes to ECM harness connector and ground as per the following.

	ECM		
Connector	Terminal	Ground	
F8	43 (Fuel tank temperature sensor signal)	Ground	

- 3. Make sure that the voltage is less than 4.2 V.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and wait at least 20 seconds.
- 6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-298, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770142

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK CONNECTOR

- 1. Disconnect EVAP control system pressure sensor harness connector.
- 2. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness connector.

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch ON.
- 2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

•	tem pressure sen- or	Ground	Voltage
Connector	Terminal		
B21	3	Ground	Approx. 5 V

Is the inspection result normal?

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

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR [MR18DE (EXCEPT FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS >

•	tem pressure sen- or	ECM		Continuity
Connector	Terminal	Connector Terminal		
B21	3	F8	76	Existed

EC

Α

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

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5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B4, M79
- Harness connectors M77, E105
- · Harness connectors E8, F1
- Harness for open or short between EVAP control system pressure sensor and ECM

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

6.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM Sensor Terminal Connector **Terminal** Connector Name 74 Refrigerant pressure sensor E49 3 75 CKP sensor (POS) F20 1 F8 EVAP control system pressure sen-3 76 B21 77 F53 1 Battery current sensor E16 102 APP sensor E110 5

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.

- Battery current sensor (Refer to <u>EC-355</u>, "Component Inspection".)
- Crankshaft position sensor (POS) (Refer to <u>EC-249, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to EC-443, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace malfunctioning component.

8.CHECK APP SENSOR

Refer to EC-399, "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. Perform EC-399, "Special Repair Requirement".

>> INSPECTION END

10.check evap control system pressure sensor ground circuit for open and

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

•	tem pressure sen- or	n- ECM		Continuity
Connector	Terminal	Connector	Terminal	
B21	1	F8	51	Existed

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

Is the inspection result normal?

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

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B4, M79
- Harness connectors M77, E105
- Harness connectors E8, F1
- Harness for open or short between EVAP control system pressure sensor and ECM

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

12.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

•	tem pressure sen- or	ECM		Continuity
Connector	Terminal	Connector	Terminal	
B21	2	F8	42	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 B4, M79
- Harness connectors M77, E105
- Harness connectors E8, F1
- Harness for open or short between EVAP control system pressure sensor and ECM

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

14. CHECK RUBBER TUBE

- 1. Disconnect rubber tube connected to EVAP canister vent control valve.
- 2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 15.

NO >> Clean the rubber tube using an air blower, repair or replace rubber tube.

15. CHECK EVAP CANISTER VENT CONTROL VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Refer to EC-282, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace EVAP canister vent control valve.

16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-301, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 17.

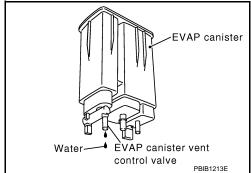
NO >> Replace EVAP control system pressure sensor.

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.
- Check if water will drain from the EVAP canister.

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

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

YES >> GO TO 20. NO >> GO TO 19.

19. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-14, "Exploded View".

20.check intermittent incident

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

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.
- Install a vacuum pump to EVAP control system pressure sensor.
- 4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

	ECM	Condition	Voltage
Connector	Terminal	[Applied vacuum kPa (kg/cm², psi)	voltage
	42	Not applied	1.8 - 4.8 V
F8	(EVAP control system pressure sensor signal)	-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 below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP control system pressure sensor

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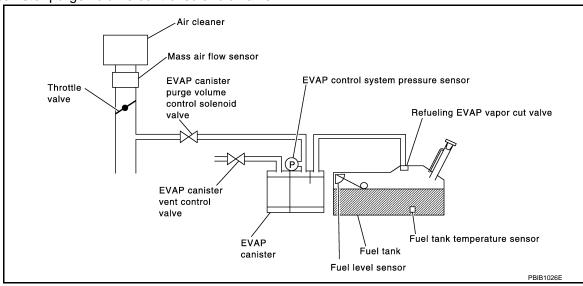
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P0455 EVAP CONTROL SYSTEM

DTC Logic

DTC DETECTION LOGIC

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0455	EVAP control system gross leak detected	EVAP control system has a very large leak such as fuel filler cap fell off, EVAP control system does not operate properly.	Fuel filler cap remains open or fails to close. Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Foreign matter caught in fuel filler cap. Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. Foreign matter caught in EVAP canister vent control valve. EVAP canister or fuel tank leaks EVAP purge line (pipe and rubber tube) leaks EVAP 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 Drain filter

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

CAUTION:

Never remove fuel filler cap during the DTC CONFIRMATION PROCEDURE.

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

TESTING CONDITION:

- Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedures.

Do you have CONSULT?

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

2. PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT

- 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.
- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 5. Make sure that the following conditions are met.

COOLAN TEMP/S: 0 - 70°C (32 - 158°F) INT/A TEMP SE: 0 - 30°C (32 - 86°F)

 Select "EVP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.

Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT screen, go to <u>EC-19</u>, "BASIC INSPECTION: Special Repair Requirement".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> GO TO 3.

3.CHECK DTC

Check DTC.

Which DTC is detected?

P0455 >> Go to EC-304, "Diagnosis Procedure". P0442 >> Go to EC-266, "Diagnosis Procedure".

4. PERFORM DTC CONFIRMATION PROCEDURE

With GST

NOTE:

Be sure to read the explanation of DRIVING PATTERN in <u>EC-29</u>, <u>"SRT Set Driving Pattern"</u> before driving vehicle.

- Start engine.
- 2. Drive vehicle according to DRIVING PATTERN.
- 3. Stop vehicle.
- Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES-1 >> P0455: Go to <u>EC-304</u>, "<u>Diagnosis Procedure</u>". YES-2 >> P0442: Go to <u>EC-266</u>, "<u>Diagnosis Procedure</u>". YES-3 >> P0441: Go to <u>EC-261</u>, "<u>Diagnosis Procedure</u>". NO >> INSPECTION END

Diagnosis Procedure

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1. CHECK FUEL FILLER CAP DESIGN

< DTC/CIRCUIT DIAGNOSIS >

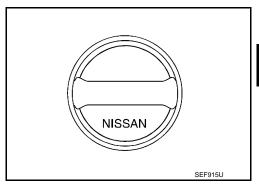
[MR18DE (EXCEPT FOR CALIFORNIA)]

- Turn ignition switch OFF.
- 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.

>> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Then retighten NO 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-307, "Component Inspection (Fuel filler cap)".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel filler cap with a genuine one.

5.CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection.

Refer to EC-87, "System Description".

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 DRAIN FILTER

Refer to EC-308, "Component Inspection (Drain filter)".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace drain filter.

8.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly.
- Refer to FL-14, "Exploded View".

 EVAP canister vent control valve. Refer to EC-282, "Component Inspection".

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace EVAP canister vent control valve and O-ring.

9.CHECK FOR EVAP LEAK

Refer to EC-487, "Inspection".

Is there any leak in EVAP line?

YES >> Repair or replace.

NO-1 >> With CONSULT: GO TO 10.

NO-2 >> Without CONSULT: GO TO 11.

10.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

(P)With CONSULT

- 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 2. Start engine.
- 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
- 4. Touch "Qu" on CONSULT screen to increase "PURG VOL C/V" opening to 100%.
- Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

⋈Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Stop engine.
- 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 4. Start engine and let it idle for at least 80 seconds.
- 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 12.

12. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-87, "System Description".

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 13.

YES-2 >> Without CONSULT: GO TO 14.

NO >> Repair or reconnect the hose.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

(P)With CONSULT

- Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 15.

NO >> GO TO 14.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-275, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

NO >> Replace EVAP canister purge volume control solenoid valve.

15. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-231, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace fuel level sensor unit. Refer to FL-5, "Exploded View".

16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-291, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 17.

NO >> Replace EVAP control system pressure sensor.

17. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-436, "Description".

Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair or replace hoses and tubes.

18. CHECK RECIRCULATION LINE

Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 19.

NO >> Repair or replace hose, tube or fuel filler tube.

19. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-439, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> GO TO 20.

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

20. CHECK INTERMITTENT INCIDENT

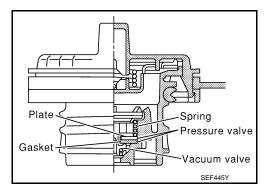
Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Fuel filler cap)

1. CHECK FUEL FILLER CAP

- 1. Turn ignition switch OFF.
- 2. Remove fuel filler cap.
- 3. Wipe clean valve housing.



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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

-Fuel filler

Fuel filler cap adapter

cap

-Vacuum/Pressure gauge

One-way

valve

4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.

5. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22

- 2.90 psi)

Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm²,

-0.87 to -0.48 psi)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE FUEL FILLER CAP

Replace fuel filler cap.

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 Inspection (Drain filter)

INFOID:0000000007770147

Vacuum/

Pressure pump

SEF9435

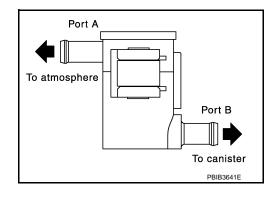
1. CHECK DRAIN FILTER

- 1. Check visually for insect nests in the drain filter air inlet.
- 2. Check visually for cracks or flaws in the appearance.
- 3. Check visually for cracks or flaws in the hose.
- 4. Blow air into port A and check that it flows freely out of port B.
- 5. Block port B.
- 6. Blow air into port A and check that there is no leakage.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace drain filter.



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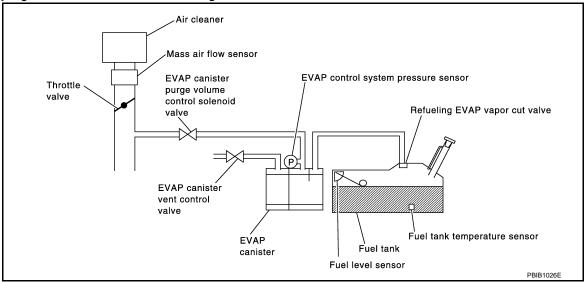
P0456 EVAP CONTROL SYSTEM

DTC Logic

DTC DETECTION LOGIC

This diagnosis detects leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the negative pressure caused by decrease of fuel temperature in the fuel tank after turning ignition switch OFF.

If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0456	Evaporative emission control system leak	EVAP system has a leak. EVAP system does not operate properly.	 Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Fuel filler cap remains open or fails to close. Foreign matter caught in fuel filler cap. Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. Foreign matter caught in EVAP canister vent control valve. EVAP canister or fuel tank leaks EVAP purge line (pipe and rubber tube) leaks EVAP purge line rubber tube bent Loose or disconnected rubber tube EVAP canister vent control valve and the circuit EVAP canister purge volume control solenoid valve and the circuit Fuel tank temperature sensor O-ring of EVAP canister vent control valve is missing or damaged EVAP canister is saturated with water EVAP control system pressure sensor Refueling EVAP vapor cut valve ORVR system leaks Fuel level sensor and the circuit Foreign matter caught in EVAP canister purge volume control solenoid valve

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC CONFIRMATION PROCEDURE

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

1.PRECONDITIONING

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

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

Do you have CONSULT?

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

2.PERFORM DTC CONFIRMATION PROCEDURE-I

(P) With CONSULT

- 1. Turn ignition switch ON and select "EVAP DIAG READY" in "DATA MONITOR" mode with CONSULT.
- 2. Start engine and wait at idle until "OFF" of "EVAP DIAG READY" changes to "ON".

NOTE:

It will take at most 2 hours until "OFF" of "EVAP DIAG READY" changes to "ON".

3. Turn ignition switch OFF and wait at least 90 minutes.

NOTE:

Never turn ignition switch ON during 90 minutes.

- 4. Turn ignition switch ON and select "EVAP LEAK DIAG" in "DATA MONITOR" mode with CONSULT.
- 5. Check that "EVAP LEAK DIAG" indication.

Which is displayed on CONSULT?

CMPLT>> GO TO 3.

YET >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 1.

3.perform dtc confirmation procedure-ii

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-310, "Diagnosis Procedure".

NO >> INSPECTION END.

4. PERFORM DTC CONFIRMATION PROCEDURE

With GST

- 1. Start engine and wait engine idle for at least 2 hours.
- 2. Turn ignition switch OFF and wait at least 90 minutes.

NOTE:

Never turn ignition switch ON during 90 minutes.

- Turn ignition switch ON.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-310, "Diagnosis Procedure".

NO >> INSPECTION END.

Diagnosis Procedure

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1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.

< DTC/CIRCUIT DIAGNOSIS >

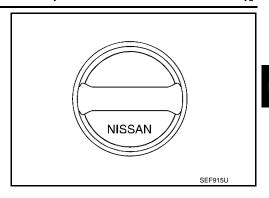
[MR18DE (EXCEPT FOR CALIFORNIA)]

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. Then retighten until ratcheting sound is heard.

3.CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-314, "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-487, "Inspection".

Is there any leak in EVAP line?

YES >> Repair or replace.

NO >> GO TO 6.

6. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

• EVAP canister vent control valve is installed properly.

Refer to FL-14, "Exploded View".

EVAP canister vent control valve.

Refer to EC-286, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace EVAP canister vent control valve and O-ring. Refer to FL-14, "Exploded View".

7.CHECK IF EVAP CANISTER SATURATED WITH WATER

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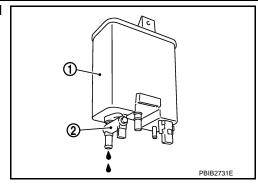
[MR18DE (EXCEPT FOR CALIFORNIA)]

- 1. Remove EVAP canister (1) with EVAP canister vent control valve (2) and EVAP control system pressure sensor attached.
- 2. Check if water will drain from the EVAP canister.

Does water drain from EVAP canister?

YES >> GO TO 8.

NO-1 >> With CONSULT: GO TO 10. NO-2 >> Without CONSULT: GO TO 11.



8. CHECK EVAP CANISTER

Weigh the EVAP canister assembly with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.2 kg (4.9 lb).

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 10.

YES-2 >> Without CONSULT: GO TO 11.

NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-14, "Exploded View".

10. Check evap canister purge volume control solenoid valve operation

(P)With CONSULT

- 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 2. Start engine and let it idle.
- 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode.
- 4. Touch "Qu" on CONSULT screen to increase "PURG VOL CONT/V" opening to 100%.
- 5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

⋈Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Stop engine.
- 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 4. Start engine and let it idle for at least 80 seconds.
- 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

12. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to <u>EC-87</u>, "System Diagram". Is the inspection result normal?

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P0456 EVAP CONTROL SYSTEM < DTC/CIRCUIT DIAGNOSIS > [MR18DE (EXCEPT FOR CALIFORNIA)]	
VETO/CITCOID /	
YES >> GO TO 13. NO >> Repair or reconnect the hose.	А
13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
Refer to EC-275, "Component Inspection".	F.0
Is the inspection result normal?	EC
YES >> GO TO 14. NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-26 , "Exploded View".	
14. CHECK FUEL TANK TEMPERATURE SENSOR	С
Refer to EC-231, "Component Inspection".	
Is the inspection result normal?	D
YES >> GO TO 15.	
NO >> Replace fuel level sensor unit. Refer to <u>FL-5, "Exploded View"</u> .	Е
15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	
Refer to EC-291, "Component Inspection".	
Is the inspection result normal? YES >> GO TO 16.	F
NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-14, "Exploded View"</u> .	
16. CHECK EVAP PURGE LINE	G
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.	
Refer to EC-87, "System Description".	Н
Is the inspection result normal? YES >> GO TO 17.	
NO >> Repair or reconnect the hose.	
17.clean evap purge line	ı
Clean EVAP purge line (pipe and rubber tube) using air blower.	
	J
>> GO TO 18.	
18.CHECK EVAP/ORVR LINE	K
Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to <u>EC-436</u> , " <u>Description</u> ".	
Is the inspection result normal?	
YES >> GO TO 19.	
NO >> Repair or replace hoses and tubes.	
19. CHECK RECIRCULATION LINE	V
Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and	
improper connection. <u>Is the inspection result normal?</u>	Ν
YES >> GO TO 20.	
NO >> Repair or replace hose, tube or fuel filler tube.	0
20. CHECK REFUELING EVAP VAPOR CUT VALVE	0
Refer to EC-439, "Component Inspection (Refueling EVAP vapor cut valve)".	
Is the inspection result normal?	Р
YES >> GO TO 21. NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-9, "Exploded View".	
21. CHECK FUEL LEVEL SENSOR	
Refer to MWI-43, "Component Inspection".	
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Is the inspection result normal?

YES >> GO TO 22.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

NO >> Replace fuel level sensor unit. Refer to FL-5, "Exploded View".

22. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

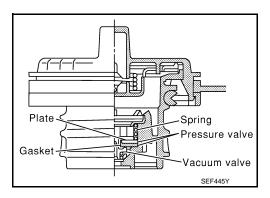
>> INSPECTION END

Component Inspection

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1. CHECK FUEL TANK VACUUM RELIEF VALVE

- 1. Turn ignition switch OFF.
- 2. Remove fuel filler cap.
- 3. Wipe clean valve housing.



4. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 -

2.90 psi)

Vacuum: −6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm²,

-0.87 to -0.48 psi)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

Fuel filler cap adapter Vacuum/Pressure gauge Vacuum/ Pressure pump One-way valve SEF943S

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 come on.

>> INSPECTION END

P0460 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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INFOID:0000000007770153

P0460 FUEL LEVEL SENSOR

Description INFOID:0000000007770151

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P0460 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0460 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-332, "DTC Logic".

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
P0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (The sensor circuit is open or shorted) Combination meter Fuel level sensor	Н

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and wait maximum of 2 consecutive minutes.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-315, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

Refer to MWI-30, "CONSULT Function (METER/M&A)".

 ${f 1}$. CHECK COMBINATION METER FUNCTION

Is the inspection result normal?

YES >> GO TO 2.

NO >> Refer to MWI-42, "Component Function Check"

2. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Revision: 2011 November EC-315 2012 CUBE

P0461 FUEL LEVEL SENSOR

Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

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-332, "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) Combination meter Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-316, "Component Function Check".

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-317, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007770156

1.PRECONDITIONING

WARNING:

When performing following procedure, be sure to observe the handling of the fuel. Refer to <u>FL-2</u>, <u>"General Precautions"</u>.

TESTING CONDITION:

Before starting component function check, preparation of draining fuel and refilling fuel is required.

Do you have CONSULT?

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

2.PERFORM COMPONENT FUNCTION CHECK

(P)With CONSULT

NOTE:

Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 $\,\ell$ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.

P0461 FUEL LEVEL SENSOR < DTC/CIRCUIT DIAGNOSIS > [MR18DE (EXCEPT FOR CALIFOR	ΝΙΔ\Ί
< DTC/CIRCUIT DIAGNOSIS > [MR18DE (EXCEPT FOR CALIFOR 2. Release fuel pressure from fuel line, refer to EC-485, "Inspection".	1417/]
3. Remove the fuel feed hose on the fuel level sensor unit.	А
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.	
Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT.	EC
 Check "FUEL LEVEL SE" output voltage and note it. Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT. 	LO
9. Touch "ON" and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.	
10. Check "FUEL LEVEL SE" output voltage and note it.11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).	С
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?	D
YES >> INSPECTION END	
NO >> Go to EC-317, "Diagnosis Procedure".	Е
3.PERFORM COMPONENT FUNCTION CHECK	
Without CONSULT	F
NOTE: Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal	
Imp gal) in advance.	
 Prepare a fuel container and a spare hose. Release fuel pressure from fuel line. Refer to <u>EC-485</u>, "Inspection". 	G
 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 ON.	Н
 6. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment. 7. Confirm that the fuel gauge indication varies. 	
8. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).	1
9. Confirm that the fuel gauge indication varies.	
Is the inspection result normal? YES >> INSPECTION END	J
NO >> Go to <u>EC-317</u> , " <u>Diagnosis Procedure</u> ".	
Diagnosis Procedure	00007770157 K
1. CHECK COMBINATION METER FUNCTION	
Refer to MWI-30, "CONSULT Function (METER/M&A)".	
Is the inspection result normal?	
YES >> GO TO 2.	

YES >> GO TO 2. NO >> Refer to MWI-42, "Component Function Check"

2.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

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P0462, P0463 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P0462, P0463 FUEL LEVEL SENSOR

Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P0462 or P0463 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0462 or P0463 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-332</u>, "<u>DTC Logic"</u>.

This diagnosis indicates the former, to detect open or short circuit malfunction.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0462	Fuel level sensor circuit 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) Combination meter Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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

>> 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-318, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770160

1. CHECK COMBINATION METER FUNCTION

Refer to MWI-30, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Refer to MWI-42, "Component Function Check"

2.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

P0462, P0463 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

>> INSPECTION END

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P0500 VSS

EXCEPT FOR M/T MODELS

EXCEPT FOR M/T MODELS: Description

INFOID:0000000007770161

ECM receives vehicle speed signals from two different paths via CAN communication line: One is from the ABS actuator and electric unit (control unit) via the combination unit and the other is from TCM.

EXCEPT FOR M/T MODELS: DTC Logic

INFOID:0000000007770162

DTC DETECTION LOGIC

NOTE:

- If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-332</u>, "DTC Logic".

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0500	VEH SPEED SEN/CIRC (Vehicle speed sensor)	At 20 km/h (13 MPH), ECM detects the following status continuously for 5 seconds or more: The difference between a vehicle speed calculated by a output speed sensor transmitted from TCM to ECM via CAN communication and the vehicle speed indicated on the combination meter exceeds 15km/h (10 MPH).	Harness or connector (The CAN communication line is open or shorted.) Combination meter ABS actuator and electric unit (control unit) Wheel sensor TCM Output speed sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

TESTING CONDITION:

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

>> GO TO 2.

2.perform dtc confirmation procedure

- 1. Start engine.
- Shift the selector lever to D range and wait at least for 2 seconds.
- 3. Drive the vehicle at least 5 seconds at 20 km/h (13 MPH) or more.

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-320, "EXCEPT FOR M/T MODELS : Diagnosis Procedure"

NO >> INSPECTION END

EXCEPT FOR M/T MODELS: Diagnosis Procedure

INFOID:0000000007770163

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-98, "CONSULT Function (TRANSMISSION)".

IMR18DE (EXCEPT FOR CALIFORNIA)1

< DTC/CI	RCUIT DIAGNOSIS	>	[MR18DE (EXCEPT FOR CALIFORNIA)]		
Is the insp	pection result normal?				
YES >	>> GO TO 2.				
_		poting relevant to DTC indicated.			
2.CHEC	K DTC WITH ABS AC	TUATOR AND ELECTRIC UNIT	(CONTROL UNIT)		
Check DT	C with ABS actuator a	and electric unit (control unit). Re	fer to BRC-23, "CONSULT Function".		
s the insp	pection result normal?				
_					
	5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				
CHEC	K DTC WITH COMBIN	NATION METER			
Check DT	C with combination m	eter. Refer to MWI-30, "CONSUL	_T Function (METER/M&A)".		
s the insp	pection result normal?				
	>> GO TO 4.				
4		poting relevant to DTC indicated.			
4.CHEC	K OUTPUT SPEED S	ENSOR			
Check ou	tput speed sensor. Re	fer to TM-118, "Diagnosis Proced	dure".		
ls the insp	pection result normal?				
. — •	>> GO TO 5.				
_	>> Replace or replace	error-detected parts.			
O.CHEC	K WHEEL SENSOR				
Check wh	neel sensor.Refer to B	RC-41, "Diagnosis Procedure".			
<u>Is the insp</u>	pection result normal?				
		ncident. Refer to GI-41, "Intermit	tent Incident".		
NO > M/T MC	>> Replace or replace	error-detected parts.			
VI/ I IVIC	DLLS				
M/T MC	DELS : Descripti	on	INFOID:000000007770164		
The vehic	olo spood signal is so	at to the combination motor from	n the "ABS actuator and electric unit (control		
			then sends a signal to the ECM via the CAN		
	cation line.		G		
M/T MC	DELS : DTC Log	iic	INFOID:000000007770165		
		, -			
DTC DE	TECTION LOGIC				
NOTE:	20500 '- 1'- 1- 1	" DTO HYWY Control	Later III Parasita (a. DTO IIVVVV		
			he trouble diagnosis for DTC UXXXX. he trouble diagnosis for DTC P0607. Refer		
	32, "DTC Logic".	man 2101 0007, mot ponom a	no trouble diagnosis for broad toom Kolor		
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause		
			Harness or connectors		
		The vehicle speed signal sent to ECM	(The CAN communication line is open or shorted) • Harness or connectors		
	.,	The vehicle speed signal sent to ECM	Tamess of connectors		

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 Combination meter ABS actuator and electric unit (control unit)	C

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

EC-321 Revision: 2011 November 2012 CUBE

INFOID:0000000007770166

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3. CHECK VEHICLE SPEED SIGNAL

NOTE

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

With CONSULT

- Start engine.
- Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT. The vehicle speed on CONSULT should exceed 10 km/h (6 mph) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Go to EC-323, "M/T MODELS : Diagnosis Procedure".

4. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Select "DATA MONITOR" mode with CONSULT.
- 2. Warm engine 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	2,200 - 6,000 rpm	
COOLAN TEMP/S	More than 70°C (158°F)	
B/FUEL SCHDL	4.0 - 31.8 msec	
Selector lever	Except Neutral position	
PW/ST SIGNAL	OFF	

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-323, "M/T MODELS : Diagnosis Procedure".

NO >> INSPECTION END

${f 5}$.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to <u>EC-322</u>, "<u>M/T MODELS</u>: <u>Component Function Check</u>". Use component function check to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-323, "M/T MODELS : Diagnosis Procedure".

M/T MODELS: Component Function Check

1. PERFORM COMPONENT FUNCTION CHECK

With GST

- 1. Lift up drive wheels.
- 2. Start engine.
- 3. Read vehicle speed signal in Service \$01 with GST.

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

P0500 VSS

[MR18DE (EXCEPT FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS >	[MR18DE (EXCEPT FOR CALIFORNIA)]	
NO >> Go to EC-323, "M/T MODELS : Diagnosis Procedur	<u>e"</u> .	
M/T MODELS : Diagnosis Procedure	INFOID:000000007770167	Α
1. CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT	Γ (CONTROL UNIT)"	EC
Refer to BRC-23, "CONSULT Function".		
Is the inspection result normal?		
YES >> GO TO 2. NO >> Repair or replace.		С
2.CHECK COMBINATION METER		
Refer to MWI-30, "CONSULT Function (METER/M&A)".		D
>> INSPECTION END		
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P0506 ISC SYSTEM

Description INFOID:000000007770168

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0506	Idle speed control system RPM lower than expected	The idle speed is less than the target idle speed by 100 rpm or more.	Electric throttle control actuator Intake air leak

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

If the target idle speed is out of the specified value, perform <u>EC-25, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"</u>, before conducting DTC Confirmation Procedure.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.
- Always perform the test at a temperature above –10°C(14°F).

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. 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-324, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770170

1. CHECK INTAKE AIR LEAK

- 1. Start engine and let it idle.
- Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Discover air leak location and repair.

NO >> GO TO 2.

2.REPLACE ECM

- 1. Stop engine.
- Replace ECM.

P0506 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

3. Perform EC-22, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Special Repair Requirement".

>> INSPECTION END

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P0507 ISC SYSTEM

Description INFOID:000000007770171

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0507	Idle speed control system RPM higher than expected	The idle speed is more than the target idle speed by 200 rpm or more.	Electric throttle control actuator Intake air leak PCV system

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

If the target idle speed is out of the specified value, perform <u>EC-25, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"</u>, before conducting DTC Confirmation Procedure.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.
- Always perform the test at a temperature above –10°C(14°F).

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. 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-326, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770173

1. CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

2. CHECK INTAKE AIR LEAK

- 1. Start engine and let it idle.
- Listen for an intake air leak after the mass air flow sensor.

P0507 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

IMR18DE (EXCEPT FOR CALIFORNIA)

< DTC/CIRCUIT DIAGNOSIS >	[MR18DE (EXCEPT FOR CALIFORNIA)]
Is intake air leak detected?	
YES >> Discover air leak location and repair. NO >> GO TO 3.	A
3.REPLACE ECM	EC
1. Stop engine.	
 Replace ECM. Perform <u>EC-22</u>, "<u>ADDITIONAL SERVICE WHEN REP ment</u>". 	LACING CONTROL UNIT: Special Repair Require-
>> INSPECTION END	D
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P050A, P050E COLD START CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P050A, P050E COLD START CONTROL

Description INFOID:000000007770174

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 P050A or P050E is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P050A	Cold start idle air control system performance	ECM does not control engine idle speed properly when engine is started with pre-warming up condition.	Lack of intake air volume Fuel injection system
P050E	Cold start engine exhaust temperature too low	The temperature of the catalyst inlet does not rise to the proper temperature when the engine is started with pre-warming up condition.	• 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.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

(F)With CONSULT

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Select "DATA MONITOR" mode with CONSULT.
- 4. Check the indication of "COOLAN TEMP/S".

With GST

Follow the procedure "With CONSULT" above.

Is the value of "COOLAN TEMP/S" between 4°C (59°F) and 36°C (97°F)?

YES >> GO TO 3.

NO-1 [If it is below 4°C (59°F)]>>Warm up the engine until the value of "COOLAN TEMP/S" reaches 4°C (59°F) or more. Retry from step 1.

NO-2 [If it is above 36°C (97°F)]>>Cool engine down to less than 36°C (97°F). Retry from step 1.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

(P)With CONSULT

- Set the select lever in N range.
- Start the engine and warm up in idle with the value of "COOLAN TEMP/S" between 4°C (59°F) and 40°C (104°F) for more than 15 seconds.
- 3. Check 1st trip DTC.

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-329, "Diagnosis Procedure".

P050A, P050E COLD START COR < DTC/CIRCUIT DIAGNOSIS > [MR18]	NTROL DE (EXCEPT FOR CALIFORNIA)]
NO >> INSPECTION END	DE (EXCE. 11 OK OALII OKKIA)
Diagnosis Procedure	INFOID:0000000007770176
1.PERFORM IDLE AIR VOLUME LEARNING	EC
Perform EC-25, "IDLE AIR VOLUME LEARNING: Special Repair Requi	rement".
Is Idle Air Volume Learning carried out successfully? YES >> GO TO 2. NO >> Follow the instruction of Idle Air Volume Learning.	С
2. CHECK INTAKE SYSTEM	D
 Check for the cause of intake air volume lacking. Refer to the following. Crushed intake air passage Intake air passage clogging Clogging of throttle body 	E
Is the inspection result normal?	
YES >> GO TO 3. NO >> Repair or replace malfunctioning part 3.CHECK FUEL INJECTION SYSTEM FUNCTION	F
Perform DTC Confirmation Procedure for DTC P0171. Refer to EC-220,	"DTC Logic"
Is the inspection result normal?	G G
YES >> GO TO 4. NO >> Go to EC-221. "Diagnosis Procedure" for DTC P0171.	
NO >> Go to <u>EC-221, "Diagnosis Procedure"</u> for DTC P0171. 4. PERFORM DTC CONFIRMATION PROCEDURE	Н
1. Turn ignition switch ON.	
 Erase DTC. Perform DTC Confirmation Procedure. See <u>EC-328</u>, "DTC Logic". 	I
Is the 1st trip DTC P050A or P050E displayed again?	J
YES >> GO TO 5.	
NO >> INSPECTION END 5.REPLACE ECM	K
Replace ECM. Go to EC-22, "ADDITIONAL SERVICE WHEN REPLACING CONT ment".	
>> INSPECTION END	
>> INGF ECTION LIND	M
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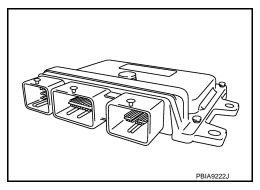
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[MR18DE (EXCEPT FOR CALIFORNIA)]

P0605 ECM

Description

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
		A)	ECM calculation function is malfunctioning.	
P0605 Engine control module	B)	ECM EEP-ROM system is malfunctioning.	• ECM	
		C)	ECM self shut-off function is malfunctioning.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Turn ignition switch ON.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-331, "Diagnosis Procedure".

NO >> GO TO 3.

${f 3.}$ PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-331, "Diagnosis Procedure".

NO >> GO TO 4.

f 4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- Repeat step 2 for 32 times.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-331, "Diagnosis Procedure".

NO >> INSPECTION END

P0605 ECM

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Diagnosis Procedure

INFOID:0000000007770179

1.INSPECTION START

- 1. Turn ignition switch ON.
- 2. Erase 1st trip DTC. Refer to EC-114, "On Board Diagnosis Function" or EC-117, "CONSULT Function".
- 3. Perform DTC CONFIRMATION PROCEDURE. Refer to EC-330, "DTC Logic".

Is the 1st trip DTC P0605 displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

2.REPLACE ECM

- Replace ECM.
- 2. Perform <u>EC-22</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Special Repair Requirement".

>> INSPECTION END

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[MR18DE (EXCEPT FOR CALIFORNIA)]

P0607 ECM

Description INFOID.0000000007770180

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

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0607	CAN communication bus	When detecting error during the initial diagnosis of CAN controller of ECM.	• ECM

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Check DTC.

Is DTC detected?

YES >> Go to EC-332, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770182

1. INSPECTION START

- Turn ignition switch ON.
- 2. Erase DTC. Refer to EC-114, "On Board Diagnosis Function" or EC-117, "CONSULT Function".
- 3. Perform DTC CONFIRMATION PROCEDURE. Refer to EC-332, "DTC Logic".
- 4. Check DTC.

Is the DTC P0607 displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

2.REPLACE ECM

- 1. Replace ECM.
- Perform <u>EC-22</u>, "<u>ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT</u>: Special Repair Requirement".

>> INSPECTION END

P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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INFOID:0000000007770184

P0643 SENSOR POWER SUPPLY

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0643	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	Harness or connectors (APP sensor 1 circuit is shorted.) (TP sensor circuit is shorted.) (Battery current sensor circuit is shorted.) (PSP sensor circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] Accelerator pedal position sensor Throttle position sensor Battery current sensor Power steering pressure sensor Camshaft position sensor (PHASE)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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 let it idle for 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-333, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect accelerator pedal position (APP) sensor harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between APP sensor harness connector and ground.

APP :	sensor	Ground	Voltage	
Connector	Terminal	Glound	vollage	
E110	4	Ground	Approx. 5 V	

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 3.

P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

3. CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F8	72	Electric throttle control actuator	F29	2
ГО	78	CMP sensor (PHASE)	F26	1
E16	106	APP sensor	E110	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.

Camshaft position sensor (PHASE) (Refer to <u>EC-252, "Component Inspection"</u>.)

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace camshaft position sensor (PHASE). Refer to EM-55, "Exploded View".

5. CHECK TP SENSOR

Refer to EC-176, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace electric throttle control actuator.
- Perform <u>EC-24</u>, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> INSPECTION END

7. CHECK APP SENSOR

Refer to EC-399, "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.
- Perform <u>EC-399</u>, "Special Repair Requirement".

>> INSPECTION END

9. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

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P0850 PNP SWITCH

Description INFOID:00000000007770185

For CVT models, transmission range switch is turn ON when the selector lever is P or N. For M/T models, park/neutral position (PNP) range switch is ON when the selector lever is Neutral position. ECM detects the position because the continuity of the line (the ON) exists.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0850	Park/neutral position switch	For CVT models, the signal of transmission range switch is not changed in the process of engine starting and driving. For M/T models, the signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	Harness or connectors [The transmission range switch circuit is open or shorted.(CVT models)] [The park/neutral position (PNP) switch circuit is open or shorted.(M/T models)] Transmission range switch (CVT models) Park/neutral position (PNP) switch (M/T models)

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.CHECK PNP SWITCH FUNCTION

(P)With CONSULT

- Turn ignition switch ON.
- 2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT. Then check the "P/N POSI SW" signal under the following conditions.

Selector lever position	Known-good signal
N or P position (CVT) Neutral position (M/T)	ON
Except above position	OFF

Is the inspection result normal?

YES >> GO TO 4.

NO >> Go to EC-336, "Diagnosis Procedure".

4. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- Maintain the following conditions for at least 60 consecutive seconds. CAUTION:

Always drive vehicle at a safe speed.

< DTC/CIRCUIT DIAGNOSIS >

ENG SPEED	1,200 - 6,375 rpm
	, , ,
COOLAN TEMP/S	More than 70°C (158°F)
	, , , , , , , , , , , , , , , , , , , ,
B/FUEL SCHDL	2.5 - 31.8 msec
27: 022 00::22	2.0 01.0000
VHCL SPEED SE	More than 64 km/h (40 mph)
71102 01 22B 02	more than or langin (10 mpin)
Selector lever	Suitable position
Ociocioi icvoi	Outlable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-336, "Diagnosis Procedure".

NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-336, "Component Function Check".

NOTE:

Use component function check the overall function of the transmission range switch circuit (CVT models) or the park/neutral position (PNP) switch circuit (M/T models). During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-336, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007770187

1. PERFORM COMPONENT FUNCTION CHECK

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

ECM		Ground	Condition		Voltage	
Connector	Terminal	Giodila	Condition		voltage	
F7	14 (PNP signal)	Ground	Ground	Selector lever	P or N (CVT) Neutral (M/T)	Approx. 0 V
	(i i vi Signai)			Except above	Battery voltage	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-336, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007770188

1. check transmission range switch (cvt) or pnp switch (m/t) power supply circuit

- 1. Turn ignition switch OFF.
- 2. Disconnect transmission range switch (CVT) or park/neutral position (PNP) switch (M/T) harness connector.
- Turn ignition switch ON.
- 4. Check the voltage between transmission range switch (CVT) or PNP switch (M/T) harness connector and ground.

CVT models

Transmission	range switch	Ground	Voltage	
Connector	Terminal	Glound	voltage	
F21	1	Ground	Battery voltage	

P0850 PNP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

M/T models				
PNP swite	ch (M/T)	Ground	Voltage	
Connector	Terminal	Glodila	voltage	
F23	2	Ground	Battery voltage	
the inspection	result normal	<u>?</u>		
YES >> GO				
NO >> GO				
DETECT MA		NG PART		
heck the follow Harness conn				
Harness conne		177 (M/T)		
IPDM E/R har	ness connecto			
10 A fuse (No. 10 A fuse (No.				
		tween PNP swi	itch and fuse (M	T)
the inspection	result normal	2	•	
>> Rep	air open circui	t or short to gro	ound or short to p	power in harness or connectors.
CHECK PNP	SWITCH INP	JT SIGNAL CII	RCUIT FOR OPI	EN AND SHORT
Turn ignition	n switch OFF.			
. Disconnect	ECM harness			
	continuity betwarness connec		on range switch	(CVT) or PNP switch (M/T) harness connector
CVT models	arriess connec	ioi.		
			204	
Transmission Connector	Terminal	Connector	CM Terminal	Continuity
F21	2	F7	14	 Existed
M/T models	2	. ,	17	Existed
	itab		204	
PNP s	Terminal	Connector	CM	
Connector	Terriiriai		Torminal	Continuity
Egg	2		Terminal	<u>. </u>
F23	3	F7	14	Existed
. Also check	harness for sho	F7 ort to ground ar		Existed
. Also check the inspection	harness for sho result normal	F7 ort to ground ar	14	Existed
. Also check leads the inspection YES >> GO	harness for sho result normal	F7 ort to ground ar	14 nd short to powe	Existed
Also check of the inspection YES >> GO	harness for sho result normal TO 4. pair open circui	F7 ort to ground ar ort to ground ar t or short to gro	nd short to powe	Existed r. Dower in harness or connectors.
Also check of the inspection o	harness for sho result normal TO 4. pair open circui NSMISSION F	F7 ort to ground ar or short to ground ar ANGE SWITC	nd short to powe bund or short to p H (CVT) OR PN	Existed r. Dower in harness or connectors. P SWITCH (M/T)
Also check of the inspection YES >> GO NO >> Rep CHECK TRA efer to TM-110	harness for sho result normal TO 4. pair open circui NSMISSION F	F7 ort to ground ar or short to ground ar ANGE SWITC	nd short to powe bund or short to p H (CVT) OR PN ransmission Rar	Existed r. Dower in harness or connectors.
Also check to the inspection YES >> GONO >> Report CHECK TRA	harness for sho result normal? TO 4. pair open circui NSMISSION R D. "Component P) SWITCH: C	F7 ort to ground ar t or short to gro ANGE SWITC Inspection (Ti omponent Insp	nd short to powe bund or short to p H (CVT) OR PN ransmission Rar	Existed r. Dower in harness or connectors. P SWITCH (M/T)
Also check of the inspection o	harness for sho result normal? TO 4. pair open circui NSMISSION R D. "Component P) SWITCH : Con result normal? TO 5.	F7 ort to ground ar t or short to gro ANGE SWITC Inspection (Tromponent Inspection)	nd short to powe bund or short to p H (CVT) OR PN ransmission Rar ection" (M/T).	Existed r. Dower in harness or connectors. P SWITCH (M/T) Inge Switch)" (CVT) or TM-8, "PARK/NEUTRAL
. Also check of the inspection YES >> GO NO >> Rep - CHECK TRA Refer to TM-110 OSITION (PNF) the inspection YES >> GO NO >> Rep	harness for sho result normal? TO 4. pair open circui NSMISSION R D. "Component P) SWITCH : Con result normal? TO 5.	F7 ort to ground ar t or short to gro ANGE SWITC Inspection (Tromponent Inspection) ion range switce	nd short to powe bund or short to pound or short	Existed r. Dower in harness or connectors. P SWITCH (M/T)
. Also check of the inspection	harness for short result normal? TO 4. pair open circuit NSMISSION R. D. "Component P) SWITCH: Control result normal? TO 5. place transmiss T) or TM-22, "I	F7 ort to ground ar t or short to gro ANGE SWITC Inspection (Tromponent Inspection range switce)	nd short to powe bund or short to pound or short	Existed r. Dower in harness or connectors. P SWITCH (M/T) Inge Switch)" (CVT) or TM-8, "PARK/NEUTRAL
Also check of the inspection o	harness for short result normal? TO 4. pair open circuit NSMISSION R. D. "Component P) SWITCH: Control TO 5. place transmiss T) or TM-22, "I	F7 ort to ground ar t or short to gro ANGE SWITC Inspection (Tromponent Inspection range switce Exploded View' ICIDENT	nd short to powe bund or short to pound or short	Existed r. Dower in harness or connectors. P SWITCH (M/T) Inge Switch)" (CVT) or TM-8, "PARK/NEUTRAL

>> INSPECTION END

P1148 CLOSED LOOP CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P1148 CLOSED LOOP CONTROL

DTC Logic

DTC DETECTION LOGIC

NOTE:

DTC P1148 is displayed with another DTC for A/F sensor 1. Perform the trouble diagnosis for the corresponding DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1148	Closed loop control function	The closed loop control function for bank 1 does not operate even when vehicle is driving in the specified condition.	Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
F 1140	Closed loop control runction	The closed loop control function for bank 2 does not operate even when vehicle is driving in the specified condition.	A/F sensor 1 A/F sensor 1 heater

P117A AIR FUEL RATIO

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P117A AIR FUEL RATIO

DTC Logic INFOID:0000000007921606

DTC DETECTION LOGIC

NOTE:

If DTC P117A is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P117A	AIR FUEL RATIO B1 (Air fuel ratio imbalance among cylinders)	ECM detects a lean/rich air fuel ratio state in any cylinder for a specified length of time.	 Fuel injector Exhaust gas leaks Incorrect fuel pressure Mass air flow sensor Intake air leaks Lack of fuel Incorrect PCV hose connection Improper spark plug Insufficient compression The fuel injector circuit is open or shorted ignition coil The ignition signal circuit is open or shorted

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING-1

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

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

NOTE:

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

>> GO TO 2.

2 . PRECONDITIONING-2

- Turn ignition switch ON.
- Clear the mixture ratio self-learning value. Refer to EC-26, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".

Will CONSULT be used?

YES >> GO TO 3.

NO >> GO TO 6.

3.PERFORM DTC CONFIRMATION PROCEDURE-1

- Turn ignition switch ON.
- Select "COOLAN TEMP/S" in "DATA MONITOR" mode of "ENGINE" using CONSULT. 2.
- 3. Start engine.
- Make sure that "COOLAN TEMP/S" indicates more than 80°C (176°F).

>> GO TO 4.

f 4.PERFORM DTC CONFIRMATION PROCEDURE-2.

(P)With CONSULT

- Select "SYSTEM 1 DIAGNOSIS B B1" and "SYSTEM 1 DIAGNOSIS A B1" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- Drive vehicle under the following conditions for at least 5 consecutive seconds.

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CAUTION:

Always drive vehicle at a safe speed.

ENG SPEED	1,600 – 1,775rpm
COOLAN TEMP/S	More than 80°C (176°F)
B/FUEL SCHDL	3 – 12 msec
Selector lever	D position
SYSTEM 1 DIAGNOSIS B B1	PRSENT

NOTE:

- Drive the vehicle at approximately 88 km/h (55MPH) allows easy diagnosis.
- Keep the accelerator pedal as possible during cruising.
- 3. Check "SYSTEM 1 DIAGNOSIS A B1" indication.

Is "CMPLT" displayed?

YES >> GO TO 5.

NO >> GO TO 2.

PERFORM DTC CONFIRMATION PROCEDURE-3

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to <u>EC-340</u>, "<u>Diagnosis Procedure</u>".

NO >> INSPECTION END

6.PERFORM DTC CONFIRMATION PROCEDURE-4

⊗Without CONSULT

- 1. Start the engine and warm it up to normal operating temperature.
- 2. Drive vehicle under the following conditions for at least 5 consecutive seconds.

CAUTION:

Always drive vehicle at a safe speed.

Engine speed	1,600 – 1,775 rpm	
Calculated load value	21 –58 %	
Selector lever	D position	

NOTE:

- Drive the vehicle at approximately 88 km/h (55MPH) allows easy diagnosis.
- Keep the accelerator pedal as possible during cruising.
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-340, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007921607

1. CHECK FOR INTAKE AIR LEAK

- Stop engine and check the following for connection.
- Air duct
- Vacuum hoses
- PCV hose
- Intake air passage between air duct to intake manifold
- Start engine and let it idle.
- 3. Listen for an intake air leak after the mass air flow sensor.

Is the inspection result normal?

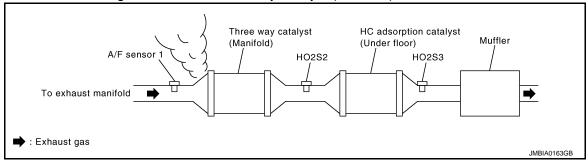
YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

< DTC/CIRCUIT DIAGNOSIS >

2.CHECK EXHAUST GAS LEAK

- 1. Stop engine and visually check exhaust tube, three way catalyst and muffler for dents connection.
- 2. Start engine and let it idle.
- Listen for an exhaust gas leak before three way catalyst (manifold).



Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK FUEL PRESSURE

- Release fuel pressure to zero. Refer to <u>EC-485, "Inspection"</u>.
- Check fuel pressure. Refer to <u>EC-485</u>, "Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 9.

4. CHECK MASS AIR FLOW SENSOR

(P)With CONSULT

Check "MASS AIR FLOW" in "DATA MONITOR" mode of "ENGINE" using CONSULT.

For specification, refer to EC-489, "Mass Air Flow Sensor".

Without CONSULT

Check mass air flow sensor signal in Service \$01 using GST.

For specification, refer to EC-489, "Mass Air Flow Sensor".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to <u>EC-160</u>, "<u>Diagnosis Procedure</u>".

CHECK FUNCTION OF FUEL INJECTOR-1

With CONSULT

- 1. Start engine.
- Perform "POWER BALANCE" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 3. Check that each circuit produces a momentary engine speed drop.

Without CONSULT

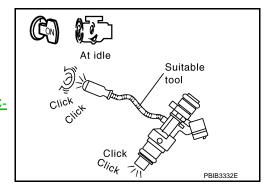
- Let engine idle.
- Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform trouble diagnosis for fuel injector, refer to <u>EC-424</u>, "Component Function Check".



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6. CHECK FUNCTION OF FUEL INJECTOR-2

CAUTION

Perform the following procedure in a place with no combustible objects and good ventilation.

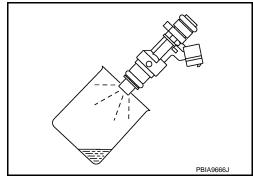
- 1. Turn ignition switch OFF.
- 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- 4. Remove fuel tube assembly. Refer to EM-37, "Removal and Installation". Keep fuel hose and all fuel injectors connected to fuel tube.
- 5. Disconnect all ignition coil harness connectors.
- 6. Prepare pans or saucers under each fuel injector.
- 7. Crank engine for approximately 3 seconds.
 - Fuel should be sprayed evenly for each fuel injector.
 - Fuel must not drip from the tip of fuel injector.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace

>> Replace fuel injector. Refer to EM-37, "Removal and Installation".



7.CHECK FUNCTION OF IGNITION COIL-1

CAUTION:

Perform the following steps in a well-ventilated area with no combustibles.

- 1. Turn ignition switch OFF.
- 2. Remove fuel pump fuse from IPDM E/R to release fuel pressure.

NOTE:

CONSULT must not be used to release fuel pressure. It develops again during the following steps, if released by using CONSULT.

- 3. Start the engine.
- 4. After an engine stall, crank the engine two or three times to release all the fuel pressure.
- 5. Turn ignition switch OFF.
- 6. Disconnect all the harness connectors of ignition coil to prevent electric discharge from occurring in ignition coil.
- 7. Remove ignition coil assembly and spark plug of cylinder. Refer to EM-42, "Removal and Installation".
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 9. Connect spark plug and harness connector to ignition coil.
- 10. Allow a 13-17mm (0.52-0.66 in) spacing between spark plug and grounded metal portion as shown in the figure to fix the ignition coil with a rope or an equivalent.
- 11. Crank the engine for approximately 3 seconds to see if sparking occurs between spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

- The discharge voltage becomes 20 kV or higher. Therefore, always stay away from the spark plug and ignition coil at least 50 cm (19.7 in) during the inspection.
- Leaving a space of more than 17mm (0.66 in) may damage the ignition coil.

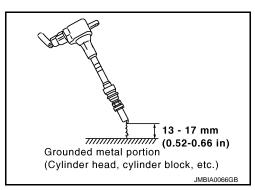


When the gap is less than 13 mm (0.52 in), a the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 10.

8.CHECK COMPRESSION PRESSURE



P117A AIR FUEL RATIO

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Check compression pressure. Refer to EC-485, "Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

9. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace fuel filter and fuel pump assembly. Refer to FL-5, "Removal and Installation".

NO >> Repair or replace error-detected parts.

10. CHECK FUNCTION OF IGNITION COIL-2

- Turn ignition switch OFF.
- 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.

Spark should be generated.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Check ignition coil, power transistor and their circuits. Refer to EC-430, "Component Function Check".

11. CHECK SPARK PLUG

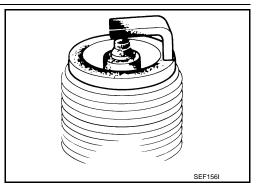
Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES Repair or clean spark plug. Refer to EM-17, >> 1. "Inspection".

GO TO 12.

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-42, "Removal and Installation".



12. CHECK FUNCTION OF IGNITION COIL-3

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 >> Check intermittent incident. Refer to GI-41, "Intermittent Incident". NO

>> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-42, "Removal and Installation".

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Revision: 2011 November

P1212 TCS COMMUNICATION LINE

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P1212 TCS COMMUNICATION LINE

Description INFOID:0000000007770190

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 U1001, first perform the trouble diagnosis for DTC U1001. Refer to <u>EC-138</u>, "<u>DTC Logic"</u>.
- If DTC P1212 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-332</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 can not 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 10.5V 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-344, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

Go to GI-37, "Work Flow".

INFOID:0000000007770192

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P1217 ENGINE OVER TEMPERATURE

DTC Logic INFOID:0000000007770193

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-332, "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 temperature (Overheat)	 Cooling fan does not operate properly (Overheat). Cooling fan system does not operate properly (Overheat). Engine coolant was not added to the system using the proper filling method. Engine coolant is not within the specified range. 	Harness or connectors (The cooling fan circuit is open or shorted.) IPDM E/R (Cooling fan relay-1) Cooling fan relays-2 and -3 Cooling fan motor Radiator hose Radiator Radiator cap Reservoir tank Water pump Thermostat Water control valve	

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to CO-9, "Draining". Also, replace the engine oil. Refer to <u>LU-8</u>, "Refilling".

- Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-10, "Anti-Freeze Coolant Mixture Ratio".
- 2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

DTC CONFIRMATION PROCEDURE

${f 1}$. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-345, "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.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-346, "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.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

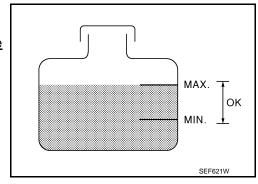
Check the coolant level in the reservoir tank and radiator.

Allow engine to cool before checking coolant level.

<u>Is the coolant level in the reservoir tank and/or radiator below the proper range?</u>

YES >> Go to EC-346, "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-346, "Diagnosis Procedure".

NO >> GO TO 3.

3.perform component function check-iii

(P)With CONSULT

- 1. Turn ignition switch ON.
- 2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.
- Make sure that cooling fan motor operates at each speed (LOW/HI).

♥Without CONSULT

Perform IPDM E/R auto active test and check cooling fan motor operation. Refer to <u>PCS-11, "Diagnosis</u> Description".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-346, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007770195

1. CHECK COOLING FAN OPERATION

(II) With CONSULT

- 1. Turn ignition switch ON.
- 2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.
- 3. Make sure that cooling fan motor operates at each speed (LOW/HI).

Without CONSULT

- Perform IPDM E/R auto active test and check cooling fan motor operation. Refer to <u>PCS-11, "Diagnosis Description"</u>.
- 2. Make sure that cooling fan motor operates at each speed (Low/High).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-420, "Diagnosis Procedure".

2.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-9, "Inspection".

Is leakage detected?

YES >> GO TO 3.

NO >> GO TO 4.

3.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak.

- Hose (Refer to <u>CO-25</u>, "Inspection".)
- Radiator (Refer to CO-17, "Inspection".)
- Water pump (Refer to <u>CO-20, "Inspection"</u>.)

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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>> Repair or replace malfunctioning part.

4. CHECK RADIATOR CAP

Check radiator cap. Refer to CO-13, "RADIATOR CAP: Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace radiator cap. Refer to CO-15, "Exploded View".

5. CHECK THERMOSTAT

Check thermostat. Refer to CO-23, "Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace thermostat. Refer to CO-22, "Removal and Installation".

6.CHECK WATER CONTROL VALVE

Check water control valve. Refer to CO-26, "Water Control Valve".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace water control valve. Refer to CO-24, "Exploded View".

7.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-170, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace engine coolant temperature sensor. Refer to CO-24, "Exploded View".

8. 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 Coo	plant Mixture Ratio"
	3	Coolant level	Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-9, "Inspection"
	4	Radiator cap	Pressure tester	CO-13, "RADIATOR CAP	P : Inspection"
ON* ²	5	Coolant leaks	Visual	No leaks	CO-9, "Inspection"
ON* ²	6	Thermostat	Touch the upper and lower radiator hoses	Both hoses should be hot	CO-23, "Inspection"
ON* ¹	7	Cooling fan motor	• CONSULT	Operating	EC-420, "Component Function Check"
OFF	8	Combustion gas leak	Color checker chemi- cal tester 4 Gas ana- lyzer	Negative	_
ON* ³	9	Coolant temperature gauge	Visual	Gauge less than 3/4 when driving	_
		Coolant overflow to reservoir tank	Visual	No overflow during driving and idling	CO-9, "Inspection"
OFF* ⁴	10	Coolant return from reservoir tank to radi- ator	Visual	Should be initial level in reservoir tank	CO-9, "Inspection"

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	11	Cylinder head	Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-69, "Disassembly and Assembly"
	12	Cylinder block and pistons	Visual	No scuffing on cylinder walls or piston	EM-98, "Inspection"

^{*1:} Turn the ignition switch ON.

For more information, refer to CO-4, "Troubleshooting Chart".

>> INSPECTION END

^{*2:} Engine running at 3,000 rpm for 10 minutes.

^{*3:} Drive at 90 km/h (56 MPH) for 30 minutes and then let idle for 10 minutes.

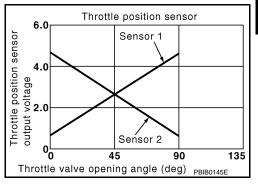
^{*4:} After 60 minutes of cool down time.

P1225 TP SENSOR

Description INFOID:0000000007770196

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

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle 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
P1225	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

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-349, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.check electric throttle control actuator visually

- Turn ignition switch OFF.
- Remove the intake air duct. Refer to <u>EM-24, "Exploded View"</u>.

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P1225 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

- Check if foreign matter is caught between the throttle valve (1) and the housing.
- Electric throttle control actuator (2)

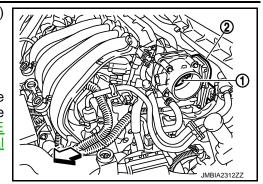
Is the inspection result normal?

YES

>> GO TO 2.

NO

>> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace electric throttle control actuator.
- 2. Perform EC-350, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007770199

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-25, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

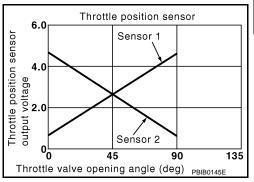
>> END

P1226 TP SENSOR

Description

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

The throttle position sensor has two sensors. These sensors are a kind of 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 conditions via the throttle control motor.



DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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, wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Repeat steps 2 and 3 for 32 times.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-351, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Turn ignition switch OFF.
- 2. Remove the intake air duct. Refer to EM-24. "Exploded View".

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P1226 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

- Check if foreign matter is caught between the throttle valve (1) and the housing.
- Electric throttle control actuator (2)

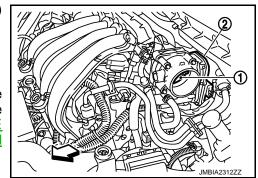
Is the inspection result normal?

YES

>> GO TO 2.

NO

>> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace electric throttle control actuator.
- 2. Perform EC-352, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007770203

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-25, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> END

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P1550 BATTERY CURRENT SENSOR

Description INFOID:0000000007770204

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 PCS-66. "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 the battery discharge may occur.

DTC Logic INFOID:00000000007770205

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 sensor (POS) circuit is shorted.] (EVAP control system pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Battery current sensor Crankshaft position sensor (POS) EVAP control system pressure sensor Accelerator pedal position sensor Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

EC-353

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and wait at least 10 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-354, "Diagnosis Procedure".

NO >> INSPECTION END EC

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Diagnosis Procedure

INFOID:0000000007770206

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

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

Battery cur	rent sensor	Ground	Voltage
Connector	Connector Terminal		voltage
F53	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 8.

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 cui	rrent sensor	ECM		Continuity	
Connector	Terminal	Connector Terminal		Continuity	
F53	1	F8	71	Existed	

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

4. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector Terminal		Name	Connector	Terminal
	74	Refrigerant pressure sensor	E49	1
	75	CKP sensor (POS)	F20	1
F8	76	EVAP control system pressure sensor	B21	3
	71	Battery current sensor	F53	1
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 5.

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

5. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to EC-249, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-291, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-443, "Diagnosis Procedure".)

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning components.

6.CHECK APP SENSOR

Refer to EC-399, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11. NO >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly.
- 2. Go to EC-399, "Special Repair Requirement".

>> INSPECTION END

8.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 cur	rrent sensor	E	CM	Continuity
Connector	Terminal	Connector Terminal		Continuity
F53	2	F8	64	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 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 cui	rrent sensor	E	CM	Continuity
Connector	Terminal	Connector Terminal		Continuity
F53	3	F8	57	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 BATTERY CURRENT SENSOR

Refer to EC-355, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace battery negative cable assembly.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK BATTERY CURRENT SENSOR

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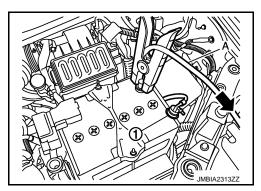
1. Turn ignition switch OFF.

- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.
- 4. Install jumper cable (A) between battery negative terminal and body ground.

1 : Battery negative terminal

: To body ground

- 5. Turn ignition switch ON.
- 6. Check the voltage between ECM harness connector and ground.



	ECM				
Connector	+	-	Voltage		
Connector	Terminal	Terminal			
F8	57 (Battery current sensor signal)	64	Approx. 2.5 V		

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P1551, P1552 BATTERY CURRENT SENSOR

Description INFOID:0000000007770208

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 PCS-66. "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 the battery discharge may occur.

DTC Logic INFOID:00000000007770209

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 sensor (POS) circuit is shorted.] (Power steering pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Battery current sensor Crankshaft position sensor (POS) Power steering pressure sensor Accelerator pedal position sensor Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following 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 8 V with ignition switch ON

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 10 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-358, "Diagnosis Procedure".

NO >> INSPECTION END

EC-357 Revision: 2011 November 2012 CUBE

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Diagnosis Procedure

INFOID:0000000007770210

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

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

Battery cur	rent sensor	Ground	Voltage
Connector	Connector Terminal		voltage
F53	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 8.

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 cui	rrent sensor	ECM		Continuity	
Connector	Terminal	Connector Terminal		Continuity	
F53	1	F8	71	Existed	

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

4. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector Terminal		Name	Connector	Terminal
	74	Refrigerant pressure sensor	E49	1
	75	CKP sensor (POS)	F20	1
F8	76	EVAP control system pressure sensor	B21	3
	71	Battery current sensor	F53	1
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 5.

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

5. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to <u>EC-249, "Component Inspection"</u>.)
- EVAP control system pressure sensor (Refer to EC-291, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-443, "Diagnosis Procedure".)

[MR18DE (EXCEPT FOR CALIFORNIA)] < DTC/CIRCUIT DIAGNOSIS > Is the inspection result normal? Α YES >> GO TO 6. NO >> Replace malfunctioning components. **O.**CHECK APP SENSOR EC Refer to EC-399, "Component Inspection". Is the inspection result normal? YES >> GO TO 11. NO >> GO TO 7. 7.REPLACE ACCELERATOR PEDAL ASSEMBLY Replace accelerator pedal assembly. Go to EC-399, "Special Repair Requirement". >> INSPECTION END 8.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 current sensor **ECM** Continuity Connector **Terminal** Connector **Terminal** F8 Existed Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 9. NO >> Repair open circuit, short to ground or short to power in harness or connectors. 9.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT Check the continuity between battery current sensor harness connector and ECM harness connector. Battery current sensor **ECM** Continuity Connector **Terminal** Connector **Terminal** F53 3 F8 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 BATTERY CURRENT SENSOR

Refer to EC-359, "Component Inspection".

Is the inspection result normal?

>> GO TO 11.

>> Replace battery negative cable assembly.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

 ${f 1}$.CHECK BATTERY CURRENT SENSOR

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INFOID:0000000007770211

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

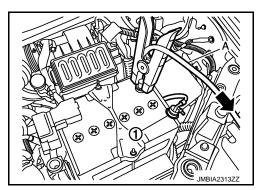
Turn ignition switch OFF.

- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.
- 4. Install jumper cable (A) between battery negative terminal and body ground.

1 : Battery negative terminal

: To body ground

- 5. Turn ignition switch ON.
- 6. Check the voltage between ECM harness connector and ground.



ECM			
Connector	+	-	Voltage
	Terminal	Terminal	
F8	57 (Battery current sensor signal)	64	Approx. 2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P1553 BATTERY CURRENT SENSOR

Description INFOID:0000000007770212

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 PCS-66. "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 the battery discharge may occur.

DTC Logic INFOID:0000000007770213

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 sensor (POS) circuit is shorted.] (Power steering pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Battery current sensor Crankshaft position sensor (POS) Power steering pressure sensor Accelerator pedal position sensor Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following 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 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and wait at least 10 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-362, "Diagnosis Procedure".

NO >> INSPECTION END

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Diagnosis Procedure

INFOID:0000000007770214

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

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

Battery cur	rent sensor	Ground	Voltage
Connector	Connector Terminal		vollage
F53	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

${f 3.}$ 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 current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F53	1	F8	71	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

4. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
	74	Refrigerant pressure sensor	E49	1
	75	CKP sensor (POS)	F20	1
F8	76	EVAP control system pressure sensor	B21	3
	71	Battery current sensor	F53	1
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 5.

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

5. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to EC-249, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-291, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-443, "Diagnosis Procedure".)

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning components.

6.CHECK APP SENSOR

Refer to EC-399, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11. >> GO TO 7. NO

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly.
- Go to EC-399, "Special Repair Requirement".

>> INSPECTION END

8.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 current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F53	2	F8	64	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 BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F53	3	F8	57	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 BATTERY CURRENT SENSOR

Refer to EC-363, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

>> Replace battery negative cable assembly.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK BATTERY CURRENT SENSOR

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INFOID:0000000007770215

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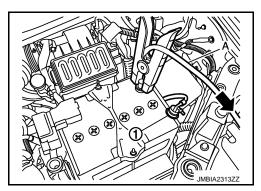
[MR18DE (EXCEPT FOR CALIFORNIA)]

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.
- 4. Install jumper cable (A) between battery negative terminal and body ground.

1 : Battery negative terminal

: To body ground

- 5. Turn ignition switch ON.
- 6. Check the voltage between ECM harness connector and ground.



Connector	+	-	Voltage
Connector	Terminal Terminal		
F8	57 (Battery current sensor signal)	64	Approx. 2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

< DTC/CIRCUIT DIAGNOSIS >

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INFOID:0000000007770218

P1554 BATTERY CURRENT SENSOR

Description INFOID:0000000007770216

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 PCS-66. "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 the battery discharge may occur.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1554	Battery current sensor performance	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.	Harness or connectors (Battery current sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Power steering pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Battery current sensor Crankshaft position sensor (POS) Power steering pressure sensor Accelerator pedal position sensor Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-365, "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-366, "Diagnosis Procedure".

Component Function Check

1.PRECONDITIONING

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 12.8 V at idle.
- Before performing the following procedure, confirm that all load switches and A/C switch are turned OFF.

>> GO TO 2.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

2.perform component function check

(P)With CONSULT

- 1. Start engine and let it idle.
- Select "BAT CUR SEN" in "DATA MONITOR" mode with CONSULT.
- Check "BAT CUR SEN" indication for 10 seconds.
 - "BAT CUR SEN" should be above 2,300 mV at least once.

Without CONSULT

- 1. Start engine and let it idle.
- 2. Check the voltage between ECM harness connector and ground.

Connector	+	-	Voltage
Connector	Terminal Terminal		
F8	57 (Battery current sensor signal)	64	Above 2.3 V at least once

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-366, "Diagnosis Procedure".

Diagnosis Procedure

Agriosis Procedure INFOID:0000000007770219

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

- 1. Disconnect battery current sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between battery current sensor harness connector and ground.

Battery cui	rent sensor	Ground	Voltage
Connector Terminal		Glound	voltage
F53	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

3.check battery current sensor power supply circuit-ii

- 1. 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
F53	1	F8	71	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

4. CHECK SENSOR POWER SUPPLY CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F8	74	Refrigerant pressure sensor	E49	1
	75	CKP sensor (POS)	F20	1
	76	EVAP control system pressure sensor	B21	3
	71	Battery current sensor	F53	1
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 5.

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

5. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to <u>EC-249. "Component Inspection"</u>.)
- EVAP control system pressure sensor (Refer to <u>EC-291, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to EC-443, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning components.

6.CHECK APP SENSOR

Refer to EC-399, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly.
- Go to EC-399, "Special Repair Requirement".

>> INSPECTION END

8.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Battery current sensor		ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
F53	2	F8	64	Existed	

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

Is the inspection result normal?

YES >> GO TO 9.

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

9.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Battery cui	rent sensor	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F53	3	F8	57	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 BATTERY CURRENT SENSOR

Refer to EC-368, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace battery negative cable assembly.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

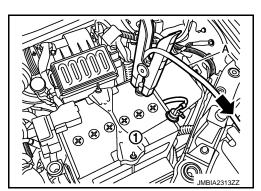
>> INSPECTION END

Component Inspection

INFOID:0000000007770220

1. CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.
- 4. Install jumper cable (Å) between battery negative terminal and body ground.
 - 1 : Battery negative terminal
 - : To body ground
- 5. Turn ignition switch ON.
- Check the voltage between ECM harness connector and ground.



Connector	+	-	Voltage
	Terminal	Terminal	
F8	57 (Battery current sensor signal)	64	Approx. 2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P1564 ASCD STEERING SWITCH

Description INFOID:0000000007770221

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-70, "System Description" for the ASCD function.

DTC Logic INFOID:0000000007770222

DTC DETECTION LOGIC

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-330, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1564	ASCD steering switch	 An excessively high voltage signal from the ASCD steering switch is sent to ECM. ECM detects that input signal from the ASCD steering switch is out of the specified range. ECM detects that the ASCD steering switch is stuck ON. 	Harness or connectors (The switch circuit is open or shorted.) ASCD steering switch ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2 Perform DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- Wait at least 10 seconds. 2.
- 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.
- Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Check DTC.

Is DTC detected?

YES >> Go to EC-369, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ASCD STEERING SWITCH CIRCUIT

(P) With CONSULT

Turn ignition switch ON.

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P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

- 2. Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW" and "SET SW" in "DATA MONITOR" mode with CONSULT.
- 3. Check each item indication under the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
WAIN SW	MAIN SWILCH	Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
	CANCEL SWIICH	Released	OFF
RESUME/ACC	RESUME/ACCELERATE switch	Pressed	ON
SW	RESONE/ACCELENATE SWIGH	Released	OFF
SET SW	SET/COAST switch	Pressed	ON
	SET/OUAST SWILLIT	Released	OFF

Without CONSULT

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals.

	ECM			
Connector	+ -		Condition	Voltage
Connector	Terminal	Terminal		
		95	MAIN switch: Pressed	Approx. 0V
	94 (ASCD steering switch signal)		CANCEL switch: Pressed	Approx. 1V
			SET/COAST switch: Pressed	Approx. 2V
E16			RESUME/ACCELERATE switch: Pressed	Approx. 3V
			All ASCD steering switches: Released	Approx. 4V

Is the inspection result normal?

YES >> GO TO 8. NO >> 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 M352.
- 4. Check the continuity between combination switch and ECM harness connector.

Combination switch	E	Continuity	
Terminal	Connector Terminal		
16	E16	95	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 M77, E105
- · Combination switch (spiral cable)
- · Harness for open and short between ECM and combination switch

P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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

${f 5.}$ CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between ECM harness connector and combination switch.

combination switch	ECM		Continuity
Terminal	Connector Terminal		
13	E16	94	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 M77, E105
- 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.

.CHECK ASCD STEERING SWITCH

Refer to EC-371, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace ASCD steering switch. Refer to ST-8, "Exploded View".

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK ASCD STEERING SWITCH

- Disconnect combination switch (spiral cable) harness connector.
- 2. Check the continuity between combination switch harness connector terminals under following conditions.

Combination switch		Condition	Resistance	
Connector	Terminals	Condition	Nesistance	
		MAIN switch: Pressed	Approx. 0 Ω	
	13 and 16	CANCEL switch: Pressed	Approx. 250 Ω	
M302		SET/COAST switch: Pressed	Approx. 660 Ω	
		RESUME/ACCELERATE switch: Pressed	Approx. 1,480 Ω	
		All ASCD steering switches: Released	Approx. 4,000 Ω	

Is the inspection result normal?

YES >> INSPECTION END

>> Replace ASCD steering switch. Refer to ST-8, "Exploded View". NO

EC-371 Revision: 2011 November 2012 CUBE

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Description INFOID.000000007770225

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to EC-70, "System Description" for the ASCD function.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-330, "DTC Logic".
- This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed.
 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause	
		A)	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to the ECM at the same time.	Harness or connectors (The stop lamp switch circuit is shorted.) Harness or connectors (The ASCD brake switch circuit is shorted.)	
P1572	ASCD brake switch	В)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	Harness or connectors (The ASCD clutch switch circuit is shorted.) Stop lamp switch ASCD brake switch ASCD clutch switch Incorrect stop lamp switch installation Incorrect ASCD brake switch installation Incorrect ASCD clutch switch installation ECM	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

NOTE:

Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

>> GO TO 2.

2.perform dtc confirmation procedure for malfunction a

- Start engine.
- Press MAIN switch and make sure that CRUISE indicator is displayed in combination meter.
- 3. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position

Check DTC.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Is DTC detected?

YES >> Go to EC-373, "Diagnosis Procedure".

NO >> GO TO 3.

${f 3.}$ PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

Drive the vehicle for at least 5 consecutive seconds under the following conditions. **CAUTION:**

Always drive vehicle at a safe speed.

NOTE:

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

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

Check DTC.

Is DTC detected?

YES >> Go to EC-373, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK OVERALL FUNCTION-I

(P) With CONSULT

- Turn ignition switch ON.
- Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
- Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal (CVT)	Slightly depressed	OFF
DIVARLE OW I	Brake pedal and clutch pedal (M/T)	Fully released	ON

₩ Without CONSULT

- Turn ignition switch ON.
- Check the voltage between ECM harness connector terminals.

	ECM					1
Connector	+	-	Condition		Voltage	
Connector	Terminal	Terminal				_
E16	100 (ASCD brake	108	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly de- pressed	Approx. 0V	
	switch signal)		brake pedarand dutch pedar (M/T)	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

Select "BRAKE SW2" and check indication in "DATA MONITOR" mode with CONSULT.

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Monitor item	Condition		Indication
BRAKE SW2	Brake pedal	Slightly de- pressed	ON
		Fully released	OFF

Without CONSULT

Check the voltage between ECM harness connector terminals.

	ECM				
Connector	+	-	Condition		Voltage
Connector	Terminal	Terminal			
E16	99 (Stop lamp	108	Brake pedal	Slightly de- pressed	Battery voltage
	switch signal)			Fully released	Approx. 0V

Is the inspection result normal?

YES >> GO TO 16. NO >> GO TO 11.

3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD bra	ake switch	Ground	Voltage	
Connector	Terminal	Glound	voltage	
E112	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 9.

NO-1 >> CVT models: GO TO 4.

NO-2 >> M/T models: GO TO 5.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M77
- 10 A fuse (No. 2)
- · 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 CLUTCH SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- Disconnect ASCD clutch switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ASCD clutch switch harness connector and ground.

ASCD clu	itch switch	Ground	Voltage	
Connector	Terminal	Glound	Voltage	
E111	3	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M77
- 10 A fuse (No. 2)
- Harness for open or short between ASCD clutch switch and fuse

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

7.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT-II

- Turn ignition switch OFF.
- Disconnect ASCD brake switch harness connector.

3. Check the continuity between ASCD clutch switch harness connector and ASCD brake switch harness connector.

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ASCD clu	itch switch	ASCD bra	ake switch	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E111	4	E112	1	Existed

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

Is the inspection result normal?

YES >> GO TO 8.

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

$oldsymbol{8}.$ CHECK ASCD CLUTCH SWITCH

Refer to EC-377, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace ASCD clutch switch. Refer to CL-10, "Exploded View".

$oldsymbol{9}.$ CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

ASCD bra	ASCD brake switch		ECM	
Connector	Terminal	Connector	Terminal	Continuity
E112	2	E16	100	Existed

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

Is the inspection result normal?

YES >> GO TO 10.

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

10.CHECK ASCD BRAKE SWITCH

Refer to EC-376, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace ASCD brake switch. Refer to BR-17, "Exploded View".

11. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- Check the voltage between stop lamp switch harness connector and ground.

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< DTC/CIRCUIT DIAGNOSIS >

Stop lan	Stop lamp switch		Voltage
Connector	Terminal	Ground	voltage
E114 (M/T) E115 (CVT)	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M77
- 10A fuse (No.9)
- 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.

13.check stop lamp switch input signal circuit for open and short

- 1. Disconnect ECM harness connector.
- 2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

E	СМ	Stop lan	np switch	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E16	99	E114 (M/T) E115 (CVT)	2	Existed

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

Is the inspection result normal?

YES >> GO TO 15.

NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- · 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.

15. CHECK STOP LAMP SWITCH

Refer to EC-377, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace stop lamp switch. Refer to <u>BR-17</u>, "Exploded View".

16. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

1. CHECK ASCD BRAKE SWITCH-I

- Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch harness connector.
- 3. Check the continuity between ASCD brake switch terminals under the following conditions.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Terminals	Con	dition	Continuity
		Fully released	Existed
1 and 2		Slightly de- pressed	Not existed
Is the inspectio	n result normal	?	
YES >> INSPECTION END NO >> GO TO 2.			
2.CHECK AS(CD BRAKE SW	ITCH-II	

- Adjust ASCD brake switch installation. Refer to BR-7, "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 de- pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD brake switch. Refer to <u>BR-17</u>, "Exploded View".

Component Inspection (ASCD Clutch Switch)

1. CHECK ASCD CLUTCH SWITCH-I

- Turn ignition switch OFF.
- 2. Disconnect ASCD clutch switch harness connector.
- Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
	Fully released	Existed	
1 and 2	Clutch pedal	Slightly de- pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK ASCD CLUTCH SWITCH-II

- Adjust ASCD clutch switch installation. Refer to BR-7, "Inspection and Adjustment".
- 2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
		Fully released	Existed
1 and 2	Clutch pedal	Slightly de- pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

>> Replace ASCD clutch switch. Refer to CL-10, "Exploded View". NO

Component Inspection (Stop Lamp Switch)

1. CHECK STOP LAMP SWITCH-I

- Turn ignition switch OFF. 1.
- 2. Disconnect stop lamp switch harness connector.
- Check the continuity between stop lamp switch terminals under the following conditions.

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[MR18DE (EXCEPT FOR CALIFORNIA)]

Terminals	Condition		Continuity
		Fully released	Not existed
1 and 2	Brake pedal	Slightly de- pressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

- 1. Adjust stop lamp switch installation. Refer to BR-7, "Inspection and Adjustment".
- 2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
		Fully released	Not existed
1 and 2	Brake pedal	Slightly de- pressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to <u>BR-17</u>, "Exploded View".

P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P1574 ASCD VEHICLE SPEED SENSOR

Description INFOID:0000000007770231

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-70, "System Description" for ASCD functions.

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DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1574 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-138, "DTC Logic".
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-321, "M/T MODELS: DTC Logic"
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-330, "DTC Logic"
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-332. "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	Harness or connectors (The CAN communication line is open or shorted.) ABS actuator and electric unit (control unit) TCM ECM	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine.
- Drive the vehicle at more than 40 km/h (25 MPH).

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

3. Check DTC.

Is DTC detected?

YES >> Go to EC-379, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-97, "Diagnosis Description".

Is DTC detected?

NO >> GO TO 2.

YES >> Perform trouble shooting relevant to DTC indicated. EC

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P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

 $2.\mathsf{CHECK}$ DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

Refer to BRC-23, "CONSULT Function".

Is DTC detected?

NO >> INSPECTION END

YES >> Perform trouble shooting relevant to DTC indicated.

P1715 INPUT SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P1715 INPUT SPEED SENSOR

Description INFOID:0000000007770234

ECM receives input shaft revolution signal from TCM via the CAN communication line. ECM uses this signal for engine control.

INFOID:0000000007770235

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1715 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-246, "DTC Logic".
- If DTC P1715 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to EC-250, "DTC Logic".
- If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-330, "DTC Logic".
- If DTC P1715 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-332. "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715	Input speed sensor (TCM output)	Input shaft revolution 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 (Primary speed sensor circuit is open or shorted) TCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Start engine and drive the vehicle at more than 50 km/h (31 MPH) for at least 5 seconds. CAUTION:

Always drive vehicle at a safe speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-381, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-98, "CONSULT Function (TRANSMISSION)".

Is the inspection result normal?

YES >> GO TO 2.

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NO >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM. Refer to TM-228, "Removal and Installation".

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P1715 INPUT SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

>> INSPECTION END

P1805 BRAKE SWITCH

Description INFOID:0000000007770237

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

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DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name DTC detecting condition Pos		Possible cause
P1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	Harness or connectors (Stop lamp switch circuit is open or shorted.) Stop lamp switch

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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.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-383, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770239

1. CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.

Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp	
Fully released	Not illuminated	
Slightly de- pressed	Illuminated	

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Is the inspection result normal?

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

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2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- 3. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal	Glodila	voltage
E114 (M/T) E115 (CVT)	` ′ 1		Battery voltage
	1. 1.		·

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.

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P1805 BRAKE SWITCH

[MR18DE (EXCEPT FOR CALIFORNIA)]

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- Harness connectors E105, M7710 A fuse (No. 9)
- 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.

f 4.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Disconnect ECM harness connector.
- Check the continuity between ECM harness connector and stop lamp switch harness connector.

E	CM	Stop lan	np switch	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E16	99	E114 (M/T) E115 (CVT)	2	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

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

CHECK STOP LAMP SWITCH

Refer to EC-384, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace stop lamp switch. Refer to BR-17, "Exploded View".

6.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Stop Lamp Switch)

INFOID:0000000007770240

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
	Brake pedal	Fully released	Not existed
1 and 2		Slightly de- pressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

- Adjust stop lamp switch installation. Refer to <u>BR-7</u>, "Inspection and Adjustment".
- 2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
		Fully released	Not existed
1 and 2	Brake pedal	Slightly de- pressed	Existed

Is the inspection result normal?

P1805 BRAKE SWITCH

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[MR18DE (EXCEPT FOR CALIFORNIA)]

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to BR-17, "Exploded View".

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P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

Description INFOID:000000007770241

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
P2100	Throttle control motor relay circuit open	ECM detects a 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	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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V.

Witch DTC is detected?

P2100 >> GO TO 2.

P2103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100

- 1. Turn ignition switch ON and wait at least 2 seconds.
- 2. Start engine and let it idle for 5 seconds.
- Check DTC.

Is DTC detected?

YES >> Go to EC-386, "Diagnosis Procedure".

NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

- Turn ignition switch ON and wait at least 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-386, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

USIS Procedure INFOID:0000000007770243

1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

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

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

	ECM		Ground	Voltage
Con	nector	Terminal	Ground	voitage
F7		15	Ground	Battery voltage
OK or NG				_
OK >> GO TO 5.				
NG				

2. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

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

E	СМ	IPDI	M E/R	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F7	15	E15	57	Existed

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

Is the inspection result normal?

>> GO TO 4. YES

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- 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 (No. 64) from IPDM E/R.
- Check 15 A fuse for blown.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace 15 A fuse.

${f 5.}$ CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

Check the voltage between ECM harness connector and ground under the following conditions.

ECM		Ground	Condition	Voltage
Connector	Terminal	Glound	Condition	vollage
F7	2	Ground	Ignition switch: OFF	Approximately 0 V
1 7	2	Giodila	Ignition switch: ON	Battery voltage

OK or NG

>> GO TO 8. OK

NG >> GO TO 6.

$\mathsf{6}.$ CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Disconnect IPDM E/R harness connector.
- Check the continuity between ECM harness connector and IPDM E/R harness connector.

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P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

E	СМ	IPDI	M E/R	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F7	2	E15	54	Existed

5. 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 E8, F1
- 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 GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to <u>PCS-33, "Removal and Installation"</u> (With I-KEY) or <u>PCS-62, "Removal and Installation"</u> (Without I-KEY).

NO >> Repair or replace harness or connectors.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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INFOID:0000000007770246

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.

The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM. ECM controls the throttle valve opening angle in response to driving condition via the throttle control motor.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P2101 is displayed with DTC P2100, first perform the trouble diagnosis for DTC P2100. Refer to <u>EC-386, "DTC Logic"</u>.
- If DTC P2101 is displayed with DTC P2119, first perform the trouble diagnosis for DTC P2119. Refer to <u>EC-395</u>, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2101	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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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-389, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

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NO >> Repair or replace ground connection.

2. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check the voltage between ECM harness connector and ground under the following conditions.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

E	ECM		Condition	Voltage
Connector	Terminal	Ground	Condition	voltage
	F7 2 Ground	Ignition switch: OFF	Approx. 0 V	
Γ/		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.
- 3. Disconnect IPDM E/R harness connector.
- 4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDN	И E/R	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E15	57	F7	15	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 E8, F8
- Harness for open or short between ECM and IPDM E/R
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

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

IPDN	/I E/R	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E15	54	F7	2	Existed

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

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- 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.

7. CHECK FUSE

- 1. Disconnect 15 A fuse (No. 64) from IPDM E/R.
- Check 15 A fuse for blown.

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

YES >> GO TO 8.

NO >> Replace 15 A fuse.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

>> Replace IPDM E/R. Refer to PCS-33, "Removal and Installation" (With I-KEY) or PCS-62, YES "Removal and Installation" (Without I-KEY).

NO >> Repair or replace harness or connectors.

9.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

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

Electric throttle control actuator		ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
	F29 6	F7 -		1	Not existed
F29 -			4	Existed	
			1	Existed	
			4	Not existed	

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

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace.

10.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

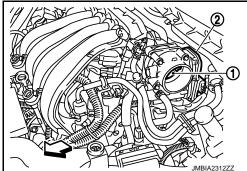
- Remove the intake air duct. Refer to EM-24, "Exploded View".
- 2. Check if foreign matter is caught between the throttle valve (1) and the housing.
- Electric throttle control actuator (2)

Is the inspection result normal?

YES >> GO TO 11.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING: Special

Repair Requirement".



11. CHECK THROTTLE CONTROL MOTOR

Refer to EC-392, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 13.

12. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

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.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Perform <u>EC-392</u>, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000007770247

1. CHECK THROTTLE CONTROL MOTOR

- 1. Turn ignition switch OFF.
- 2. Disconnect electric throttle control actuator harness connector.
- Check the resistance between electric throttle control actuator terminals as per the following.

Terminals	Resistance
5 and 6	Approx. 1 - 15 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.replace electric throttle control actuator

- 1. Replace electric throttle control actuator.
- 2. Perform EC-392, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007770248

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-25, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> END

P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P2118 THROTTLE CONTROL MOTOR

Description INFOID:0000000007770249

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.

The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM. ECM controls the throttle valve opening angle in response to driving conditions via the throttle control motor.

DTC Logic INFOID:0000000007770250

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2118	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)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> 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.
- Check DTC.

Is DTC detected?

YES >> Go to EC-393, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Electric throttle	control actuator	ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
	5	F7	1	Not existed	
F29	6		4	Existed	
1 29			1	Existed	
			4	Not existed	

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P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-394, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 5.

4. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace harness or connectors.

5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace electric throttle control actuator.
- Perform <u>EC-394</u>, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000007770252

1. CHECK THROTTLE CONTROL MOTOR

- 1. Turn ignition switch OFF.
- Disconnect electric throttle control actuator harness connector.
- 3. Check the resistance between electric throttle control actuator terminals as per the following.

Terminals	Resistance	
5 and 6	Approx. 1 - 15 Ω [at 25°C (77°F)]	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.replace electric throttle control actuator

- 1. Replace electric throttle control actuator.
- 2. Perform EC-392, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007770253

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-25, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> END

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

Description INFOID:0000000007770254

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.

The throttle position sensor detects the throttle valve position, and feeds the voltage signal to the ECM. The ECM judges the current opening angle of the throttle valve and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.

DTC Logic INFOID:0000000007770255

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause	E
P2119	Electric throttle control actuator	Α	Electric throttle control actuator does not function properly due to the return spring malfunction.	Electric throttle control actuator	
		В	Throttle valve opening angle in fail-safe mode is not in specified range.		F
		С	ECM detect the throttle valve is stuck open.		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND B

- Turn ignition switch ON and wait at least 1 second.
- Set selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
- Set selector lever to P (CVT) or Neutral (M/T) position.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON and wait at least 1 second.
- Set selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
- Set selector lever to P (CVT) or Neutral (M/T) position. 7.
- Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- 9. Check DTC.

Is DTC detected?

YES >> Go to EC-395, "Diagnosis Procedure".

NO >> GO TO 3.

${f 3.}$ PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

- Turn ignition switch ON and wait at least 1 second.
- Set selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
- Set selector lever to P (CVT) or Neutral (M/T) position.
- Start engine and let it idle for 3 seconds.
- Check DTC.

Is DTC detected?

YES >> Go to EC-395, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- Turn ignition switch OFF.
- Remove the intake air duct. Refer to EM-24, "Exploded View".

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P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

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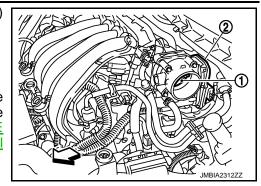
[MR18DE (EXCEPT FOR CALIFORNIA)]

- Check if foreign matter is caught between the throttle valve (1) and the housing.
- Electric throttle control actuator (2)

Is the inspection result normal?

YES NO

- >> GO TO 2.
- - >> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to <u>EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING: Special National Control of the Position Learning in the Posi</u> Repair Requirement".



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- Replace electric throttle control actuator.
- Perform EC-396, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007770257

${f 1}$. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-25, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

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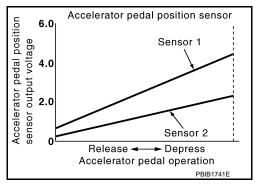
P2122, P2123 APP SENSOR

Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation 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-333, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	Harness or connectors (APP sensor 1 circuit is open or shorted.)
P2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	Accelerator pedal position sensor (APP sensor 1)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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 let it idle for 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-397, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

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NO >> Repair or replace ground connection.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

Disconnect accelerator pedal position (APP) sensor harness connector.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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

APP :	sensor	Ground	Voltage
Connector	Terminal	Glound	vollage
E110	4	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.

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

3.CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

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

APP :	sensor	E(Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E110	2	E16	111	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

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

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

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

APP	sensor	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E110	3	E16	110	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

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

5.CHECK APP SENSOR

Refer to EC-399, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly.
- 2. Perform EC-399, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Component Inspection

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1. CHECK ACCELERATOR PEDAL POSITION SENSOR

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

E	ECM		Condition		Voltage
Connector	Terminal	- Ground Condit		uition	voitage
	110			Fully released	0.6 - 0.9 V
E16	(APP sensor 1 signal)	Ground	Accelerator ped- al	Fully depressed	3.9 - 4.7 V
LIO				Fully released	0.3 - 0.6 V
	(APP sensor 2 signal)			Fully depressed	1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.replace accelerator pedal assembly

- 1. Replace accelerator pedal assembly.
- 2. Perform EC-399, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007770262

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-24, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 3.

3.perform idle air volume learning

Refer to EC-25, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

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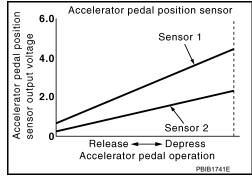
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Description INFOID:000000007770263

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	Harness or connectors (APP sensor 2 circuit is open or shorted.)
P2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	[Crankshaft position sensor (POS) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Battery current sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor • EVAP control system pressure sensor • Battery current sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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 let it idle for 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-400, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770265

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-44, "Circuit Inspection".

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

- Disconnect accelerator pedal position (APP) sensor harness connector.
- Turn ignition switch ON. 2.
- Check the voltage between APP sensor harness connector and ground.

APP :	sensor	Ground	Voltage	
Connector	Terminal	Glodila	voltage	
E110	5	Ground	Approx. 5 V	

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 3.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

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

APP :	sensor	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E110	5	E16	102	Existed

Is the inspection result normal?

YES >> GO TO 4.

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

$oldsymbol{4}.$ CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

E	CM	Sensor			
Connector	Terminal	Name	Connector	Terminal	
	74	Refrigerant pressure sensor	E17	3	
	75	CKP sensor (POS)	F15	1	
F8	76	EVAP control system pressure sensor	B104	3	
	77	Battery current sensor	F53	1	
E16	102	APP sensor	E12	5	

Is the inspection result normal?

>> GO TO 5. YES

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

5. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to EC-249, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-291, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-443, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace malfunctioning component.

O.CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

Turn ignition switch OFF.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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

APP :	sensor	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E110	1	E16	104	Existed

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

Is the inspection result normal?

YES >> GO TO 7.

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

7.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

APP :	sensor	E	Continuity	
Connector Terminal		Connector Terminal		Continuity
E110	6	E16	103	Existed

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

Is the inspection result normal?

YES >> GO TO 8.

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

8.CHECK APP SENSOR

Refer to EC-402, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

>> GO TO 9. NO

REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly.
- Perform EC-403, "Special Repair Requirement".

>> INSPECTION END

10. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770266

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

- Reconnect all harness connectors disconnected.
- Turn ignition switch ON.
- Check the voltage between ECM harness connector and ground.

E	ECM		Condition		Voltage
Connector	Terminal	Ground	Condition		voltage
	110			Fully released	0.6 - 0.9 V
E16	(APP sensor 1 signal)	gnal) Ground sensor 2	Accelerator ped- al	Fully depressed	3.9 - 4.7 V
LIO				Fully released	0.3 - 0.6 V
	(APP sensor 2 signal)			Fully depressed	1.95 - 2.4 V

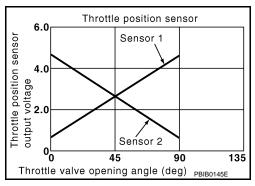
< DTC/CIRCUIT DIAGNOSIS >	[MR18DE (EXCEPT FOR CALIFORNIA)]
Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 2.	A
2.REPLACE ACCELERATOR PEDAL ASSEMBLY	
Replace accelerator pedal assembly. Perform EC 410. "Special Repair Requirement".	EC
2. Perform <u>EC-410, "Special Repair Requirement"</u> .	С
>> INSPECTION END	
Special Repair Requirement	INFOID:0000000007770267
1.PERFORM ACCELERATOR PEDAL RELEASED POSITION	
Refer to EC-24, "ACCELERATOR PEDAL RELEASED POSITION PROPERTY OF THE PROPERTY	ON LEARNING : Special Repair Requirement".
>> GO TO 2.	
2.perform throttle valve closed position lear	NING F
Refer to EC-24, "THROTTLE VALVE CLOSED POSITION LEA	RNING : Special Repair Requirement".
>> GO TO 3.	G
3. PERFORM IDLE AIR VOLUME LEARNING	
Refer to EC-25, "IDLE AIR VOLUME LEARNING: Special Rep	air Requirement".
>> END	
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P2135 TP SENSOR

Description INFOID.000000007770268

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

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



DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-333, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135	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.	Harness or connector (TP sensor 1 or 2 circuit is open or shorted.) Electric throttle control actuator (TP sensor 1 or 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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 let it idle for 1 second.
- 2. Check DTC.

Is DTC detected?

YES >> Go to EC-404, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770270

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect electric throttle control actuator harness connector.
- 2. Turn ignition switch ON.

P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle	control actuator	Ground	Voltage
Connector	Terminal	Ground	voltage
F29	2	Ground Approx.	

EC

Is the inspection result normal?

YES >> GO TO 3.

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

3.check throttle position sensor ground circuit for open and short

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F29	4	F8	36	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

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

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

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

Electric throttle	control actuator	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F29	1	F8	33	Existed
1 29	3	10	34	Existed

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

Is the inspection result normal?

>> GO TO 5. YES

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

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-406, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- Replace electric throttle control actuator.
- 2. Perform EC-406, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

EC-405 Revision: 2011 November

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[MR18DE (EXCEPT FOR CALIFORNIA)]

Component Inspection

INFOID:0000000007770271

1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D (CVT) or 1st (M/T) position.
- 6. Check the voltage between ECM harness connector and ground.

E	CM	Ground	Condition Voltage		Voltage				
Connector	Terminal	Ground			Voltage				
	33 (TP sensor			Fully released	More than 0.36V				
F8	1 signal)	1 signal)	Ground	Cround	Ground		Accelerator	Fully de- pressed	Less than 4.75V
10	34 (TP sensor	Cround	pedal	Fully released	Less than 4.75V				
	2 signal)			Fully de- pressed	More than 0.36V				

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace electric throttle control actuator.
- 2. Perform EC-406, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:00000000007770272

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-25, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> END

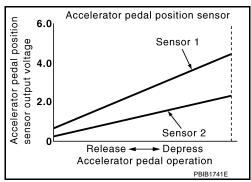
P2138 APP SENSOR

Description INFOID:0000000007770273

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



DTC Logic INFOID:00000000007770274

DTC DETECTION LOGIC

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-333. "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	Harness or connector (APP sensor 1 or 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system sensor circuit is shorted.) (Battery current sensor circuit is shorted.) Accelerator pedal position sensor (APP sensor 1 or 2) Crankshaft position sensor (POS) Refrigerant pressure sensor EVAP control system pressure sensor Battery current sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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 let it idle for 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-408, "Diagnosis Procedure".

NO >> INSPECTION END

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P2138 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Diagnosis Procedure

INFOID:0000000007770275

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect accelerator pedal position (APP) sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between APP sensor harness connector and ground.

APP s	sensor	Ground	Voltage
Connector	Terminal	Ground	vollage
E110	4	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.

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

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Check the voltage between APP sensor harness connector and ground.

APP :	APP sensor		Voltage
Connector	Terminal	Ground	voltage
E110	5	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 4.

4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E110	4	E16	106	Existed

Is the inspection result normal?

YES >> GO TO 5.

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

${f 5}.$ CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

< DTC/CIRCUIT DIAGNOSIS >

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
F8	76	EVAP control system pressure sensor B104		3
	77	Battery current sensor	F53	1
E16	102	APP sensor	E12	5

Is the inspection result normal?

YES >> GO TO 6.

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

6. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to <u>EC-249</u>. "Component Inspection".)
- EVAP control system pressure sensor (Refer to <u>EC-291, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to <u>EC-443</u>, "<u>Diagnosis Procedure</u>".)

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace malfunctioning component.

7.CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between APP sensor harness connector and ECM harness connector as per the following.

Continuity	ECM		APP sensor	
al	Terminal	Connector	Terminal	Connector
Existed	111	E16	2	E110
LXISTEG	104	LIO	1	LIIO

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

Is the inspection result normal?

YES >> GO TO 8.

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

8.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between APP sensor harness connector and ECM harness connector as per the following.

APP	sensor	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E110	3	E16	110	Existed
LIIO	6	LIO	103	LXISIEU

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

Is the inspection result normal?

YES >> GO TO 9.

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

9.CHECK APP SENSOR

Refer to EC-410, "Component Inspection".

Is the inspection result normal?

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< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 11. NO >> GO TO 10.

10. REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly.
- 2. Perform EC-410, "Special Repair Requirement".

>> INSPECTION END

11. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770276

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

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

ECM		Ground	Condition		Voltage
Connector	Terminal	Glound	Con	anton	voltage
	110				0.6 - 0.9 V
E16	103	Ground	Accelerator ped-	Fully depressed	3.9 - 4.7 V
LIO		Glound		Fully released	0.3 - 0.6 V
	(APP sensor 2 signal)			Fully depressed	1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly.
- 2. Perform EC-410, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007770277

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-24, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-24, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-25, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

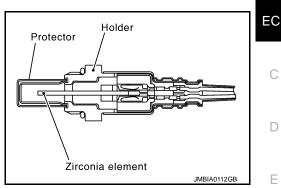
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Description INFOID:0000000007770278

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

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

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



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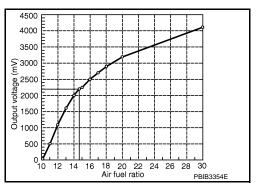
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Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



DTC Logic INFOID:0000000007770279

DTC DETECTION LOGIC

To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored not to be shifted to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause	K
P2A00	Air fuel ratio (A/F) sensor 1 circuit range/performance	 The output voltage computed by ECM from the A/F sensor 1 signal is shifted to the lean side for a specified period. The A/F signal computed by ECM from the A/F sensor 1 signal is shifted to the rich side for a specified period. 		L

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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-26, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- 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 1 minute under no load.
- Let engine idle for 1 minute.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

- 5. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-412, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770280

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK HARNESS CONNECTOR

- Disconnect A/F sensor 1 harness connector.
- Check harness connector for water.

Water should not exit.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness connector.

3.RETIGHTEN A/F SENSOR 1 AND HEATED OXYGEN SENSOR 2

1. Loosen and retighten the A/F sensor 1 and heated oxygen sensor 2. Refer to EM-30, "Exploded View" or EX-5, "Exploded View".

>> GO TO 4.

4. CHECK FOR EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- Listen for an exhaust gas leak before the three way catalyst 2.

Is exhaust gas leak detected?

YES >> Repair or replace malfunctioning parts.

NO >> GO TO 5.

5. CHECK FOR INTAKE AIR LEAK

- Reconnect A/F sensor 1 harness connector.
- Start engine and run it at idle.
- 3. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 6.

6.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to <u>EC-26, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement"</u>.
- Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171or P0172. Refer to <u>EC-220, "DTC Logic"</u> or <u>EC-224, "DTC Logic"</u>.

NO >> GO TO 7.

7. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect A/F sensor 1 harness connector.
- 2. Turn ignition switch ON.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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

A/F se	ensor 1	Ground	Voltage	
Connector	Terminal	Glound	voltage	
F50	4	Ground	Battery voltage	

EC

Is the inspection result normal?

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

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- IPDM E/R harness connector E15
- 10 A fuse (No. 61)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

9.check a/f sensor 1 input signal circuit for open and short

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

A/F ser	nsor 1	ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
F50	1	F8	49	Existed
1 30	2	10	53	LAISIEU

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

A/F ser	nsor 1	Ground	Continuity	
Connector Terminal		Ground	Continuity	
F50	1	Ground	Not existed	
	2	Ground	Not existed	

EC	М	Ground	Continuity	
Connector Terminal		Ground	Continuity	
F8	49	Ground	Not existed	
10	53	Giodila	INOL EXISTED	

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 10.

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

10.CHECK A/F SENSOR 1 HEATER

Refer to EC-145, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11. NO >> GO TO 13.

11. CHECK HEATED OXYGEN SENSOR 2

Check heated oxygen sensor 2. Refer to EC-198, "Component Inspection".

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace heated oxygen sensor 2. Refer to <a>EX-5, "Exploded View".

12. CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace.

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

Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".

CAUTION:

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

Do you have CONSULT?

YES >> GO TO 14. NO >> GO TO 15.

14.CONFIRM A/F ADJUSTMENT DATA

(P)With CONSULT

- 1. Turn ignition switch ON.
- Select "A/F ADJ-B1" in "DATA MONITOR" mode with CONSULT.
- 3. Make sure that "0.000" is displayed on CONSULT screen.

Is "0.000" displayed?

YES >> INSPECTION END

NO >> GO TO 15.

15. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to <u>EC-26</u>, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".

Do you have CONSULT?

YES >> GO TO 16.

NO >> INSPECTION END

16.confirm a/f adjustment data

(P)With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "A/F ADJ-B1" in "DATA MONITOR" mode with CONSULT.
- 3. Make sure that "0.000" is displayed on CONSULT screen.

>> INSPECTION END

Description INFOID:0000000007770281

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).

Refer to EC-70, "System Description" for the ASCD function.

Component Function Check

CHECK FOR ASCD BRAKE SWITCH FUNCTION

(II) With CONSULT

- Turn ignition switch ON.
- Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
- Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly de- pressed	OFF
	brake pedarand dutter pedar (W/T)		ON

₩ Without CONSULT

- Turn ignition switch ON.
- Check the voltage between ECM harness connector terminals.

	ECM				
Connector	+	-	Condition		Voltage
Connector	Terminal	Terminal			
E16	100 (ASCD brake	108	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly de- pressed	Approx. 0 V
	switch signal)		Brake pedar and clutch pedar (IM/T)	Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-415, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT-I

- 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 bra	ake switch	Ground	Voltage
Connector	Terminal	Glound	voltage
E112	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.

NO-1 >> CVT models: GO TO 2. NO-2 >> M/T models: GO TO 3.

2.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E105, M77

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< DTC/CIRCUIT DIAGNOSIS >

- 10 A fuse (No. 2)
- · 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.

3.check ascd clutch switch power supply circuit

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD clutch switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ASCD clutch switch harness connector and ground.

ASCD clu	itch switch	Ground	Voltage
Connector	Terminal	Giodila	voltage
E111	3	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 E105, M77
- 10 A fuse (No. 2)
- · Harness for open or short between ASCD clutch switch and fuse
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT-II

- Turn ignition switch OFF.
- Disconnect ASCD brake switch harness connector.
- Check the continuity between ASCD clutch switch harness connector and ASCD brake switch harness connector.

ASCD clu	ASCD clutch switch		ASCD brake switch	
Connector	Terminal	Connector Terminal		Continuity
E111	4	E112	1	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

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

6.CHECK ASCD CLUTCH SWITCH

Refer to EC-417, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace ASCD clutch switch. Refer to CL-10, "Exploded View".

7.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

ASCD bra	ASCD brake switch		ECM	
Connector	Terminal	Connector	Terminal	Continuity
E112	2	E16	100	Existed

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

8. CHECK ASCD BRAKE SWITCH

Refer to EC-417, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace ASCD brake switch. Refer to BR-17, "Exploded View".

9. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

1. CHECK ASCD BRAKE SWITCH-I

- Turn ignition switch OFF.
- Disconnect ASCD brake switch harness connector.
- 3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
		Fully released	Existed
1 and 2	Brake pedal	Slightly de- pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH-II

- Adjust ASCD brake switch installation. Refer to BR-7, "Inspection and Adjustment".
- Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
		Fully released	Existed
1 and 2	Brake pedal	Slightly de- pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD brake switch. Refer to BR-17, "Exploded View".

Component Inspection (ASCD Clutch Switch)

1. CHECK ASCD CLUTCH SWITCH-I

- 1. Turn ignition switch OFF.
- Disconnect ASCD clutch switch harness connector.
- Check the continuity between ASCD clutch switch terminals under the following conditions.

		Fully released	Existed
1 and 2 Cluto	h pedal	Slightly de- pressed	Not existed

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[MR18DE (EXCEPT FOR CALIFORNIA)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK ASCD CLUTCH SWITCH-II

1. Adjust ASCD clutch switch installation. Refer to BR-7, "Inspection and Adjustment".

2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
		Fully released	Existed
1 and 2	Clutch pedal	Slightly de- pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD clutch switch. Refer to CL-10, "Exploded View".

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ASCD INDICATOR

Description

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.

CRUISE lamp illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.

SET lamp illuminates when 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 ASCD setting.

SET lamp remains lit during ASCD control.

Refer to EC-70, "System Description" for the ASCD function.

Component Function Check

1. ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD indicator	Cor	ndition	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	When vehicle speed: Between 40 km/h (25 MPH) and 190 km/h (118 MPH) (For the Middle East), 40 km/h (25 MPH) and 160 km/h (100 MPH) (Except for the Middle East) Output Description:	ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-419, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK DTC

Check that DTC U1001 is not displayed.

Is DTC detected?

NO >> GO TO 2

YES >> Perform trouble diagnosis for DTC U1001. Refer to EC-138, "DTC Logic".

2. CHECK COMBINATION METER OPERATION

Refer to MWI-6, "METER SYSTEM: System Description".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Check combination meter circuit. Refer to MWI-6, "METER SYSTEM: System Diagram".

3.check intermittent incident

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

COOLING FAN

Description INFOID:000000007770289

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

COOLING FAN MOTOR

Models without A/C

The cooling fan operates at each speed when the current flows in the cooling fan motor as per the following.

Cooling fan Speed	Cooling fan motor terminals		
Cooling lan Speed	(+)	(-)	
	1	3 and 4	
Low (LOM)	2	3 and 4	
Low (LOW)	1 and 2	3	
	1 and 2	4	
High (HI)	1 and 2	3 and 4	

Models with A/C

The cooling fan operates at high (HI) speed when the current flows, and operates at low (LOW) speed when cooling fan motor and the resistor are circuited in series.

Component Function Check

INFOID:0000000007770290

1. CHECK COOLING FAN FUNCTION

(II) With CONSULT

- 1. Turn ignition switch ON.
- Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.
- 3. Touch "LOW" and "Hi" on the CONSULT screen.
- 4. Check that cooling fan operates at each speed.

W Without CONSULT

- 1. Perform IPDM E/R auto active test and check cooling fan motor operation. Refer to PCS-11, "Diagnosis Description" or PCS-40, "Diagnosis Description".
- Check that cooling fan operates at each speed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Refer to EC-420, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007770291

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- 2. Check ground connection E21. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2 .CHECK COOLING FAN MOTOR CIRCUIT

- Disconnect cooling fan motor harness connector.
- 2. Check the continuity between IPDM E/R harness connector and cooling fan motor harness connector.

COOLING FAN

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IPDM	I E/R	Cooling t	Cooling fan motor			
Connector	Terminal	Connector	Terminal	Continuity		
E10	5		1			
E10 -	7	E62	2	Existed	Existed	
E11	10	=	3			
. Check the o				connector and gro		
Cooling fa	an motor	01	O continuity			
Cooling for Connector	an motor Terminal	- Ground	Continuity			
		- Ground Ground	Continuity			
Connector E62	Terminal 4		Existed	er.		
Connector E62 Also check	Terminal 4	Ground	Existed	er.		
Connector E62	Terminal 4 harness for she TO 4.	Ground	Existed	er.		

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground

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

4. CHECK COOLING FAN MOTOR

Refer to EC-421, "Component Inspection".

OK or NG

OK >> GO TO 5.

NG >> Replace cooling fan motor. Refer to CO-18, "Exploded View".

5. CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

OK or NG

OK >> Replace IPDM E/R. Refer to <u>PCS-33</u>, "Removal and Installation" (With I-KEY) or <u>PCS-62</u>, "Removal and Installation" (Without I-KEY).

NG >> Repair or replace harness or connector.

Component Inspection

COOLING FAN MOTOR

1. Disconnect cooling fan motor harness connectors.

2. Supply cooling fan motor terminals with battery voltage and check operation.

	Speed	term	inals
	opeed	(+)	(–)
Cooling fan mo-	Low	1	4
		2	3
	High	1 and 2	3 and 4

Cooling fan motor should operate.

If NG, replace cooling fan motor. Refer to <a>CO-18, "Exploded View".

[MR18DE (EXCEPT FOR CALIFORNIA)]

ELECTRICAL LOAD SIGNAL

Description INFOID.000000007770293

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred via the CAN communication line.

Component Function Check

INFOID:0000000007770294

1. CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

- 1. Turn ignition switch ON.
- 2. Connect CONSULT and select "DATA MONITOR" mode.
- 3. Select "LOAD SIGNAL" and check indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Rear window defogger switch	ON	ON
LOAD GIGINAL	iteal willdow delogger switch	OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-422, "Diagnosis Procedure".

2. CHECK LIGHTING SWITCH FUNCTION

Check "LOAD SIGNAL" indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Lighting switch	ON at 2nd position	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to EC-422, "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	Heater fan control switch	ON	ON
SW	Treater fair control switch	OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-422, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007770295

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-422, "Component Function Check".

Which circuit is related to the incident?

Rear window defogger>>GO TO 2.

Headlamp>>GO TO 3.

Heater fan>>GO TO 4.

2. CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to DEF-3, "Work Flow".

ELECTRICAL LOAD SIGNAL

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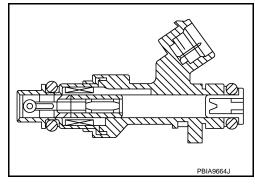
[MR18DE (EXCEPT FOR CALIFORNIA)]

>> INSPECTION END	A
3.CHECK HEADLAMP SYSTEM	
Refer to EXL-5, "Work Flow".	EC
>> INSPECTION END	
4. CHECK HEATER FAN CONTROL SYSTEM	C
Refer to <u>HA-3, "Work Flow"</u> . >> INSPECTION END	D
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FUEL INJECTOR

Description INFOID.000000007770296

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



Component Function Check

INFOID:0000000007770297

1. INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.

NO >> Go to EC-424, "Diagnosis Procedure".

2. CHECK FUEL INJECTOR FUNCTION

(F)With CONSULT

- 1. Start engine.
- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- 3. Make sure that each circuit produces a momentary engine speed drop.

⊗Without CONSULT

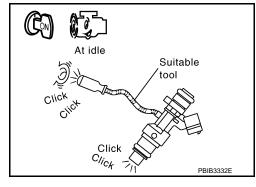
- 1. Let engine idle.
- 2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-424, "Diagnosis Procedure".



Diagnosis Procedure

INFOID:0000000007770298

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- Disconnect fuel injector harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between fuel injector harness connector and ground.

FUEL INJECTOR

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	Fuel injector			Voltogo
Cylinder	Connector	Terminal	- Ground	Voltage
1	F37	1		
2	F38	1	Ground	Battery voltage
3	F39	1	Ground	Battery voltage
4	F40	1	-	

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Is the inspection result normal?

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

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2.DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R harness connector E15
- 15 A fuse (No. 62)
- Harness for open or short between fuel injector and fuse

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

3. 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			E(CM	Continuity
Cylinder	Connector	Terminal	Connector	Terminal	Continuity
1	F37	2		31	
2	F38	2	F7	30	Existed
3	F39	2	17	29	LXISIEU
4	F40	2		25	

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

Is the inspection result normal?

YES >> GO TO 4.

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

4. CHECK FUEL INJECTOR

Refer to EC-425, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning fuel injector. Refer to EM-37, "Exploded View".

5. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to <u>PCS-33, "Removal and Installation"</u> (With I-KEY) or <u>PCS-62, "Removal and Installation"</u> (Without I-KEY).

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

Component Inspection

INFOID:0000000007770299

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1. CHECK FUEL INJECTOR

- Turn ignition switch OFF.
- 2. Disconnect fuel injector harness connector.

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FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

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3. Check resistance between fuel injector terminals as per the following.

Terminals	Resistance
1 and 2	11.1 - 14.5 Ω [at 10 - 60°C (50 - 140°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector. Refer to EM-37, "Exploded View".

[MR18DE (EXCEPT FOR CALIFORNIA)]

FUEL PUMP

Description INFOID:0000000007770300

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓
Battery	Battery voltage*		Fuel pump

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

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine start ability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

Component Function Check

1. CHECK FUEL PUMP FUNCTION

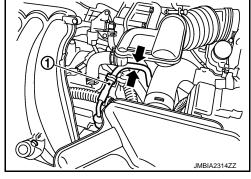
- Turn ignition switch ON.
- Pinch fuel feed hose (1) with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

YES >> INSPECTION END

>> EC-427, "Diagnosis Procedure". NO



Diagnosis Procedure

${f 1}$.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

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

E	СМ	Ground	Voltage	
Connector	Terminal	Glound	voltage	
F7	23	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

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- Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector E13.
- 3. Turn ignition switch ON.
- 4. Check the voltage between IPDM E/R harness connector and ground.

IPDN	/I E/R	Ground	Voltage
Connector	Terminal	Glound	vollage
E13	31	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness or connectors E8, F1
- 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 FUEL PUMP POWER SUPPLY CIRCUIT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 4. Turn ignition switch ON.
- 5. Check the voltage between "fuel level sensor unit and fuel pump" harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage	
Connector	Terminal	Ground	voltage	
B40	1	Ground	Battery voltage should exist 1 second after ignition switch is turn ON.	

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 5.

5. CHECK FUSE

- Turn ignition switch OFF.
- 2. Disconnect 15 A fuse (No. 60) from IPDM E/R.
- Check 15 A fuse.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace15 A fuse.

6.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

- Disconnect IPDM E/R harness connector E15.
- 2. Check the continuity between IPDM E/R harness connector and "fuel level sensor unit and fuel pump" harness connector.

IPDM E/R		Fuel level sensor unit and fuel pump		Continuity		
Connector	Terminal	Connector Terminal				Continuity
E15	55	B40	1	Existed		

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

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 7.

FUEL PUMP

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7. DETECT MA	LFUNCTIONIN	G PART			А
Check the followHarness conneHarness conne	ectors B1, M18 ectors M77, E10				EC
 Harness for op 	pen or short bet	ween IPDM E/F	R and "fuel lev	el sensor unit and fuel pump"	EC
>> Rep	pair open circuit L PUMP GROU	•	er in harness	or connectors.	С
1. Check the c	continuity betwe	en "fuel level se	ensor unit and	fuel pump" and ground.	D
Fuel level sensor u	ınit and fuel pump	Ground	Continuity	-	
Connector	Terminal			_	Е
B40	3	Ground	Existed	_	
	arness for short	to power.			_
Is the inspection YES >> GO					F
	pair open circuit	or short to pow	er in harness	or connectors.	
9.CHECK FUE	L PUMP				G
Refer to EC-429), "Component I	nspection".			
Is the inspection	result normal?				Н
YES >> GO			lfuolouses" [Defeate CL E "Evaleded View"	
NO >> Rep 10.CHECK IN			i luei pump . i	Refer to FL-5, "Exploded View".	
					- 1
Refer to GI-41, '	intermittent inc	ident".			
Is the inspection	result normal?				J
YES >> Rep	olace IPDM E/F			oval and Installation" (With I-KEY) or PCS-62,	
	moval and Insta pair or replace h				K
_	·	arriess or comm	eciors.		
Component I	inspection			INFOID:000000007770303	
1. CHECK FUE	L PUMP				L
1. Turn ignition	n switch OFF.			-	
	"fuel level sense			ss connector. el pump" terminals as per the following.	\mathbb{N}
3. Check lesis	dance between	luei levei selis	or uriit ariu rut	er pump terminais as per the following.	
Terminals	Resist	ance			N
1 and 3	0.2 - 5.0 Ω [at	25°C (77°F)]			IA
Is the inspection	result normal?				
	PECTION END				0
NO >> Rep	place "fuel level	sensor unit and	I fuel pump". F	Refer to <u>FL-5, "Exploded View"</u> .	
					Р
					-

IGNITION SIGNAL

Description INFOID:000000007770304

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.

Component Function Check

INFOID:0000000007770305

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT: GO TO 2.

YES-2 >> Without CONSULT: GO TO 3.

NO >> Go to EC-430, "Diagnosis Procedure".

2.ignition signal function

(P)With CONSULT

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-430, "Diagnosis Procedure".

3. IGNITION SIGNAL FUNCTION

(X) Without CONSULT

- 1. Let engine idle.
- Read the voltage signal between ECM harness connector and ground.

ECM		Ground	Voltage signal
Connector	Terminal	Ground	voltage signal
	17	Ground	
	18		
- 7	21		
F7	22		≥ 2.0 V/DIV 50 ns/DIV T PBIA9265J

NOTE:

The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-430, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007770306

1. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

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

ECM		Ground	Voltage	
Connector	Terminal	Giodila	vollage	
E16	105	Ground	Battery voltage	

IGNITION SIGNAL

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Is the inspection result normal?

YES >> GO TO 2.

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

2.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- Disconnect Condenser harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between condenser harness connector and ground.

Condenser		Ground	Voltage	
Connector	Terminal	Ground	voltage	
F13	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector E43.
- 3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

IPDM E/R		Cond	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E14	44	F13	1	Existed

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

Is the inspection result normal?

YES >> Go to EC-134, "Diagnosis Procedure".

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- IPDM E/R harness connector E43
- Harness for open or short between IPDM E/R and condenser

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

5. CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Check the continuity between Condenser harness connector and ground.

Condenser		Ground	Continuity	
Connector	Terminal	Glodila	Continuity	
F13	F13 2		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 ground or short to power in harness or connectors.

6.CHECK CONDENSER

Refer to EC-434, "Component Inspection (Condenser)".

Is the inspection result normal?

YES >> GO TO 7.

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NO >> Replace condenser.

7.check ignition coil power supply circuit-v

- 1. Reconnect all harness connectors disconnected.
- Disconnect ignition coil harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ignition coil harness connector and ground.

Ignition coil			Ground	Voltage	
Cylinder	Connector	Connector Terminal		voltage	
1	F33	3			
2	F34	3	Ground	Battery voltage	
3	F35	3	Giouna		
4	F36	3			

Is the inspection result normal?

YES >> GO TO 8.

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

8.CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity	
Cylinder	Connector	Terminal	Glound	Continuity	
1	F33	2			
2	F34	2	Ground	Existed	
3	F35	2	Giouna		
4	F36	2			

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

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

9. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect ECM harness connector.
- Check the continuity between ECM harness connector and ignition coil harness connector.

Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	Continuity
1	F33	1		17	
2	F34	1	F7	18	Existed
3	F35	1	Г	22	LXISIEU
4	F36	1		21	

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

10.check ignition coil with power transistor

Refer to EC-433, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> GO TO 11.

IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-42, "Exploded View".

11. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000007770307

1.CHECK IGNITION COIL WITH POWER TRANSISTOR-I

- Turn ignition switch OFF.
- Disconnect ignition coil harness connector. 2.
- Check resistance between ignition coil terminals as per the following.

Terminals	Resistance [Ω at 25°C (77°F)]
1 and 2	Except 0 or ∞
1 and 3	Except 0
2 and 3	Ехсері О

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-42, "Exploded View".

2.CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

- Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- Remove fuel pump fuse in IPDM E/R to release fuel pressure.

NOTE:

Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

- 4. Start engine.
- 5. After engine stalls, crank it two or three times to release all fuel pressure.
- 6. Turn ignition switch OFF.
- 7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 8. Remove ignition coil and spark plug of the cylinder to be checked.
- 9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 10. Connect spark plug and harness connector to ignition coil.
- 11. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 -0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

• During the operation, always stay 0.5 cm (19.7 in) away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.

13 - 17 mm (0.52-0.66 in) Grounded metal portion (Cylinder head, cylinder block, etc.) JMBIA0066GB

 It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken. NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> INSPECTION END EC

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IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-42, "Exploded View".

Component Inspection (Condenser)

INFOID:0000000007770308

1. CHECK CONDENSER

- 1. Turn ignition switch OFF.
- 2. Disconnect condenser harness connector.
- 3. Check resistance between condenser terminals as per the following.

Terminals	Resistance
1 and 2	Above 1 MΩ [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Condenser.

MALFUNCTION INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

MALFUNCTION INDICATOR LAMP

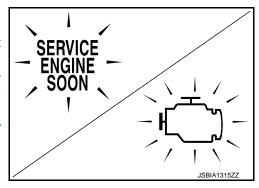
Description INFOID:0000000007770309

The Malfunction Indicator Lamp (MIL) is located on the combination

The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.

When the engine is started, the MIL should go off. If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.

For details, refer to EC-113, "DIAGNOSIS DESCRIPTION: Malfunction Indicator Lamp (MIL)".



Component Function Check

1. CHECK MIL FUNCTION

- Turn ignition switch ON.
- Make sure that MIL lights up.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-435, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK DTC

Check that DTC UXXXX is not displayed.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble diagnosis for DTC UXXXX.

2. CHECK DTC WITH METER

Refer to MWI-30, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-90, "Removal and Installation".

NO >> Repair or replace. EC

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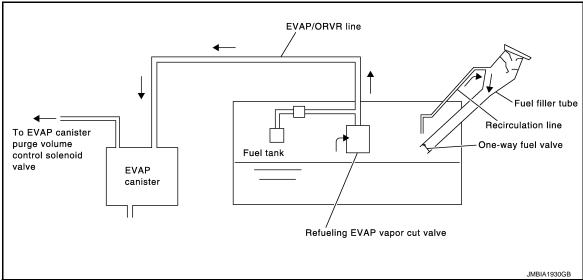
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INFOID:0000000007770311

EC-435 2012 CUBE

Revision: 2011 November

Description INFOID:000000007770312



From the beginning of refueling, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve and EVAP/ORVR line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

WARNING:

When conducting inspections below, be sure to observe the following:

- Put a "CAUTION: FLAMMABLE" sign in workshop.
- Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Be sure to furnish the workshop with a CO2 fire extinguisher.

CAUTION:

- Before removing fuel line parts, carry out the following procedures:
- Put drained fuel in an explosion-proof container and put lid on securely.
- Release fuel pressure from fuel line. Refer to EC-485, "Inspection".
- Disconnect battery ground cable.
- Always replace O-ring when the fuel gauge retainer is removed.
- Do not kink or twist hose and tube when they are installed.
- Do not tighten hose and clamps excessively to avoid damaging hoses.
- · After installation, run engine and check for fuel leaks at connection.
- Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically.
 Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

Component Function Check

INFOID:0000000007770313

1. CHECK ORVR FUNCTION

Check whether the following symptoms are present.

- Fuel odor from EVAP canister is strong.
- Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Is any symptom present?

YES >> Go to EC-436, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770314

1.INSPECTION START

Check whether the following symptoms are present.

A: Fuel odor from EVAP canister is strong.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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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 8.

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 1.9 kg (4.2 lb).

Is the inspection result normal?

YES >> GO TO 3.

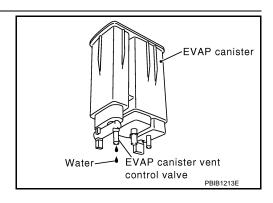
NO >> GO TO 4.

3. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 4. NO >> GO TO 7.



4. REPLACE EVAP CANISTER

Replace EVAP canister with a new one. Refer to FL-14, "Removal and Installation".

>> GO TO 5.

5. CHECK DRAIN FILTER

Refer to EC-441, "Component Inspection (Drain filter)".

Is the inspection result normal?

OK >> GO TO 6.

NO >> Replace drain filter.

6. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

7. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-439, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

8. 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 1.9 kg (4.2 lb).

Is the inspection result normal?

Revision: 2011 November

EC-437 2012 CUBE

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

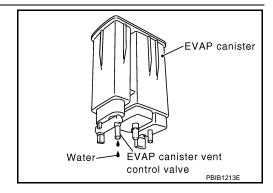
YES >> GO TO 9. NO >> GO TO 10.

9. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

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



10. REPLACE EVAP CANISTER

Replace EVAP canister with a new one. Refer to FL-14, "Removal and Installation".

>> GO TO 11.

11. CHECK DRAIN FILTER

Refer to EC-441, "Component Inspection (Drain filter)".

Is the inspection result normal?

OK >> GO TO 12.

NO >> Replace drain filter.

12. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

13. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 14.

NO >> Repair or replace hoses and tubes.

14. CHECK RECIRCULATION LINE

Check recirculation line for clogging, dents and cracks.

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace fuel filler tube.

15. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-439, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

16. CHECK FUEL FILLER TUBE

Check fuel filler tube and hose connected to the fuel tank for clogging, dents and cracks.

Is the inspection result normal?

YES >> GO TO 17.

NO >> Replace fuel filler tube.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

17. CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair or replace one-way fuel valve with fuel tank.

18. CHECK ONE-WAY FUEL VALVE-II

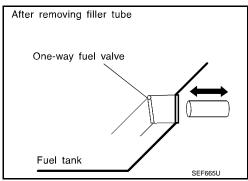
- 1. Make sure that fuel is drained from the tank.
- Remove fuel filler tube and hose. Refer to <u>FL-5, "Exploded View"</u>.
- Check one-way fuel valve for operation as per the following.
 When a stick is inserted, the valve should open, when removing stick it should close.

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.



Component Inspection (Refueling EVAP vapor cut valve)

INFOID:0000000007770315

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK REFUELING EVAP VAPOR CUT VALVE

(P)With CONSULT

- 1. Remove fuel tank. Refer to FL-9, "Removal and Installation".
- 2. 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.
- 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.
- 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.

- Put fuel tank upside down.
- Apply vacuum pressure to hose end [-13.3 kPa (-0.136 kg/cm³, -1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.

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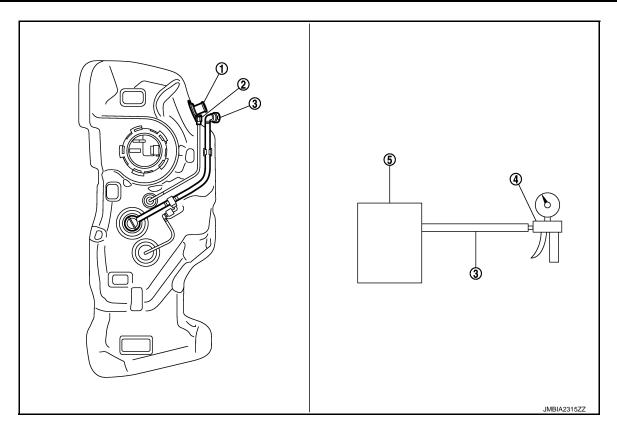
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1. Filler tube

- 2. Recirculation line
- 5. Fuel tank

3. EVAP/ORVR line

Is the inspection result normal?

Vacuum/pressure handy pump

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

3. CHECK REFUELING EVAP VAPOR CUT VALVE

♥Without CONSULT

- 1. Remove fuel tank. Refer to FL-9, "Removal and Installation".
- 2. 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.
- 3. Check refueling EVAP vapor cut valve for being stuck to close as per the following.

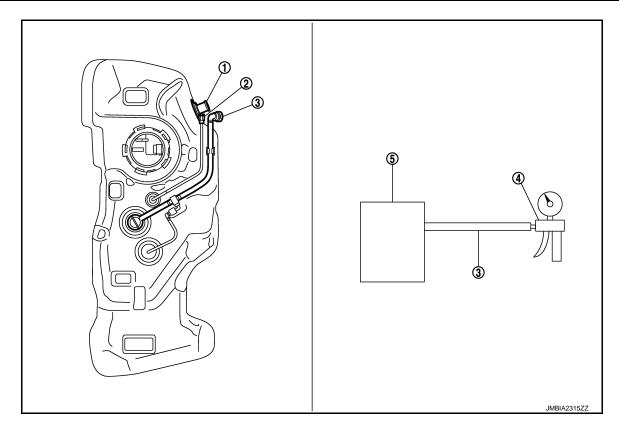
 Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
- 4. Check refueling EVAP vapor cut valve for being stuck to open as per the following.
- Connect vacuum pump to hose end.
- Remove fuel gauge retainer with fuel gauge unit.

Always replace O-ring with new one.

- Put fuel tank upside down.
- Apply vacuum pressure to hose end [–13.3 kPa (–0.136 kg/cm³, –1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]



1. Filler tube

- Recirculation line
- 4. Vacuum/pressure handy pump
- 5. Fuel tank

3. EVAP/ORVR line

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

Component Inspection (Drain filter)

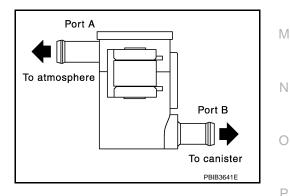
1. CHECK DRAIN FILTER

- 1. Check visually for insect nests in the drain filter air inlet.
- 2. Check visually for cracks or flaws in the appearance.
- 3. Check visually for cracks or flaws in the hose.
- 4. Blow air into port A and check that it flows freely out of port B.
- Block port B.
- 6. Blow air into port A and check that there is no leakage.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace drain filter.



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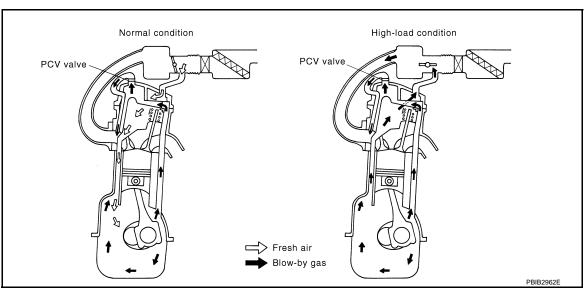
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INFOID:0000000007770316

Revision: 2011 November EC-441

POSITIVE CRANKCASE VENTILATION

Description INFOID:000000007770317



This system returns blow-by gas to the intake manifold.

The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

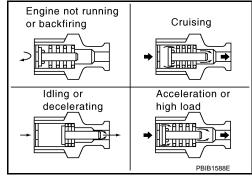
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

The ventilating air is drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



Component Inspection

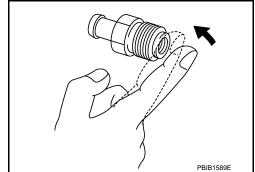
1. CHECK PCV VALVE

With engine running at idle, remove PCV valve from rocker cover (Refer to <u>EM-42</u>, "<u>Exploded View</u>"). A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.

Is the inspection result normal?

YES >> INSPECTION END

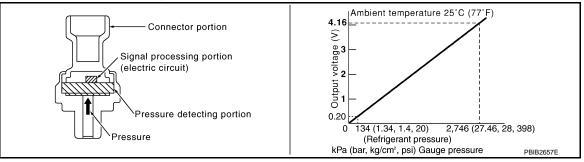
NO >> Replace PCV valve. Refer to EM-42, "Exploded View".



REFRIGERANT PRESSURE SENSOR

Description INFOID:0000000007770319

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



Component Function Check

1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

- Start engine and warm it up to normal operating temperature.
- Turn A/C switch and blower fan switch ON.
- Check the voltage between ECM harness connector and ground.

	ECM	Ground	Voltage	
Connector	Connector Terminal		voltage	
F8	41 (Refrigerant pressure sensor signal)	Ground	1.0 - 4.0V	

Is the inspection result normal?

YES >> INSPECTION END

>> Go to EC-443, "Diagnosis Procedure". NO

Diagnosis Procedure

${f 1}$.CHECK GROUND CONNECTION

- 1. Turn A/C switch and blower fan switch OFF.
- 2. Stop engine.
- Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YFS >> GO TO 2.

NO >> Repair or replace ground connection.

2.check refrigerant pressure sensor power supply circuit

- Disconnect refrigerant pressure sensor harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pr	essure sensor	Ground	Voltage
Connector	Terminal	Glound	voltage
E49	3	Ground	Approx. 5 V

Is the inspection result normal?

>> GO TO 4. YES

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REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F1. E8
- Harness for open or short between ECM and refrigerant pressure sensor
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Refrigerant pr	Refrigerant pressure sensor		ECM	
Connector	Terminal	Connector Terminal		Continuity
E49	1	F8	48	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 E8. F1
- · Harness for open or short between ECM and refrigerant pressure sensor
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between ECM harness connector and refrigerant pressure sensor harness connector.

Refrigerant p	Refrigerant pressure sensor		ECM	
Connector	Terminal	Connector Terminal		Continuity
E49	2	F8	41	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.

1. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- · Harness for open or short between ECM and refrigerant pressure sensor
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor. Refer to <u>HA-40, "REFRIGERANT PRESSURE SENSOR: Removal and Installation"</u>.

NO >> Repair or replace.

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ECU DIAGNOSIS INFORMATION

ECM

Reference Value EC

VALUES ON THE DIAGNOSIS TOOL

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	C	Values/Status	
ENG SPEED	Run engine and compare CONSL	Almost the same speed as the tachometer indication.	
MAS A/F SE-B1	See EC-127, "Diagnosis Procedure"		
B/FUEL SCHDL	See EC-127, "Diagnosis Procedure"		
A/F ALPHA-B1	See EC-127, "Diagnosis Procedure"		
COOLAN TEMP/S	Engine: After warming up		More than 70°C (158F)
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
HO2S2 (B1)	are met.	00 rpm quickly after the following conditions	0 - 0.3 V ←→ Approx. 0.6 - 1.0 V
HO2S2 MNTR (B1)	Engine: After warming up After keeping engine speed betwe idle for 1 minute under no load	en 3,500 and 4,000 rpm for 1 minute and at	$LEAN \longleftrightarrow RICH$
VHCL SPEED SE	Turn drive wheels and compare C cation.	ONSULT value with the speedometer indi-	Almost the same speed as speedometer indication
BATTERY VOLT	Ignition switch: ON (Engine stopped)	ed)	11 - 14 V
ACCEL SEN 1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9 V
ACCEL SEN I		Accelerator pedal: Fully depressed	4.0 - 4.8 V
ACCEL SEN 2*1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9 V
ACCEL SEN 2"		Accelerator pedal: Fully depressed	3.9 - 4.8 V
	Ignition switch: ON (Engine stopped) Selector lever position: D (CVT) or 1st (M/T)	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 1-B1		Accelerator pedal: Fully depressed	Less than 4.75 V
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 2-B1* ¹	(Engine stopped)Selector lever position: D (CVT) or 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75 V
START SIGNAL	• Ignition switch: $ON \rightarrow START \rightarrow O$	ON	$OFF \to ON \to OFF$
CLED THE DOC	Ignition switch: ON	Accelerator pedal: Fully released	ON
CLSD THL POS	(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
P/N POSI SW	Ignition switch: ON	Selector lever position: P or N (CVT) or Neutral (M/T)	ON
		Selector lever position: Except above	OFF

ECM

Monitor Item	C	ondition	Values/Status
PW/ST SIGNAL	Engine: After warming up, idle the	Steering wheel: Not being turned	OFF
	engine	Steering wheel: Being turned	ON
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON
LOAD SIGNAL	ignition switch. ON	Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	• Ignition switch: $ON \rightarrow OFF \rightarrow ON$		$ON \to OFF \to ON$
LIEATED FAN CVA	Engine: After warming up, idle the	Heater fan switch: ON	ON
HEATER FAN SW	engine	Heater fan switch: OFF	OFF
DDAKE CW	a Ignition quitable ON	Brake pedal: Fully released	OFF
BRAKE SW	Ignition switch: ON	Brake pedal: Slightly depressed	ON
	Engine: After warming up	Idle	2.0 - 3.0 msec
INJ PULSE-B1	 Selector lever position: P or N (CVT) or Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	1.9 - 2.9 msec
	Engine: After warming up	Idle	8 - 18°BTDC
IGN TIMING	 Selector lever position: P or N (CVT) or Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	25 - 45°BTDC
	Engine: After warming up	Idle	10 - 35%
CAL/LD VALUE	 Selector lever position: P or N (CVT) or Neutral (M/T) Air conditioner switch: OFF No load 	2,500 rpm	10 - 35%
	Engine: After warming up	Idle	1.0 - 4.0 g/s
MASS AIRFLOW	 Selector lever position: P or N (CVT) or Neutral (M/T) Air conditioner switch: OFF No load 	2,500 rpm	2.0 - 10.0 g/s
	Engine: After warming up	Idle	0%
PURG VOL C/V	 Selector lever position: P or N (CVT) or Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	0 - 50%
	Engine: After warming up	Idle	−5 - 5°CA
INT/V TIM (B1)	 Selector lever position: P or N (CVT) or Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0 - 40°CA
	Engine: After warming up	Idle	0 - 2%
INT/V SOL (B1)	 Selector lever position: P or N (CVT) or Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0 - 90%
	• Engine Afterware idla (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 Engine running or cranking	switch: ON	ON
	Except above		OFF
THRTL RELAY	Ignition switch: ON		ON

ECM

Monitor Item	C	ondition	Values/Status
		Engine coolant temperature is 98°C (208°F) or less	OFF
COOLING FAN	 Engine: After warning up, idle the engine Air conditioner switch: OFF 	Engine coolant temperature is between 98°C (208°F) and 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH
HO2S2 HTR (B1)	 Engine speed: Below 3,600 rpm a Engine: After warming up Keeping the engine speed betwee idle for 1 minute under no load 	fter the following conditions are met. on 3,500 and 4,000 rpm for 1 minute and at	ON
VEHICLE SPEED	Turn drive wheels and compare C cation.	ONSULT value with the speedometer indi-	Almost the same speed as the speedometer indication
IDL A/V LEARN	Engine: running	Idle air volume learning has not been performed yet.	YET
IDE AV LEAKN	Carigine, running	Idle air volume learning has already been performed successfully.	CMPLT
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	0 - 65,535 km (0 - 40,723 miles)
A/F S1 HTR (B1)	Engine: After warming up, idle the (More than 140 seconds after star)		4 - 100%
AC PRESS SEN	Engine: IdleBoth A/C switch and blower fan sv	witch: ON (Compressor operates)	1.0 - 4.0 V
EVAP SYS PRES	Ignition switch: ON		Approx 1.8 - 4.8 V
VENT CONT/V	Ignition switch: ON		OFF
I/P PULLY SPD	Vehicle speed: More than 20 km/h	Almost the same speed as the tachometer indication.	
A/F ADJ-B1	Engine: Running		-0.330 - 0.330
FUEL T/TMP SE	Ignition switch: ON	Indicates fuel tank temperature.	
INT/A TEMP SE	Ignition switch: ON		Indicates intake air temperature.
FUEL LEVEL SE	Ignition switch: ON		Depending on fuel level of fuel tank.
BAT CUR SEN	 Engine speed: Idle Battery: Fuel charged*² Selector lever: P or N (CVT), Neut Air conditioner switch: OFF No load 	tral (M/T)	Approx 2,600 - 3,500 mV
ALT DUTY	Engine: Idle		0 - 80%
ALT DUTY SIG	Power generation voltage variable	control: Operating	ON
ALI DUTT SIG	Power generation voltage variable	control: Not operating	OFF
VHCL SPEED SE	Turn drive wheels and compare C cation.	ONSULT value with the speedometer indi-	Almost the same speed as the speedometer indication.
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed.
MAIN SW	Ignition switch: ON	MAIN switch: pressed	ON
	Igilition Switten. Olv	MAIN switch: Released	OFF
CANCEL SW	Ignition switch: ON	CANCEL switch: pressed	ON
	ignition divitori. Ort	CANCEL switch: Released	OFF
SET SW	Ignition switch: ON	SET/COAST switch: pressed	ON
J_1 JVV		SET/COAST switch: Released	OFF

Monitor Item	C	Condition	Values/Status
DE011145/4.00.014		RESUME/ACCELERATE switch: pressed	ON
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Released	OFF
BRAKE SW1		Brake pedal: Fully released (CVT) Brake pedal and clutch pedal: Fully released (M/T)	ON
(ASCD brake switch)	Ignition switch: ON	Brake pedal: Slightly depressed (CVT) Brake pedal and/or clutch pedal: Slightly depressed (M/T)	OFF
BRAKE SW2	Leaving and the CNI	Brake pedal: Fully released	OFF
(stop lamp switch)	Ignition switch: ON	Brake pedal: Slightly depressed	ON
VHCL SPD CUT	Ignition switch: ON		NON
LO SPEED CUT	Ignition switch: ON		NON
AT OD MONITOR	Ignition switch: ON		OFF
AT OD CANCEL	Ignition switch: ON		OFF
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time \rightarrow at the 2nd time	$ON \to OFF$
	MAIN switch: ON Vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Operating	ON
SET LAMP		ASCD: Not operating	OFF
THRTL STK CNT B1	NOTE: The item is indicated, but not used.	_	
EVAP LEAK DIAG	Ignition switch: ON	Indicates the condition of EVAP leak diagnosis.	
EVAP DIAG READY	Ignition switch: ON	Indicates the ready condition of EVAP leak diagnosis.	
1100 C0 DIA C4 (B4)	DTC P0139 self-diagnosis (delayed response) is incomplete.		INCMP
HO2 S2 DIAG1 (B1)	DTC P0139 self-diagnosis (delayed	CMPLT	
1100 00 DIA 00 (D4)	DTC P0139 self-diagnosis (slow res	ponse) is incomplete.	INCMP
HO2 S2 DIAG2 (B1)	DTC P0139 self-diagnosis (slow res	ponse) is complete.	CMPLT
A/F SEN1 DIAG1	DTC P015A and P015B self-diagnos	sis is incomplete.	INCMP
(B1)	DTC P015A and P015B self-diagnos	sis is complete.	CMPLT
A/F SEN1 DIAG2	DTC P014C and P014D self-diagno	sis is incomplete.	INCMP
(B1)	DTC P014C and P014D self-diagnosis is complete.		CMPLT
A/F SEN1 DIAG3	The vehicle condition is not within the diagnosis range of DTC P014C, P014D,P015A or P015B.		ABSNT
(B1)	The vehicle condition is within the diagnosis range of DTC P014C, P014D, P015A or P015B.		PRSNT
SYSTEM 1 DIAG-	DTC P117A self-diagnosis is incomp	olete.	INCMP
NOSIS A B1	DTC P117A self-diagnosis is comple	ete.	CMPLT
SYSTEM 1 DIAG-	DTC P117A self-diagnosis is on star	ndby.	ABSENT
NOSIS B B1	DTC P117A self-diagnosis is under diagnosis.		PRSENT

^{*:} 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.

^{*:} Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3. "How to Handle Battery".

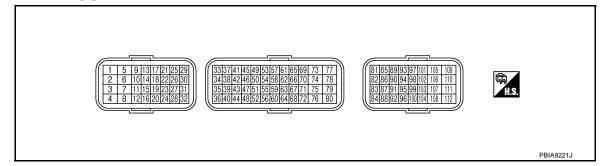
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TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

- ECM is located in the engine room left side near battery.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT.

Tern	minal No.	Description			Volus	F
+	-	Signal name	Input/ Output	Condition	Value (Approx.)	(
1 (P)	108 (B)	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	3.2 V★ 1mSec/div 5V/div JMBIA0324GB	ŀ
2 (SB)	108 (B)	Throttle control motor re- lay power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	
4 (L)	108 (B)	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	1.8 V★ 5mSec/div 5V/div JMBIA0326GB	ŀ
5 (G)	59 (O)	Heated oxygen sensor 2 heater	Output	 [Engine is running] Engine speed: Below 3,600 rpm after the following conditions are met Engine: after warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	10 V★ 50mSec/div 10V/div JMBIA0325GB	N
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)	F

Tern	ninal No.	Description			Volue
+	_	Signal name	Input/ Output	Condition	Value (Approx.)
8 (G)	53 (LG)	A/F sensor 1 heater	Output	 [Engine is running] Warm-up condition Engine speed: Idle speed (More than 140 seconds after starting engine) 	2.9 - 8.8 V★ 50mSec/div 10V/div JMBIA0325GB
9 (P)		EVAP canister purge vol- ume control solenoid	Output	[Engine is running]Idle speedAccelerator pedal: Not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div 10V/div JMBIA0327GB
()		valve		[Engine is running]Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)	10 V★ 50mSec/div 10V/div JMBIA0328GB
11 (B)	_	ECM ground	_	_	_
14 (L)	108 (B)	PNP signal	Input	[Ignition switch: ON] • Selector lever: P or N (CVT), Neutral (M/T)	BATTERY VOLTAGE (11 - 14 V)
()				[Ignition switch: ON] • Selector lever: Except above	0 V
15 (Y)	108 (B)	Throttle control motor re- lay	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V) 0 - 1.0 V
17 (R)	Ignition signal No. 1 Ignition signal No. 2 108 (B)	Ignition signal No. 1		[Engine is running] • Warm-up condition • Idle speed NOTE:	0 - 0.3 V★ 50mSec/div
18 (LG)		Output	The pulse cycle changes depending on rpm at idle	2V/div JMBIA0329GB	
21 (G)	(0)	Ignition signal No. 4		[Engine is running] • Warm-up condition	0.2 - 0.5 V★ 50mSec/div
22 (SB)	Ignition signal No. 3			Engine speed: 2,500 rpm	2V/div JMBIA0330GB

ECM

Term	inal No.	Description			Value
+ -		Signal name	Input/ Output	Condition	(Approx.)
23 (GR)	108 (B)	Fuel pump relay	Output	[Ignition switch: ON]For 1 second after turning ignition switch ON[Engine is running]	0 - 1.0 V
25 (V)		Fuel injector No. 4		[Engine is running]	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div
29 (Y)	108	Fuel injector No. 3	Output	Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle	10V/div JMBIA0331GB
30 (O)	(B)	Fuel injector No. 2			BATTERY VOLTAGE (11 - 14 V)★
31 (L)		Fuel injector No. 1		[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	50mSec/div 10V/div JMBIA0332GB
28 W)	108 (B)	EVAP canister vent control valve	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
32 (P)	108 (B)	ECM relay (Self shut-off)	Output	[Engine is running][Ignition switch: OFF]A few seconds after turning ignition switch OFF	0 - 1.0 V
()	(b)	(Sell Stidt-Oil)		[Ignition switch: OFF]More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
33	36	Throttle position sensor 1	Input	 [Ignition switch: ON] Engine stopped Selector lever: D (CVT), 1st (M/T) Accelerator pedal: Fully released 	More than 0.36 V
LG)	(Y)	Throdic position sensor T	при	 [Ignition switch: ON] Engine stopped Selector lever: D (CVT), 1st (M/T) Accelerator pedal: Fully depressed 	Less than 4.75 V
34	36	Throttle position sensor 2	Input	 [Ignition switch: ON] Engine stopped Selector lever: D (CVT), 1st (M/T) Accelerator pedal: Fully released 	Less than 4.75 V
(R) (Y)	Throttle position sensor 2 Input		 [Ignition switch: ON] Engine stopped Selector lever: D (CVT), 1st (M/T) Accelerator pedal: Fully depressed 	More than 0.36 V	
36 (Y)		Sensor ground (Throttle position sensor)	_	_	_
37 (W)	40 (—)	Knock sensor	Input	[Engine is running] • Idle speed	2.5 V
38 BR)	44 (GR)	Engine coolant tempera- ture sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.

Term	ninal No.	Description			Value
+	-	Signal name	Input/ Output	Condition	(Approx.)
40 (—)	_	Sensor ground (Knock sensor)	_	_	_
41 (GR)	48 (BR)	Refrigerant pressure sensor	Input	 [Engine is running] Warm-up condition Both A/C switch and blower fan motor switch: ON (Compressor operates) 	1.0 - 4.0 V
42 (V)	51 (Y)	EVAP control system pressure sensor	Input	[Ignition switch: ON]	1.8 - 4.8 V
43 (P)	108 (B)	Fuel tank temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with fuel tank temperature.
44 (GR)	_	Sensor ground (Engine coolant temperature sensor)	_	_	_
45	52	Mass air flow sensor	loout	[Engine is running]Warm-up conditionIdle speed	0.7 - 1.1 V
(G)	(R)	iviass all flow sensor	Input	[Engine is running]Warm-up conditionEngine speed: 2,500 rpm	1.3 - 1.7 V
46 (L)	55 (P)	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.
48 (BR)	_	Sensor ground (Refrigerant pressure sensor)	_	_	_
49 (V)	53 (LG)	A/F sensor 1	Input	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	Approximately 1.8 V Output voltage varies with air fue ratio.
50 (W)	59 (O)	Heated oxygen sensor 2	Input	 [Engine is running] Revving engine from idle to 3,000 rpm quickly after the following conditions are met Engine: after warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	0 - 1.0 V
51 (Y)	_	Sensor ground (EVAP control system pressure sensor)	_	_	_
52 (R)	_	Sensor ground (Mass air flow sensor)	_	_	_
53 (LG)	_	Sensor ground (A/F sensor 1)	_	_	_
55 (P)	_	Sensor ground (Intake air temperature sensor)	_	_	_
57 (GR)	64 (SB)	Battery current sensor	Input	[Engine is running] • Battery: Fully charged *1 • Idle speed	2.6 - 3.5 V
59 (O)	_	Sensor ground (Heated oxygen sensor 2)	_	_	_

ECM

Term	ninal No.	Description			Value	
+	_	- Signal name Input/ Condition Output		Condition	(Approx.)	
61	62	Crankshaft position sen-	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	4.0 V★ 5mSec/div 2V/div JMBIA0333GB	
(W) (B)	sor (POS)	при	[Engine is running] • Engine speed: 2,000 rpm	4.0 V★ 5mSec/div 2V/div JMBIA0334GB		
62 (B)	_	Sensor ground [Crankshaft position sen- sor (POS)]		_	_	
63 (L)	_	Sensor ground [Camshaft position sen- sor (PHASE)]	_	_	_	
64 (SB)	_	Sensor ground (Battery current sensor)	_	_	_	
65		Camshaft position sensor	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	0 - 5.0★ 20mSec/div 2V/div JMBIA0045GB	
(Y)	(L)	(PHASE)		[Engine is running] • Engine speed is 2,000 rpm	0 - 5.0★ 20mSec/div 2V/div JMBIA0046GB	
66 ^{*2} (L)	108 (B)	Power supply for ECM (Back-up)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)	
71 (Y)	108 (B)	Sensor power supply [Battery current sensor]	_	[Ignition switch: ON]	5 V	
72 (O)	36 (Y)	Sensor power supply (Throttle position sensor)		[Ignition switch: ON]	5 V	

Term	inal No.	Description			Value
+	-	Signal name	Input/ Output	Condition	(Approx.)
		Intake valve timing control solenoid valve		[Engine is running]Warm-up conditionIdle speed	BATTERY VOLTAGE (11 - 14 V)
-	108 (B)		Output	[Engine is running]Warm-up conditionWhen revving engine up to 2,000rpm Quickly	7 - 10 V★
74 (W)	108 (B)	Sensor power supply (Refrigerant pressure sensor)	Input	[Ignition switch: ON]	5 V
75 (R)	62 (B)	Sensor power supply [Crankshaft position sensor (POS)]	_	[Ignition switch: ON]	5 V
76 (LG)	51 (Y)	Sensor power supply [EVAP control system pressure sensor]	1	[Ignition switch: ON]	5 V
78 (G)	63 (L)	Sensor power supply [Camshaft position sensor (PHASE)]	_	[Ignition switch: ON]	5 V
83 (P)	108 (B)	CAN communication line	Input/ Output	_	_
84 (L)	108 (B)	CAN communication line	Input/ Output	_	_
88 (LG)	108 (B)	Data link connector	Input/ Output	_	_
93 (L)	108 (B)	Ignition switch	Input	[Ignition switch: OFF]	0 V BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON] • ASCD steering switch: OFF	4 V
				[Ignition switch: ON] • MAIN switch: Pressed	0 V
94 (SB)	95 (BR) ^{*3}	ASCD steering switch	Input	[Ignition switch: ON] • CANCEL switch: Pressed	1 V
	(B) ^{*4}			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3 V
				[Ignition switch: ON] • SET/COAST switch: Pressed	2 V
95 (BR) ^{*3} (B) ^{*4}	_	Sensor ground (ASCD steering switch)	_	_	_
99	108	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0 V
(W)	(B)	Ctop tamp ownor	iiput	[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)

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Tern	minal No.	Description			Value
+	_	Signal name Input/ Condition Output		(Approx.)	
100	108	ASCD brake switch	Input	[Ignition switch: ON] Brake pedal: Slightly depressed (CVT) Brake pedal and clutch pedal: Slightly depressed (M/T)	0 V
(28)	(SB) (B)		·	 [Ignition switch: ON] Brake pedal: Fully released (CVT) Brake pedal and/or clutch pedal: Fully released (M/T) 	BATTERY VOLTAGE (11 - 14 V)
102 (O)	108 (B)	Sensor power supply (Accelerator pedal position sensor 2)	_	[Ignition switch: ON]	5 V
103	104	Accelerator pedal posi-	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6 V
(G)		tion sensor 2	mput	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4 V
104 (R)	_	Sensor ground (Accelerator pedal position sensor 2)	_	_	_
105 (G)	108 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
106 (V)	108 (B)	Sensor power supply (Accelerator pedal position sensor 1)	_	[Ignition switch: ON]	5 V
107 (B) 108 (B) 109 (B) 112 (B)	_	ECM ground	_	_	_
110	111	Accelerator pedal posi-	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9 V
(BR)	(BR) (Y)			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7 V
111 (Y)	_	Sensor ground (Accelerator pedal position sensor 1)	_	_	_

^{★:} Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Wiring Diagram — ENGINE CONTROL SYSTEM —

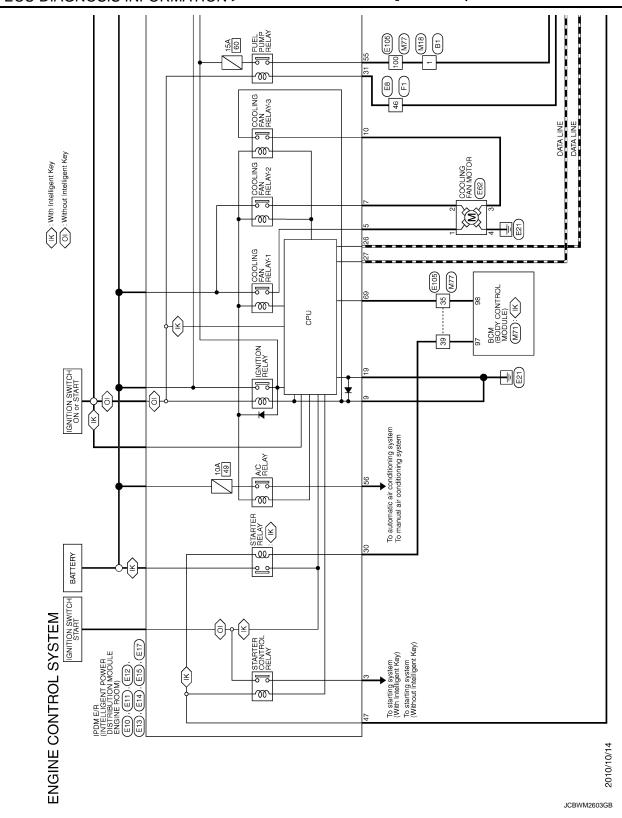
For connector terminal arrangements, harness layouts, and alphabets in a (option abbreviation; if not described in wiring diagram), refer to GI-12, "Connector Information".

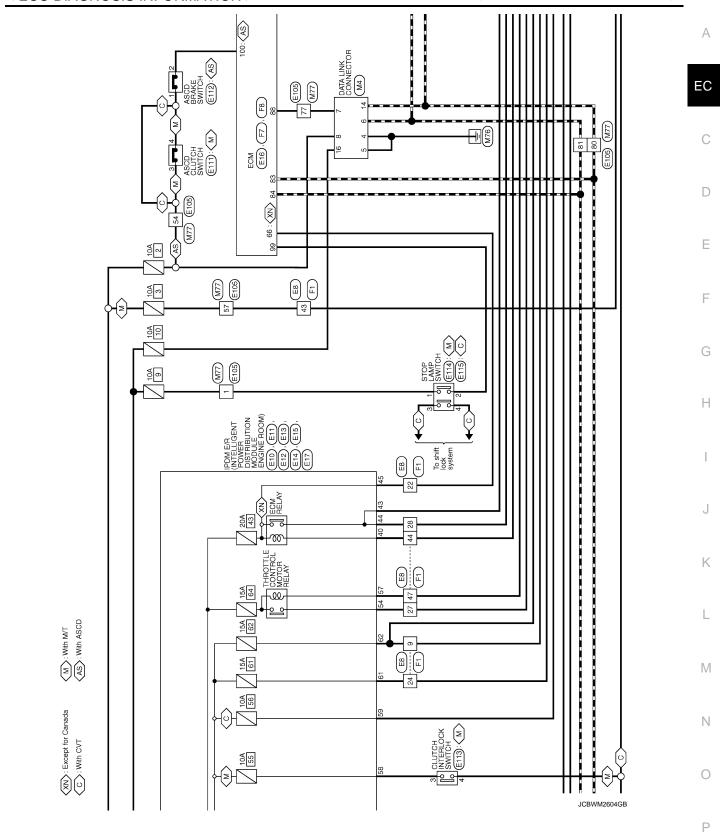
^{*1:} Before measuring the terminal voltage, confirm that the battery is fully changed. Refer to PG-3. "How to Handle Battery".

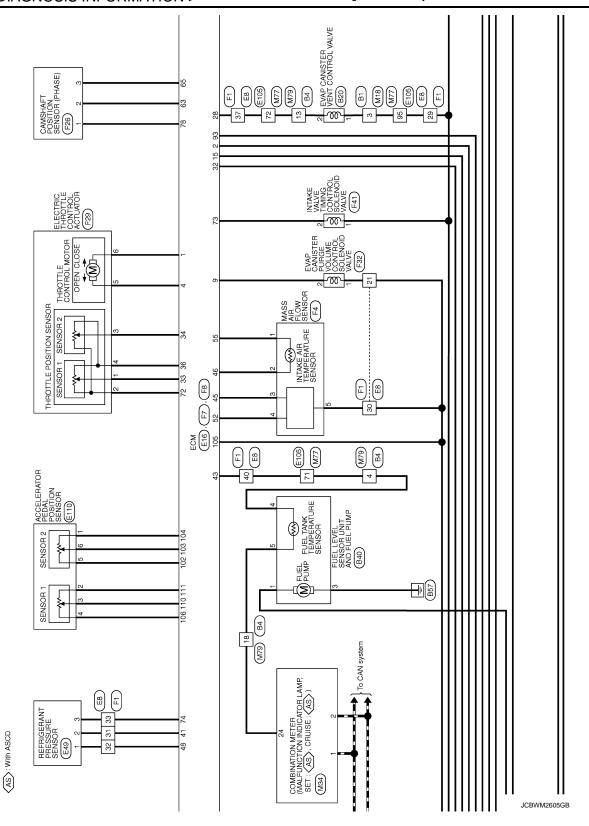
^{*2:} Except for Canada

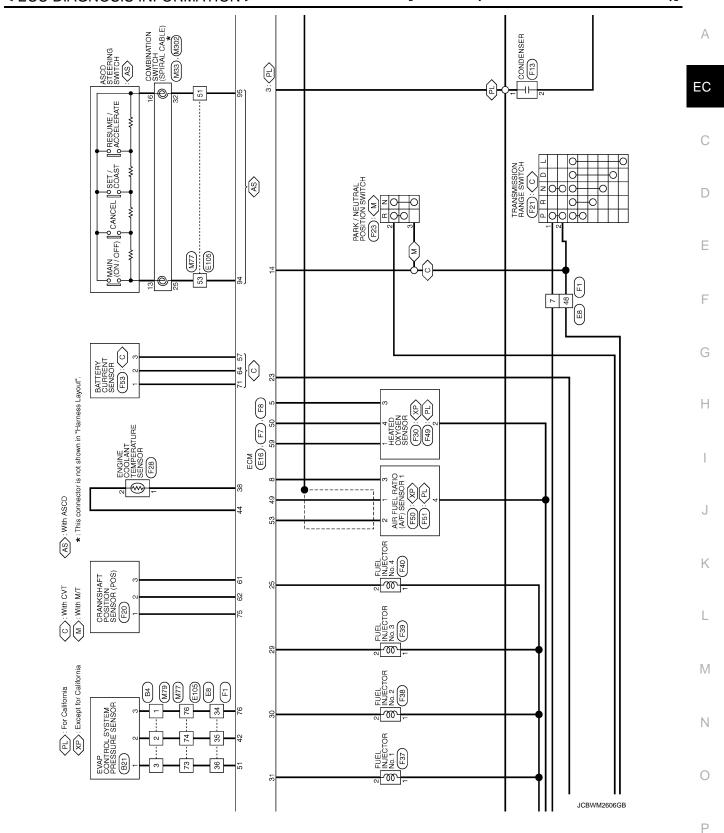
^{*3:} CVT models

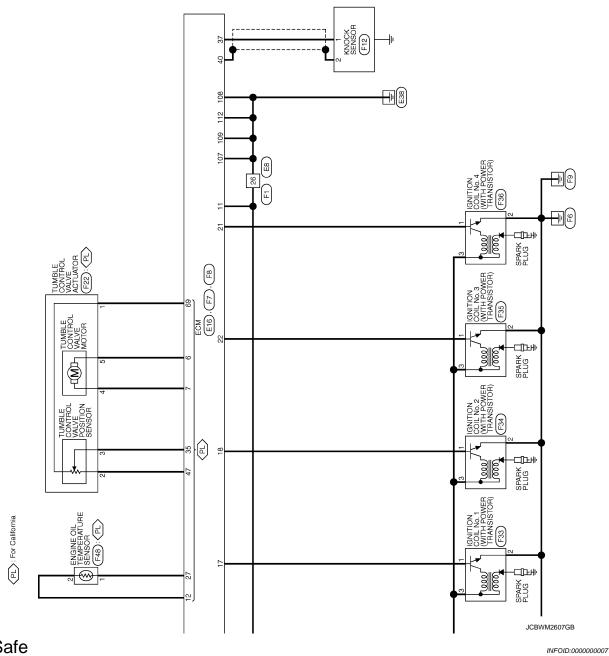
^{*4:} M/T models











Fail Safe INFOID:0000000007770324

NON DTC RELATED ITEM

Detected items Engine operating confail-safe moderation indicator lamp circuit Engine speed will not more than 2,500 rpm the fuel cut				Remarks				
			When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function. The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.					
TC REL	ATED I	TEM						
DTC No.	I	Detected items		Engine opera	ating condition in fail-safe mode			
P0011	Intake	valve timing control	_	al is not energized to the in	take valve timing control solenoid valve and the valve			
P0101 P0102 P0103	Mass	air flow sensor circuit	Engine s	speed will not rise more tha	n 2,400 rpm due to the fuel cut.			
P0117 P0118		e coolant tempera- ensor circuit			determined by ECM based on the following condition. lant temperature decided by ECM.			
				Condition	Engine coolant temperature decided (CONSULT display)			
			Just as iç or STAR	gnition switch is turned ON T	40°C (104°F)			
			More that engine s	n approx. 4 minutes after tarting	80°C (176°F)			
			Except a	s shown above	40 - 80°C (104 - 176°F) (Depends on the time)			
				When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.				
P0122 P0123 P0222 P0223 P2135	Throttl	e 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 norma condition. So, the acceleration will be poor.					
P0500	Vehicle	e speed sensor	The cooling fan operates (highest) while engine is running.					
P0643	Senso	r power supply		ps the electric throttle contening (approx. 5 degrees) b	rol actuator control, throttle valve is maintained at a by the return spring.			
P0605	ECM		ECM sto	CM calculation function is ps the electric throttle cont ening (approx. 5 degrees) b	rol actuator control, throttle valve is maintained at a			
P1805	Brake	switch	small rar		ontrol actuator by regulating the throttle opening to a			
				Vehicle condition	Driving condition			
			When er	ngine is idling	Normal			
			When ac	ccelerating	Poor acceleration			
P2100 P2103	Throttl	e control motor relay		ps the electric throttle contening (approx. 5 degrees) t	rol actuator control, throttle valve is maintained at a by the return spring.			
P2101	Electri functio	c throttle control on		ps the electric throttle cont ening (approx. 5 degrees) t	rol actuator control, throttle valve is maintained at a by the return spring.			
P2118	Throttl	e control motor		ps the electric throttle cont ening (approx. 5 degrees) b	rol actuator control, throttle valve is maintained at a by the return spring.			

ECM

[MR18DE (EXCEPT FOR CALIFORNIA)]

DTC No.	Detected items	Engine operating condition in fail-safe mode
P2119	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P (CVT), Neutral (M/T) position, and engine speed will not exceed 1,000 rpm or more.
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Inspection Priority Chart

INFOID:0000000007770325

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	 U0100 U0101 U1001 CAN communication line P0101 P0102 P0103 Mass air flow sensor P0111 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 Knock sensor
	 P0327 P0326 Killock Serisor P0335 Crankshaft position sensor (POS) P0340 Camshaft position sensor (PHASE) P0460 P0461 P0462 P0463 Fuel level sensor P0500 Vehicle speed sensor P0605 P607 ECM P0643 Sensor power supply P0705 Transmission range switch P0850 Park/neutral position (PNP) switch P1550 P1551P1552 P1553 P1554 Battery current sensor P1610 - P1615 NATS P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor

Priority	Detected items (DTC)	
2	 P0031 P0032 Air fuel ratio (A/F) sensor 1 heater P0037 P0038 Heated oxygen sensor 2 heater P0075 Intake valve timing control solenoid valve 	Α
	 P0073 Intake valve timing control solenoid valve P0130 P0131 P0132 P014C P014D P015A P015B P2A00 Air fuel ratio (A/F) sensor 1 P0137 P0138 P0139 Heated oxygen sensor 2 P0441 EVAP control system purge flow monitoring 	EC
	 P0443 P0444 P0445 EVAP canister purge volume control solenoid valve P0447 P0448 EVAP canister vent control valve P0451 P0452 P0453 EVAP control system pressure sensor P0710 P0715 P0720 P0740 P0744 P0745 P0746 P0776 P0778 P0840 P1740 P1777 P1778 CVT related sensors, so- 	С
	lenoid valves and switches • P1217 Engine over temperature (OVERHEAT) • P1805 Brake switch • P2100 P2103 Throttle control motor relay	D
	P2101 Electric throttle control function P2118 Throttle control motor	Е
3	 P0011 Intake valve timing control P0171 P0172 Fuel injection system function P0300 - P0304 Misfire P0420 Three way catalyst function P0442 P0456 EVAP control system (SMALL LEAK, VERY SMALL LEAK) 	F
	 P0455 EVAP control system (GROSS LEAK) P0506 P0507 Idle speed control system P050A P050E Cold start control P1148 Closed loop control 	G
	 P117A Air fuel ratio P1212 TCS communication line P1564 ASCD steering switch 	Н
	 P1572 ASCD brake switch P1574 ASCD vehicle speed sensor P1715 Input speed sensor P2119 Electric throttle control actuator 	I

DTC Index

×:Applicable —: Not applicable

						ла тррпоавто	. Hot applicable	
DT(CONSULT		ltems (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group*4	Reference page	ŀ
GST*2	ECM*3	(CONSOLT Screen terms)				DTC group	page	
U0100	0100 ^{*5}	LOST COMM (ECM A)	_	1	×	В	<u>TM-102</u>	
U0101	0101 ^{*5}	LOST COMM (TCM)	_	1	×	В	EC-137	
U1001	1001 ^{*5}	CAN COMM CIRCUIT	_	2	_	_	EC-138	
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_	_	Flashing ^{*8}	_	_	
P0011	0011	INT/V TIM CONT-B1	×	2	×	В	EC-139	
P0031	0031	A/F SEN1 HTR (B1)	_	2	×	В	EC-143	(
P0032	0032	A/F SEN1 HTR (B1)	_	2	×	В	EC-143	
P0037	0037	HO2S2 HTR (B1)	_	2	×	В	EC-146	
P0038	0038	HO2S2 HTR (B1)	_	2	×	В	EC-146	-
P0075	0075	INT/V TIM V/CIR-B1	_	2	×	В	EC-149	
P0101	0101	MAF SEN/CIRCUIT-B1	_	2	×	В	EC-152	
P0102	0102	MAF SEN/CIRCUIT-B1	_	1	×	В	EC-159	
P0103	0103	MAF SEN/CIRCUIT-B1	_	1	×	В	EC-159	
P0111	0111	IAT SENSOR 1 B1	_	2	×	А	EC-164	

DTC	;*1	Items				Permanent	Referenc
CONSULT GST*2	ECM*3	(CONSULT screen terms)	SRT code	Trip	MIL	DTC group*4	page
P0112	0112	IAT SEN/CIRCUIT-B1	_	2	×	В	EC-166
P0113	0113	IAT SEN/CIRCUIT-B1	_	2	×	В	EC-166
P0116	0116	ECT SEN/CIRC	_	2	×	А	EC-168
P0117	0117	ECT SEN/CIRC	_	1	×	В	EC-171
P0118	0118	ECT SEN/CIRC	_	1	×	В	EC-171
P0122	0122	TP SEN 2/CIRC-B1	_	1	×	В	EC-174
P0123	0123	TP SEN 2/CIRC-B1	_	1	×	В	EC-174
P0125	0125	ECT SENSOR	_	2	×	В	EC-177
P0127	0127	IAT SENSOR-B1	_	2	×	В	EC-180
P0128	0128	THERMSTAT FNCTN	_	2	×	А	EC-182
P0130	0130	A/F SENSOR1 (B1)	_	2	×	А	EC-185
P0131	0131	A/F SENSOR1 (B1)	_	2	×	В	EC-189
P0132	0132	A/F SENSOR1 (B1)	_	2	×	В	EC-192
P0137	0137	HO2S2 (B1)	×	2	×	Α	EC-195
P0138	0138	HO2S2 (B1)	×	2	×	А	EC-201
P0139	0139	HO2S2 (B1)	×	2	×	А	EC-209
P014C	014C	A/F SENSOR1 (B1)	×	2	×	А	EC-215
P014D	014D	A/F SENSOR1 (B1)	×	2	×	А	EC-215
P015A	015A	A/F SENSOR1 (B1)	×	2	×	А	EC-215
P015B	015B	A/F SENSOR1 (B1)	×	2	×	А	EC-215
P0171	0171	FUEL SYS-LEAN-B1	_	2	×	В	EC-220
P0172	0172	FUEL SYS-RICH-B1	_	2	×	В	EC-224
P0181	0181	FTT SENSOR	_	2	×	A and B	EC-228
P0182	0182	FTT SEN/CIRCUIT	_	2	×	В	EC-232
P0183	0183	FTT SEN/CIRCUIT	_	2	×	В	EC-232
P0222	0222	TP SEN 1/CIRC-B1	_	1	×	В	EC-235
P0223	0223	TP SEN 1/CIRC-B1	_	1	×	В	EC-235
P0300	0300	MULTI CYL MISFIRE	_	1 or 2	×	В	EC-238
P0301	0301	CYL 1 MISFIRE	_	1 or 2	×	В	EC-238
P0302	0302	CYL 2 MISFIRE	_	1 or 2	×	В	EC-238
P0303	0303	CYL 3 MISFIRE	_	1 or 2	×	В	EC-238
P0304	0304	CYL 4 MISFIRE	_	1 or 2	×	В	EC-238
P0327	0327	KNOCK SEN/CIRC-B1	_	2	_	_	EC-244
P0328	0328	KNOCK SEN/CIRC-B1	_	2	_	_	EC-244
P0335	0335	CKP SEN/CIRCUIT	_	2	×	В	EC-246
P0340	0340	CMP SEN/CIRC-B1	_	2	×	В	EC-250
P0420	0420	TW CATALYST SYS-B1	×	2	×	A	EC-254
P0441	0441	EVAP PURG FLOW/MON	×	2	×	A	EC-259
P0442	0442	EVAP SMALL LEAK	×	2	×	A	EC-265
P0443	0443	PURG VOLUME CONT/V	_	2	×	A	EC-272
P0444	0444	PURG VOLUME CONT/V	_	2	×	В	EC-277
P0445	0445	PURG VOLUME CONT/V	_	2	×	В	EC-277

ECM

\ L00 Di/(0)	10010 1111	ORIVIATION >			`			_
DTC	C*1					Dormonant	- <i>i</i>	^
CONSULT GST*2	ECM*3	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group*4	Reference page	Α
P0447	0447	VENT CONTROL VALVE	_	2	×	В	EC-280	EC
P0448	0448	VENT CONTROL VALVE	_	2	×	В	EC-284	
P0451	0451	EVAP SYS PRES SEN	_	2	×	А	EC-288	_
P0452	0452	EVAP SYS PRES SEN	_	2	×	В	EC-292	С
P0453	0453	EVAP SYS PRES SEN	_	2	×	В	EC-297	=
P0455	0455	EVAP GROSS LEAK	_	2	×	А	EC-303	_ D
P0456	0456	EVAP VERY SML LEAK	×*7	2	×	А	EC-309	
P0460	0460	FUEL LEV SEN SLOSH	_	2	×	Α	EC-315	=
P0461	0461	FUEL LEVEL SENSOR	_	2	×	В	EC-316	Е
P0462	0462	FUEL LEVL SEN/CIRC	_	2	×	В	EC-318	=
P0463	0463	FUEL LEVL SEN/CIRC	_	2	×	В	EC-318	F
P0500	0500	VEHICLE SPEED SEN A*6	_	2	×	В	EC-321	
P0506	0506	ISC SYSTEM	_	2	×	В	EC-324	_
P0507	0507	ISC SYSTEM	_	2	×	В	EC-326	G
P050A	050A	COLD START CONTROL	_	2	×	A	EC-328	_
P050E	050E	COLD START CONTROL	_	2	×	А	EC-328	H
P0605	0605	ECM	_	1 or 2	× or —	В	EC-330	_ П
P0607	0607	ECM	_	1 (CVT) 2 (M/T)	× (CVT) — (M/T)	В	EC-332	-
P0643	0643	SENSOR POWER/CIRC	_	1	×	В	EC-333	= -
P0705	0705	T/M RANGE SENSOR A	_	2	×	В	<u>TM-108</u>	_
P0710	0710	FLUID TEMP SENSOR A*9	_	1	×	В	<u>TM-111</u>	J
P0715	0715	INPUT SPEED SENSOR A	_	2	×	В	TM-115	=
P0720	0720	OUTPUT SPEED SENSOR*6	_	2	×	В	<u>TM-118</u>	K
P0740	0740	TORQUE CONVERTER	_	2	×	В	<u>TM-122</u>	=
P0744	0744	TORQUE CONVERTER	_	2	×	В	TM-125	_
P0745	0745	PC SOLENOID A	_	2	×	В	<u>TM-128</u>	- L
P0746	0746	PC SOLENOID A	_	1	×	В	TM-130	_
P0776	0776	PC SOLENOID B	_	2	×	В	TM-132	M
P0778	0778	PC SOLENOID B	_	2	×	В	TM-134	_
P0840	0840	FLUID PRESS SEN/SW A	_	2	×	В	TM-136	_
P0850	0850	P-N POS SW/CIRCUIT	_	2	×	В	EC-335	N
P1148	1148	CLOSED LOOP-B1	_	1	×	А	EC-338	_
P117A	117A	AIR FUEL RATIO B1	_	2	×	А	EC-339	0
P1212	1212	TCS/CIRC	_	2	_	_	EC-344	_
P1217	1217	ENG OVER TEMP	_	1	×	В	EC-345	=
P1225	1225	CTP LEARNING-B1	_	2	_	_	EC-349	Р
P1226	1226	CTP LEARNING-B1	_	2	_	_	EC-351	-
P1550	1550	BAT CURRENT SENSOR	_	2	_	_	EC-353	_
P1551	1551	BAT CURRENT SENSOR	_	2	_	_	EC-357	_
P1552	1552	BAT CURRENT SENSOR	_	2	_	_	EC-357	-
P1553	1553	BAT CURRENT SENSOR	_	2	_	_	EC-361	=

DTC*1		Itomo				Permanent	Deference
CONSULT GST*2	ECM*3	ltems (CONSULT screen terms)	SRT code	Trip	MIL	DTC group*4	Reference page
P1554	1554	BAT CURRENT SENSOR	_	2	_	_	EC-365
P1564	1564	ASCD SW	_	1	_	_	EC-369
P1572	1572	ASCD BRAKE SW	_	1	_	_	EC-372
P1574	1574	ASCD VHL SPD SEN	_	1	_	_	EC-379
P1610	1610	LOCK MODE	_	2	_	_	SEC-34
P1611	1611	ID DISCORD, IMMU-ECM	_	2	_	_	<u>SEC-35</u>
P1612	1612	CHAIN OF ECM-IMMU	_	2	_	_	SEC-37
P1614	1614	CHAIN OF IMMU-KEY	_	2	_	_	SEC-6
P1615	1615	DIFFERENCE OF KEY	_	2	_	_	SEC-6
P1715	1715	IN PULY SPEED	_	2	_	_	EC-381
P1740	1740	SLCT SOLENOID	_	2	×	В	<u>TM-153</u>
P1777	1777	STEP MOTOR	_	1	×	В	TM-156
P1778	1778	STEP MOTOR	_	2	×	В	TM-159
P1805	1805	BRAKE SW/CIRCUIT	_	2	_	_	EC-383
P2100	2100	ETC MOT PWR-B1	_	1	×	В	EC-386
P2101	2101	ETC FNCTN/CIRC-B1	_	1	×	В	EC-389
P2103	2103	ETC MOT PWR	_	1	×	В	EC-386
P2118	2118	ETC MOT-B1	_	1	×	В	EC-393
P2119	2119	ETC ACTR-B1	_	1	×	В	EC-395
P2122	2122	APP SEN 1/CIRC	_	1	×	В	EC-397
P2123	2123	APP SEN 1/CIRC	_	1	×	В	EC-397
P2127	2127	APP SEN 2/CIRC	_	1	×	В	EC-400
P2128	2128	APP SEN 2/CIRC	_	1	×	В	EC-400
P2135	2135	TP SENSOR-B1	_	1	×	В	EC-404
P2138	2138	APP SENSOR	_	1	×	В	EC-407
P2A00	2A00	A/F SENSOR1 (B1)	_	2	×	А	EC-411

^{*1: 1}st trip DTC No. is the same as DTC No.

Test Value and Test Limit

INFOID:0000000007921615

The following is the information specified in Service \$06 of SAE J1979/ISO 15031-5.

The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

These data (test value and test limit) are specified by On Board Monitor ID (OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.

The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (e.g., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

^{*2:} This number is prescribed by SAE J2012/ISO 15031-6.

^{*3:} In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

^{*4:} Refer to EC-34, "Description", "PERMANENT DTC".

^{*5:} The troubleshooting for this DTC needs CONSULT.

^{*6:} When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

^{*7:} SRT code will not be set if the self-diagnostic result is NG.

^{*8:} When the ECM is in the mode that displays SRT status, MIL may flash. For the details, refer to EC-28, "Description".

^{*9:} When erasing this DTC, always use CONSULT or GST.

	OBD-			Test value and Test limit (GST display)			
Itom I	MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description	
			P0131	83H	0BH	Minimum sensor output voltage for test cycle	
			P0131	84H	0BH	Maximum sensor output voltage for test cycle	
			P0130	85H	0BH	Minimum sensor output voltage for test cycle	
			P0130	86H	0BH	Maximum sensor output voltage for test cycle	
			P0133	87H	04H	Response rate: Response ratio (lean to rich)	
			P0133	88H	04H	Response rate: Response ratio (rich to lean)	
			P2A00	89H	84H	The amount of shift in air fuel ratio	
			P2A00	8AH	84H	The amount of shift in air fuel ratio	
			P0130	8BH	0BH	Difference in sensor output voltage	
	01H	Air fuel ratio (A/F) sensor 1	P0133	8CH	83H	Response gain at the limited frequency	
02H		(Bank 1)	P014C	8DH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1	
			P014C	8EH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1	
			P014D	8FH	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1	
			P014D	90H	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1	
			P015A	91H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1	
			P015A	92H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1	
			P015B	93H	01H	O2 sensor delayed response - Lean t rich bank 1 sensor 1	
			P015B	94H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1	
		Heated oxygen sensor 2 (Bank 1)	P0138	07H	0CH	Minimum sensor output voltage for test cycle	
			P0137	08H	0CH	Maximum sensor output voltage for test cycle	
	02H		P0138	80H	0CH	Sensor output voltage	
			P0139	81H	0CH	Difference in sensor output voltage	
			P0139	82H	11H	Rear O2 sensor delay response diagnosis	
		Heated oxygen sensor 3 (Bank 1)	P0143	07H	0CH	Minimum sensor output voltage for test cycle	
	03H		P0144	08H	0CH	Maximum sensor output voltage for test cycle	
			P0146	80H	0CH	Sensor output voltage	
			P0145	81H	0CH	Difference in sensor output voltage	

1 2 0 0 0		JOIO INFORMATION >		_			
Item OBD MID		Self-diagnostic test item		li	e and Test mit		
	OBD-		DTC	(GST	display)	Description	
	MID	Ç		TID	Unitand Scaling ID		
			P0151	83H	0BH	Minimum sensor output voltage for teacycle	
			P0151	84H	0BH	Maximum sensor output voltage for test cycle	
			P0150	85H	овн	Minimum sensor output voltage for te cycle	
			P0150	86H	0BH	Maximum sensor output voltage for test cycle	
			P0153	87H	04H	Response rate: Response ratio (lear to rich)	
			P0153	88H	04H	Response rate: Response ratio (rich lean)	
			P2A03	89H	84H	The amount of shift in air fuel ratio	
			P2A03	8AH	84H	The amount of shift in air fuel ratio	
			P0150	8BH	0BH	Difference in sensor output voltage	
	05H	Air fuel ratio (A/F) sensor 1	P0153	8CH	83H	Response gain at the limited frequen	
HO2S 06H	(Bank 2)	P014E	8DH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1		
		P014E	8EH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1		
		P014F	8FH	84H	O2 sensor slow response - Lean to ric bank 2 sensor 1		
			P014F	90H	84H	O2 sensor slow response - Lean to ric bank 2 sensor 1	
			P015C	91H	01H	O2 sensor delayed response - Rich lean bank 2 sensor 1	
			P015C	92H	01H	O2 sensor delayed response - Rich lean bank 2 sensor 1	
			P015D	93H	01H	O2 sensor delayed response - Lean rich bank 2 sensor 1	
			P015D	94H	01H	O2 sensor delayed response - Lean rich bank 2 sensor 1	
		Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for te cycle	
	061		P0157	08H	0CH	Maximum sensor output voltage for test cycle	
	Hou		P0158	H08	0CH	Sensor output voltage	
			P0159	81H	0CH	Difference in sensor output voltage	
			P0159	82H	11H	Rear O2 sensor delay response dia nosis	
		Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for te cycle	
	07H		P0164	08H	0CH	Maximum sensor output voltage for test cycle	
			P0166	80H	0CH	Sensor output voltage	
			P0165	81H	0CH	Difference in sensor output voltage	

	OBD-			li	e and Test mit display)			
Item	MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description		
			P0420	80H	01H	O2 storage index		
	21H	Three way catalyst function	P0420	82H	01H	Switching time lag engine exhaust index value		
	2111	(Bank1)	P2423	83H	0CH	Difference in 3rd O2 sensor output voltage		
CATA-			P2423	84H	84H	O2 storage index in HC trap catalyst		
LYST			P0430	80H	01H	O2 storage index		
	22H	Three way catalyst function	P0430	82H	01H	Switching time lag engine exhaust index value		
	2211	(Bank2)	P2424	83H	0CH	Difference in 3rd O2 sensor output voltage		
			P2424	84H	84H	O2 storage index in HC trap catalyst		
			P0400	80H	96H	Low flow faults: EGR temp change rate (short term)		
			P0400	81H	96H	Difference in 3rd O2 sensor output voltage O2 storage index in HC trap catalyst Low flow faults: EGR temp change rate (short term) Low flow faults: EGR temp change rate (long term) Low flow faults: Difference between max EGR temp and EGR temp under idling condition Low flow faults: Max EGR temp High Flow Faults: EGR temp increase rate VTC intake function diagnosis (VTC alignment check diagnosis)		
EGR SYSTEM 31H	31H	EGR function	P0400	82H	96H			
			P0400	83H	96H	Low flow faults: Max EGR temp		
			P1402	84H	96H	High Flow Faults: EGR temp increase rate		
			P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)		
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)		
	35H	VVT Monitor (Bank1)	P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)		
			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)		
			P100A	84H	10H	VEL slow response diagnosis		
VVT			P1090	85H	10H	VEL servo system diagnosis		
SYSTEM					P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)		
	36H	VVT Monitor (Bank2)	P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)		
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)		
			P100B	84H	10H	VEL slow response diagnosis		
			P1093	85H	10H	VEL servo system diagnosis		

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				lir	e and Test mit	
Item	OBD-	Self-diagnostic test item	DTC	(GST	display)	Description
	MID			TID	Unitand Scaling ID	
	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3ВН	EVAP control system leak (Small leak)	P0442	80H 05H		Leak area index (for more than 0.04 inch)
EVAP			P0456	80H	05H	Leak area index (for more than 0.02 inch)
SYSTEM	3СН	EVAP control system leak (Very small leak)	P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
			P0456	82H	FDH	Internal pressure of EVAP system at the end of monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close
	41H	A/F sensor 1 heater (Bank 1)	Low Input: P0031 High Input: P0032	81H	0BH	Converted value of heater electric current to voltage
	42H	Heated oxygen sensor 2 heater (Bank 1)	Low Input: P0037 High Input: P0038	80H	0CH	Converted value of heater electric current to voltage
O2 SEN- SOR	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of heater electric current to voltage
HEATER	45H A/F sensor 1 heater (Bank 2)		Low Input: P0051 High Input: P0052	81H	0BH	Converted value of heater electric current to voltage
	46H	Heated oxygen sensor 2 heater (Bank 2)	Low Input: P0057 High Input: P0058	80H	0CH	Converted value of heater electric current to voltage
	47H	Heated oxygen sensor 3 heater (Bank 2)	P0063	80H	0CH	Converted value of heater electric current to voltage
			P0411	80H	01H	Secondary air injection system incorrect flow detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary air injection system insufficient flow
			P2445	82H	01H	Secondary air injection system pump stuck off
SEC- OND- ARY AIR	71H	Secondary air system	P2448	83H	01H	Secondary air injection system high airflow
			Bank1: P2440 Bank2: P2442	84H	01H	Secondary air injection system switching valve stuck open
			P2440	85H	01H	Secondary air injection system switching valve stuck open
			P2444	86H	01H	Secondary air injection system pump stuck on
			P0171 or P0172	80H	2FH	Long term fuel trim
	81H	Fuel injection system function (Bank 1)	P0171 or P0172	81H	24H	The number of lambda control clamped
FUEL			P117A	82H	03H	Cylinder A/F imbalance monitoring
SYSTEM			P0174 or P0175	80H	2FH	Long term fuel trim
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	81H	24H	The number of lambda control clamped
			P117B	82H	03H	Cylinder A/F imbalance monitoring

		3515 INFORMATION >				EXOCITION OALII OMMA)			
				li	e and Test mit				
Item	OBD- MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description			
			P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder			
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second cylinder			
				P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder		
			P0304	83H	24H	Misfiring counter at 1000 revolution of the fourth cylinder			
			P0305	84H	24H	Misfiring counter at 1000 revolution of the fifth cylinder			
			P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder			
						P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder
			P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder			
			P0300	88H	24H	Misfiring counter at 1000 revolution of the third cylinder Misfiring counter at 1000 revolution of the fourth cylinder Misfiring counter at 1000 revolution of the fifth cylinder Misfiring counter at 1000 revolution of the sixth cylinder Misfiring counter at 1000 revolution of the seventh cylinder Misfiring counter at 1000 revolution of the eighth cylinder Misfiring counter at 1000 revolution of the multiple cylinders Misfiring counter at 200 revolution of the first cylinder Misfiring counter at 200 revolution of the second cylinder Misfiring counter at 200 revolution of the third cylinder Misfiring counter at 200 revolution of the fourth cylinder Misfiring counter at 200 revolution of the fifth cylinder			
MISFIRE	A1H	Multiple cylinder misfires	Multiple cylinder misfires	P0301	89H	24H			
VIIOFINE	АІП			Multiple Cylinder misilies	ap.e syases	P0302	8AH	24H	
			P0303	8BH	24H				
			P0304	8CH	24H				
				P0305	8DH	24H			
			P0306	8EH	24H				
			P0307	8FH	24H	Misfiring counter at 200 revolution of the seventh cylinder			
			P0308	90H	24H	Misfiring counter at 200 revolution of the eighth cylinder			
			P0300	91H	24H	Misfiring counter at 1000 revolution of the single cylinder			
			P0300	92H	24H	Misfiring counter at 200 revolution of the single cylinder			
			P0300	93H	24H	Misfiring counter at 200 revolution of the multiple cylinders			

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	055			liı	e and Test mit display)	
Item	OBD- MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description
	A2H	No. 1 cylinder misfire	P0301	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
			P0301	0CH	24H	Misfire counts for last/current driving cycles
	АЗН	No. 2 cylinder misfire	P0302	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0302	0CH	24H	Misfire counts for last/current driving cycles
	A4H	No. 3 cylinder misfire	P0303	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0303	0CH	24H	Misfire counts for last/current driving cycles
	A5H	No. 4 cylinder misfire	P0304	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
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 driv- ing cycles
			P0305	0CH	24H	Misfire counts for last/current driving cycles
	A7H	No. 6 cylinder misfire	P0306	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0306	0CH	24H	Misfire counts for last/current driving cycles
	A8H	No. 7 cylinder misfire	P0307	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
	AOH NO		P0307	0CH	24H	Misfire counts for last/current driving cycles
	A9H	No. 8 cylinder misfire	P0308	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0308	0CH	24H	Misfire counts for last/current driving cycles

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

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SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table EC

SYSTEM — BASIC ENGINE CONTROL SYSTEM

			SYMPTOM												С	
		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	D E F
Warrant	y symptom code	AA	AB	AC	AD	AE	AF	AG	АН	AJ	AK	AL	AM	НА		Н
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-427	
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-485	
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-424	
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-87	J
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-442	Ü
	Incorrect idle speed adjustment						1	1	1	1		1			EC-22	K
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-389 EC-393	
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-23	L
	Ignition circuit	1	1	2	2	2		2	2			2			EC-430	
Main po	wer supply and ground circuit	2	2	3	3	3		3	3		2	3			EC-134	
Mass ai	r flow sensor circuit	1			2										EC-152 EC-159	M
Engine	coolant temperature sensor circuit	'					3			3					EC-168 EC-171	Ν
Air fuel ratio (A/F) sensor 1 circuit			1	2	3	2		2	2			2			EC-185 EC-189 EC-192 EC-215 EC-411	0
Throttle	Throttle position sensor circuit						2			2					EC-174 EC-235 EC-349 EC-351 EC-404	Р
Accelera	Accelerator pedal position sensor circuit			3	2	1									EC-397 EC-400 EC-407	
Knock s	ensor circuit			2								3			EC-244	

Revision: 2011 November EC-473 2012 CUBE

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

						S\	/MPT	OM						
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	НА	
Crankshaft position sensor (POS) circuit	2	2												EC-246
Camshaft position sensor (PHASE) circuit	3	2												EC-250
Vehicle speed signal circuit		2	3		3						3			EC-321
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-330 EC-332
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-139
transmission range switch circuit			3		3		3	3			3			EC-335
PNP switch circuit			3		3		3	3			3			EC-335
Refrigerant pressure sensor circuit		2				3			3		4			EC-443
Electrical load signal circuit							3							EC-422
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-103 HAC-210
ABS actuator and electric unit (control unit)			4											BRC-93

^{1 - 6:} The numbers refer to the order of inspection. (continued on next table)

SYSTEM — ENGINE MECHANICAL & OTHER

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

		SYMPTOM														А
		(A				NOIL					HIGH					F0
		XCP. H		SPOT		ELERA.					ATURE	NOI	NO	RGE)		EC
		TART (E		3/FLAT §	NATION	OR ACC		(J)) IDLE	-EMPER	NSUMP	SUMPTIC	ER CHA		С
		HARD/NO START/RESTART (EXCP. HA)	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	D
		HARD/NO	ENGINE 8	HESITATION	SPARK KI	LACK OF	HIGH IDLI	ROUGHII	IDLING VI	SLOW/NC	OVERHE/	EXCESSIV	EXCESSIV	BATTERY		Е
Warranty	symptom code	A A	AB	AC	AD	AE	AF	AG	АН	AJ	AK	AL	AM	НА		F
Fuel	Fuel tank	_													FL-13	
	Fuel piping	5		5	5	5	1	5	5			5			FL-4	G
	Vapor lock		5												_	
	Valve deposit														_	1.1
	Poor fuel (Heavy weight gas- oline, Low octane)	5		5	5	5		5	5			5			_	Н
Air	Air duct															ı
	Air cleaner														=14.45	- 1
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)		5	5		5		5	5			5			<u>EM-15</u>	J
	Electric throttle control actuator	5			5		5			5					EM-26	IZ.
	Air leakage from intake mani- fold/Collector/Gasket														<u>LIVI-20</u>	K
Cranking	Battery	1	1	1		1		1	1					1	<u>PG-3</u>	L
	Generator circuit	•	·			·								•	CHG-5	
	Starter circuit	3										1			STR-2	
	Signal plate	6													<u>EM-88</u>	M
	Transmission range switch	4													TM-108 (CVT)	
	PNP switch	4													<u>TM-8</u> (M/T)	Ν
Engine	Cylinder head	5	5	5	5	5		5	5			5			<u>EM-67</u>	1.4
	Cylinder head gasket										4		3			
	Cylinder block															0
	Piston												4			
	Piston ring	6	6	6	6	6		6	6			6			<u>EM-88</u>	Р
	Connecting rod															۲
	Bearing															
	Crankshaft															

							S`	YMPT	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	A A	AB	AC	AD	AE	AF	AG	АН	AJ	AK	AL	AM	НА	
Valve	Timing chain														<u>EM-44</u>
mecha- nism	Camshaft														<u>EM-55</u>
HISH	Intake valve timing control	5	5	5	5	5		5	5			5			<u>EM-44</u>
	Intake valve														511.07
	Exhaust valve												3		<u>EM-67</u>
Exhaust	Exhaust manifold/Tube/Muf- fler/Gasket	5	5	5	5	5		5	5			5			EM-30 EX-4
	Three way catalyst														<u> </u>
Lubrica- tion	Oil pan/Oil strainer/Oil pump/ Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			<u>EM-34</u> <u>LU-7</u> <u>LU-11</u>
	Oil level (Low)/Filthy oil														<u>LU-7</u>
Cooling	Radiator/Hose/Radiator filler cap														CO-13 CO-13
	Thermostat									5					<u>CO-22</u>
	Water pump	_	5	E	_	_		_	E		4	_			<u>CO-20</u>
	Water gallery	5	5	5	5	5		5	5		4	5			<u>CO-2</u>
	Cooling fan	1													EC-420
	Coolant level (Low)/Contami- nated coolant									5					<u>CO-2</u>
NVIS (NIS tem — NA	SSAN Vehicle Immobilizer Sys- ATS)	1	1												<u>SEC-16</u>

^{1 - 6:} The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS >

[MR18DE (EXCEPT FOR CALIFORNIA)]

NORMAL OPERATING CONDITION

Description

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,500 rpm under no load (for example, the selector lever position is neutral and engine speed is over 2,500 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 2,000 rpm, then fuel cut will be cancelled.

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, <u>EC-47.</u> "System Description".

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PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the "SRS AIR BAG" and "SEAT BELT" of this Service Manual.

WARNING:

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see "SRS AIR BAG".
- Never use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

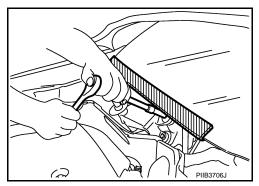
WARNING:

Always observe the following items for preventing accidental activation.

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the
 ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with
 a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing
 serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Precaution for Procedure without Cowl Top Cover

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



On Board Diagnosis (OBD) System of Engine and CVT

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INFOID:0000000007921623

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

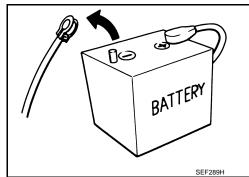
CAUTION:

- Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair
 or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will
 cause the MIL to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will
 cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease,
 dirt, bent terminals, etc.)

- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-84, "Description".
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube
 may cause the MIL to light up due to the malfunction of the EVAP system or fuel injection system,
 etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

General Precautions

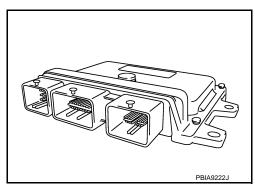
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- Before removing parts, turn ignition switch OFF and then disconnect negative battery cable.

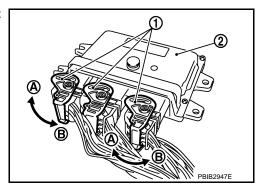


- Do not disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.

The ECM will now start to self-control at its initial value. Thus, engine operation can vary slightly in this case. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.

- If the battery is disconnected, the following emission-related diagnostic information will be 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 (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.
 - 2. ECM
 - A. Loosen





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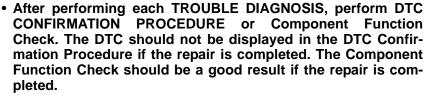
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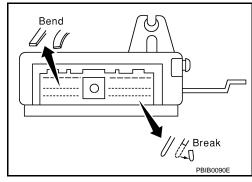
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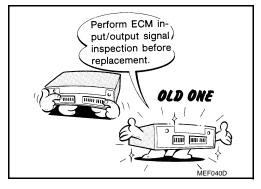
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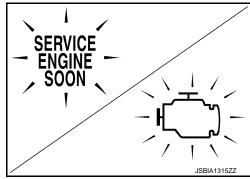
< PRECAUTION >

- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).
 - Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors.
 A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- · Keep engine control system parts and harness dry.
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to <u>EC-445</u>, "<u>Reference Value</u>".
- Handle mass air flow sensor carefully to avoid damage.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).





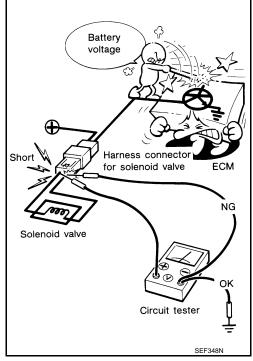




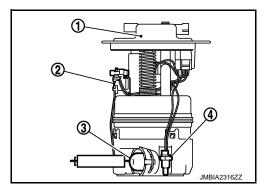
 When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.

Assidental contact of probes will cause a short circuit and

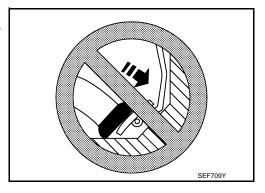
Accidental contact of probes will cause a short circuit and damage the ECM power transistor.



- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.
- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel level sensor (3)
- Fuel tank temperature sensor (4)



- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.



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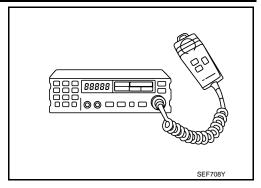
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PRECAUTIONS

< PRECAUTION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.
- Keep the antenna as far as possible from the electronic control units.
- Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.
 Do not let them run parallel for a long distance.
- Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
- Be sure to ground the radio to vehicle body.



PREPARATION

[MR18DE (EXCEPT FOR CALIFORNIA)]

PREPARATION

PREPARATION

Special Service Tools

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NOTE:

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name		Description
(J-44321) Fuel pressure gauge kit	LEC642	Checks fuel pressure
(J-44321-6) Fuel pressure adapter	LBIA0376E	Connects fuel pressure gauge to quick connector type fuel lines.
KV10118400 Fuel tube adapter	PBIB3043E	Measures fuel pressure

Commercial Service Tools

INFOID:00000000007770335

Tool name (Kent-Moore No.)		Description	
Leak detector		Locates the EVAP leak	- 11
i.e.: (J-41416)			١
	S-NT703		(
EVAP service port		Applies positive pressure through EVAP service	_
adapter i.e.: (J-41413-OBD)		port	F
	S-NT704		

PREPARATION

< PREPARATION >

[MR18DE (EXCEPT FOR CALIFORNIA)]

PREPARATION >		[WINTODE (EXCEPT FOR CALIFORNIA)]
Tool name (Kent-Moore No.)		Description
Fuel filler cap adapter i.e.: (MLR-8382)		Checks fuel tank vacuum relief valve opening pressure
Socket wrench	S-NT815	Removes and installs engine coolant temperature sensor
	19 mm (0.75 in) More than 32 mm (1.26 in)	
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)	a b Mating surface	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 Zirco-
	shave cylinder Flutes	nia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor
Anti-seize lubricant i.e.: (Permatex TM 133AR or equivalent meeting MIL specifica- tion MIL-A-907)		Lubricates oxygen sensor thread cleaning tool when reconditioning exhaust system threads.
	S-NT779	

PERIODIC MAINTENANCE

FUEL PRESSURE

Inspection INFOID:0000000007770336 EC

FUEL PRESSURE RELEASE

(P) With CONSULT

- 1. Turn ignition switch ON.
- 2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT.
- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- Turn ignition switch OFF.

₩ithout CONSULT

- 1. Remove fuel pump fuse located in IPDM E/R.
- 2. Start engine.
- 3. After engine stalls, crank it two or three times to release all fuel pressure.
- 4. Turn ignition switch OFF.
- Reinstall fuel pump fuse after servicing fuel system.

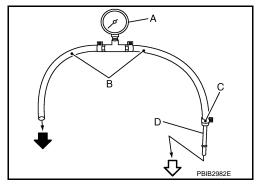
FUEL PRESSURE CHECK

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 C11 models do not have fuel return system.
- The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.
- Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains seal ability with O-rings inside.
- Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.
- Release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".
- 2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.
 - <: To quick connector
 - **(=:** To fuel tube (engine side)
 - C: Clamp
 - Use suitable fuel hose for fuel pressure check (genuine NIS-SAN fuel hose without quick connector).
 - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
 - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
 - Use Pressure Gauge to check fuel pressure.
- 3. Remove fuel hose. Refer to EM-37, "Removal and Installation".
 - Do not twist or kink fuel hose because it is plastic hose.



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FUEL PRESSURE

< PERIODIC MAINTENANCE >

[MR18DE (EXCEPT FOR CALIFORNIA)]

- 4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
 - No.2 spool (5)
 - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
 - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
 - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
 - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
 - When reconnecting fuel line, always use new clamps.
 - Use a torque driver to tighten clamps.
 - Install hose clamp to the position within 1 2 mm (0.04 0.08 in).

Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

- Make sure that clamp screw does not contact adjacent parts.
- Connect fuel tube adapter to quick connector.
 - A: Fuel pressure gauge
 - B: Fuel hose for fuel pressure check
- After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
- 7. Turn ignition switch ON and check for fuel leakage.
- 8. Start engine and check for fuel leakage.
- 9. Read the indication of fuel pressure gauge.
 - Do not perform fuel pressure check with system operating.
 Fuel pressure gauge may indicate false readings.
 - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.

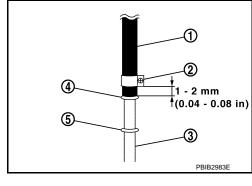


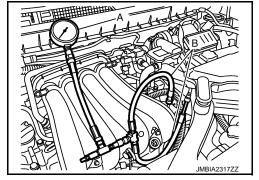
- 10. If result is unsatisfactory, go to next step.
- 11. Check the following.
 - Fuel hoses and fuel tubes for clogging
 - · Fuel filter for clogging
 - Fuel pump
 - Fuel pressure regulator for clogging

If OK, replace fuel pressure regulator.

If NG, repair or replace.

12. Before disconnecting Fuel Pressure Gauge and Fuel Pressure Adapter J-44321-6, release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".





EVAP LEAK CHECK

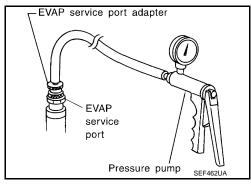
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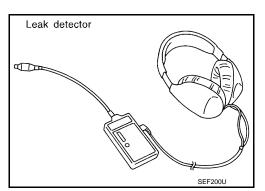
CAUTION:

- Do not use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system. NOTE:
- Do not start engine.
- Improper installation of EVAP service port adapter [commercial service tool: (J-41413-OBD)] to the EVAP service port may cause a leak.

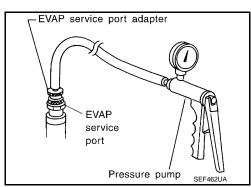
(P) WITH CONSULT

- 1. Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.
- 2. Turn ignition switch ON.
- 3. Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT.
- 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: (J-41413-OBD)] and hose with pressure pump.
- Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to <u>EC-87</u>, "System Description".





- Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.
- Apply battery voltage between the terminals of EVAP canister vent control valve to make a closed EVAP system.
- To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm², 0.2 to 0.4 psi).
- 4. Remove EVAP service port adapter [commercial service tool: (J-41413-OBD)] and hose with pressure pump.



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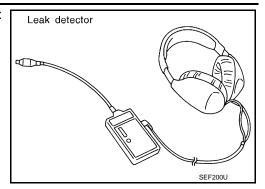
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EVAP LEAK CHECK

< PERIODIC MAINTENANCE >

[MR18DE (EXCEPT FOR CALIFORNIA)]

 Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to <u>EC-87</u>, "System <u>Description"</u>.



SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR18DE (EXCEPT FOR CALIFORNIA)]

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

Transmission	Condition	Specification
CVT	No load* (in P or N position)	700 ± 50 rpm
M/T	No load* (in Neutral position)	700 ± 50 rpm

^{*:} Under the following conditions

• A/C switch: OFF

• Electric load: OFF (Lights, heater fan & rear window defogger)

• Steering wheel: Kept in straight-ahead position

Ignition Timing

Transmission	Condition	Specification
CVT	No load* (in P or N position)	13 ± 5°BTDC
M/T	No load* (in Neutral position)	13 ± 5°BTDC

^{*:} Under the following conditions

· A/C switch: OFF

• Electric load: OFF (Lights, heater fan & rear window defogger)

· Steering wheel: Kept in straight-ahead position

Calculated Load Value

Condition	Specification (Using CONSULT or GST)	
At idle	10 – 35 %	
At 2,500 rpm	10 – 35 %	

Mass Air Flow Sensor

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	0.9 – 1.3V*
Mass air flow (Using CONSULT or GST)	1.0 – 4.0 g/sec at idle* 2.0 – 10.0 g/sec at 2,500 rpm*

^{*:} Engine is warmed up to normal operating temperature and running under no load.

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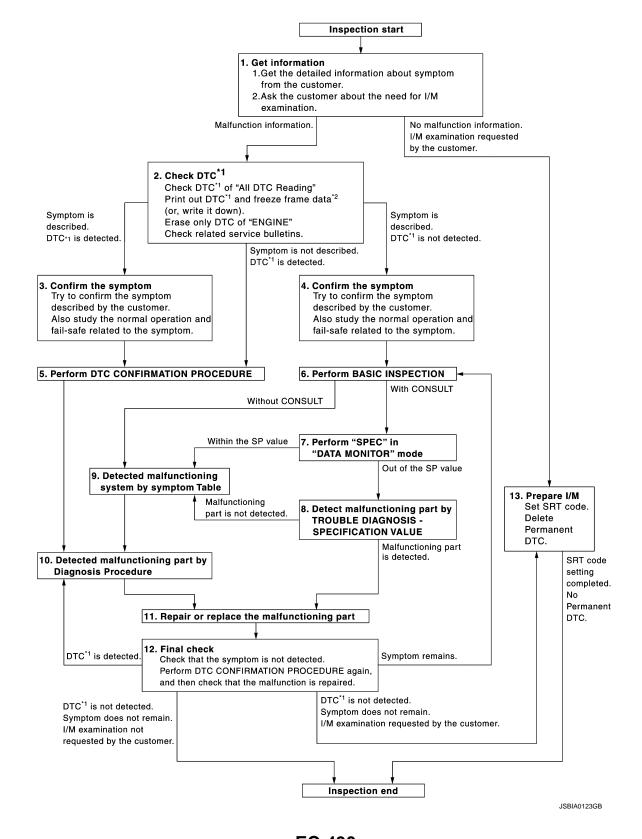
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BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

OVERALL SEQUENCE



< BASIC INSPECTION >

[MR18DE (FOR CALIFORNIA)]

*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

DETAILED FLOW

1.GET INFORMATION FOR SYMPTOM

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- 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-493, "Diagnostic Work Sheet".)
- Ask if the customer requests I/M examination.

Malfunction information, obtained>>GO TO 2.

No Malfunction information, but a request for I/M examination>>GO TO 13.

2.CHECK DTC

Check DTC of "All DTC Reading".

- Perform the following procedure if DTC is displayed.
- Record DTC and freeze frame data. (Print them out with CONSULT or GST.)
- Erase only DTC of "ENGINE".
 - (X) With CONSULT: Refer to "How to Erase DTC and 1st Trip DTC" in EC-600, "CONSULT Function".
 - (R) Without CONSULT: Refer to "How to Erase Self-diagnostic Results" in EC-597, "On Board Diagnosis Function".
- Turn ignition switch OFF.
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to EC-973, "Symptom Table".)
- Check related service bulletins for information.

Are any symptoms described and any DTCs detected?

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

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

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

3.confirm the symptom

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

Also study the normal operation and fail-safe related to the symptom. Refer to EC-977, "Description" and EC-959, "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-977, "Description" and EC-959, "Fail Safe".

Diagnosis Work Sheet is useful to verify the incident.

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

>> GO TO 6.

${f 5}$.PERFORM DTC CONFIRMATION PROCEDURE

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

If two or more DTCs are detected, refer to EC-961, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

Freeze frame data is useful if the DTC is not detected.

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< BASIC INSPECTION >

[MR18DE (FOR CALIFORNIA)]

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

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

Is DTC detected?

YES >> GO TO 10.

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

6.PERFORM BASIC INSPECTION

Perform EC-495, "BASIC INSPECTION: Special Repair Requirement".

Do you have CONSULT?

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

7. PERFORM SPEC IN DATA MONITOR MODE

(P)With CONSULT

Make sure that "MAS A/F SE-B1", "MAS A/F SE-B2", "B/FUEL SCHDL", "A/F ALPHA-B1" and "A/F ALPHA-B2" are within the SP value using CONSULT "SPEC" in "DATA MONITOR" mode of "ENGINE". Refer to EC-609, "Component Function Check".

Is the measurement value within the SP value?

YES >> GO TO 9.

NO >> GO TO 8.

$oldsymbol{8}$.DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-610, "Diagnosis Procedure".

Is a malfunctioning part detected?

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

$9.\mathsf{DETECT}$ MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to <u>EC-973</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-44. "Circuit Inspection".

Is a malfunctioning part detected?

YES >> GO TO 11.

NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CON-SULT. Refer to <u>EC-943</u>, "<u>Reference Value</u>".

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

- 1. Repair or replace the malfunctioning part.
- Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
- Check DTC. If DTC is displayed, erase it.
 - (R) With CONSULT: Refer to "How to Erase DTC and 1st Trip DTC" in EC-600, "CONSULT Function".
 - Without CONSULT: Refer to "How to Erase Self-diagnostic Results" in EC-597, "On Board Diagnosis Function".

>> GO TO 12.

< BASIC INSPECTION >

[MR18DE (FOR CALIFORNIA)]

12. FINAL CHECK

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

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

Is DTC detected and does symptom remain?

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

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

NO-1 >> No request for I/M examination from the customer: Before returning the vehicle to the customer, always erase unnecessary DTC in ECM and TCM (R) With CONSULT: Refer to "How to Read DTC and 1st Trip DTC" in EC-600, "CONSULT Function", W Without CONSULT: Refer to "How to Read Self-diagnostic Results" in EC-597, "On Board Diagnosis Function").

NO-2 >> I/M examination, requested from the customer: GO TO 13.

13. PREPARE FOR I/M EXAMINATION

- Set SRT codes. Refer to EC-504, "Description".
- 2. Erase permanent DTCs. Refer to EC-510, "Description".

>> INSPECTION END.

Diagnostic Work Sheet

DESCRIPTION

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

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

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

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

KEY POINTS

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

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< BASIC INSPECTION >

[MR18DE (FOR CALIFORNIA)]

WORKSHEET SAMPLE

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

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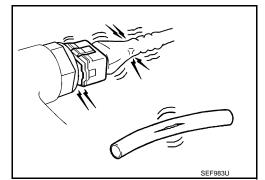
INSPECTION AND ADJUSTMENT BASIC INSPECTION

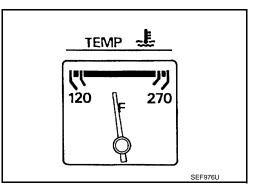
BASIC INSPECTION: Special Repair Requirement

INFOID:0000000007770344

1.INSPECTION START

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

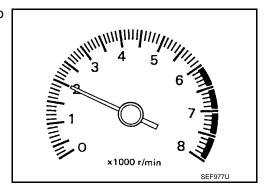




- 5. Run engine at about 2,000 rpm for about 2 minutes under no load.
- 6. Make sure that no DTC is displayed with CONSULT or GST.

Is any DTC detected?

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



2. REPAIR OR REPLACE

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

>> GO TO 3

3. CHECK IDLE SPEED

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

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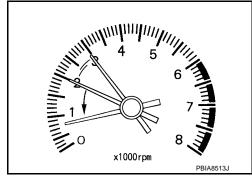
[MR18DE (FOR CALIFORNIA)]

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

For procedure, refer to <u>EC-498</u>, "IDLE <u>SPEED</u>: <u>Special Repair Requirement"</u>. For specification, refer to <u>EC-989</u>, "Idle <u>Speed"</u>.

Is the inspection result normal?

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



4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- Stop engine.
- 2. Perform EC-500, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 5.

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

Perform EC-500, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-501, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 7.

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

7. CHECK IDLE SPEED AGAIN

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

For procedure, refer to EC-498, "IDLE SPEED: Special Repair Requirement".

For specification, refer to EC-989, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the Following.

- Check camshaft position sensor (PHASE) and circuit. Refer to <u>EC-738, "DTC Logic"</u>.
- Check crankshaft position sensor (POS) and circuit. Refer to <u>EC-734, "DTC Logic"</u>.

Is the inspection result normal?

YES >> GO TO 9.

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

9. CHECK ECM FUNCTION

- 1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is rare.)
- 2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to SEC-9, "ECM: Special Repair Requirement" or SEC-154, "ECM: Special Repair Requirement".

>> GO TO 4.

10. CHECK IGNITION TIMING

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

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< BASIC INSPECTION >

18.check ecm function

[MR18DE (FOR CALIFORNIA)]

For procedure, refer to EC-499, "IGNITION TIMING: Special Repair Requirement". For specification, refer to EC-989, "Ignition Timing". Α Is the inspection result normal? YES >> GO TO 19. NO >> GO TO 11. EC 11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING Stop engine. Perform EC-500, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement". D >> GO TO 12. 12.perform throttle valve closed position learning Perform EC-500. "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement". >> GO TO 13. 13.perform idle air volume learning Perform EC-501, "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 Н Start engine and warm it up to normal operating temperature. Check idle speed. For procedure, refer to EC-498, "IDLE SPEED: Special Repair Requirement". For specification, refer to EC-989, "Idle Speed". Is the inspection result normal? YES >> GO TO 15. NO >> GO TO 17. 15. CHECK IGNITION TIMING AGAIN Run engine at idle. 2. Check ignition timing with a timing light. For procedure, refer to EC-499, "IGNITION TIMING: Special Requirement". For specification, refer to EC-989, "Ignition Timing". Is the inspection result normal? YES >> GO TO 19. M NO >> GO TO 16. 16.CHECK TIMING CHAIN INSTALLATION Check timing chain installation. Refer to EM-45, "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 (PHASE) and circuit. Refer to <u>EC-738, "DTC Logic"</u>. • Check crankshaft position sensor (POS) and circuit. Refer to EC-734, "DTC Logic". Is the inspection result normal? YES >> GO TO 18. NO >> Repair or replace. Then GO TO 4.

< BASIC INSPECTION >

[MR18DE (FOR CALIFORNIA)]

- 1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is rare.)
- Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to EC-498, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Special Repair Requirement".

>> GO TO 4.

19. INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, perform <u>EC-498</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Special Repair Requirement".

>> INSPECTION END

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Description

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INFOID:0000000007770347

INFOID:0000000007770348

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Special Repair Requirement

 ${f 1}$.PERFORM INITIALIZATION OF NATS SYSTEM AND REGISTRATION OF ALL NATS IGNITION KEY IDS

Refer to SEC-9, "ECM: Special Repair Requirement" or SEC-154, "ECM: Special Repair Requirement".

>> GO TO 2.

2.PERFORM VIN REGISTRATION

Refer to EC-499, "VIN REGISTRATION: Special Repair Requirement".

>> GO TO 3.

3. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-500, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 4.

4. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-500, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 5.

5. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-501, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> END
IDLE SPEED

IDLE SPEED: Description

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

IDLE SPEED : Special Repair Requirement

1.CHECK IDLE SPEED

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< BASIC INSPECTION >

[MR18DE (FOR CALIFORNIA)]

(P)With CONSULT

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

■With GST

Check idle speed with Service \$01 of GST.

>> INSPECTION END

IGNITION TIMING

IGNITION TIMING: Description

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INFOID:0000000007770350

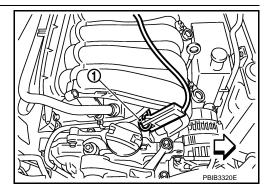
This describes how to check the ignition timing. For the actual procedure, follow the instructions in "BASIC INSPECTION".

IGNITION TIMING: Special Repair Requirement

1. CHECK IGNITION TIMING

1. Attach timing light to No. 1 ignition coil (1) wire as shown.

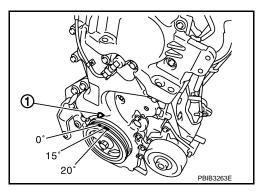
: Vehicle front



Check ignition timing.

1 : Timing indicator

>> INSPECTION END



VIN REGISTRATION

VIN REGISTRATION: Description

INFOID:0000000007770351

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

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

VIN REGISTRATION: Special Repair Requirement

INFOID:0000000007770352

1.CHECK VIN

Check the VIN of the vehicle and note it. Refer to GI-23, "Model Variation".

>> GO TO 2.

2.PERFORM VIN REGISTRATION

(P)With CONSULT

Turn ignition switch ON and engine stopped.

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

EC-499 Revision: 2011 November 2012 CUBE

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< BASIC INSPECTION >

[MR18DE (FOR CALIFORNIA)]

Follow the instruction of CONSULT display.

>> END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

ACCELERATOR PEDAL RELEASED POSITION LEARNING: Description INFOID:00000007770353

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

ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement

1.START

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

>> END

THROTTLE VALVE CLOSED POSITION LEARNING

THROTTLE VALVE CLOSED POSITION LEARNING: Description

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

THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement

INFOID:0000000007770356

INFOID:0000000007770357

INFOID:0000000007770355

1.START

(P)With CONSULT

- 1. Turn ignition switch ON.
- Select "CLSD THL POS LEARN" in "WORK SUPPORT" mode of "ENGINE" using CONSULT.
- 3. Follow the instructions on the CONSULT display.
- Turn ignition switch OFF and wait at least 10 seconds.
 Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

®Without CONSULT

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

 Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

>> END

IDLE AIR VOLUME LEARNING

IDLE AIR VOLUME LEARNING: Description

Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps each engine idle speed within the specific range. It must be performed under any of the following conditions:

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

< BASIC INSPECTION >

blinking and turned ON.

Start engine and let it idle.

[MR18DE (FOR CALIFORNIA)]

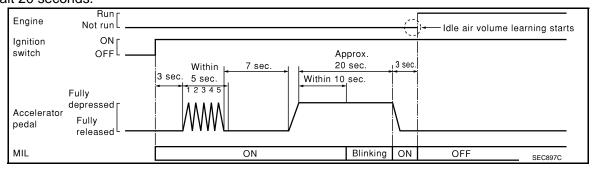
IDLE AIR VOLUME LEARNING: Special Repair Requirement INFOID:0000000007770358 Α 1.PRECONDITIONING Make sure that all of the following conditions are satisfied. EC Learning will be cancelled if any of the following conditions are missed for even a moment. Battery voltage: More than 12.9 V (At idle) Engine coolant temperature: 70 - 100°C (158 - 212°F) Selector lever: P or N (CVT), Neutral (M/T) 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 D started the headlamp will not be illuminated. Steering wheel: Neutral (Straight-ahead position) Vehicle speed: Stopped Transmission: Warmed-up Е - CVT models With CONSULT: Drive vehicle until "FLUID TEMP SE" in "DATA MONITOR" mode of "TRANSMISSION" system indicates less than 0.9 V. Without CONSULT: Drive vehicle for 10 minutes. M/T models Drive vehicle for 10 minutes. Do you have CONSULT? YES >> GO TO 2. NO >> GO TO 3. Н 2.IDLE AIR VOLUME LEARNING (P)With CONSULT Perform Accelerator Pedal Released Position Learning. Refer to EC-500, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement". Perform Throttle Valve Closed Position Learning. Refer to EC-500, "THROTTLE VALVE CLOSED POSI-TION LEARNING: Special Repair Requirement". 3. Start engine and warm it up to normal operating temperature. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode. Touch "START" and wait 20 seconds. Is "CMPLT" displayed on CONSULT screen? YES >> GO TO 4. NO >> GO TO 5. ${f 3.}$ idle air volume learning 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. Ν Perform Accelerator Pedal Released Position Learning, Refer to EC-500, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement". Perform Throttle Valve Closed Position Learning. Refer to EC-500, "THROTTLE VALVE CLOSED POSI-TION LEARNING: Special Repair Requirement". Start engine and warm it up to normal operating temperature. Turn ignition switch OFF and wait at least 10 seconds. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds. Р 6. Repeat the following procedure quickly five times within 5 seconds. Fully depress the accelerator pedal. Fully release the accelerator pedal. 7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops

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Fully release the accelerator pedal within 3 seconds after the MIL turned ON.

< BASIC INSPECTION >

10. Wait 20 seconds.



>> GO TO 4.

4. CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.

Item	Specification	
Idle speed	CVT: 700 \pm 50 rpm (in P or N position) M/T: 700 \pm 50 rpm (in Neutral position)	
Ignition timing	CVT: $13 \pm 5^{\circ}$ BTDC (in P or N position) M/T: $13 \pm 5^{\circ}$ BTDC (in Neutral position)	

Is the inspection result normal?

YES >> INSPECTION END

DETECT MALFUNCTIONING PART

Check the following

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6. DETECT MALFUNCTIONING PART

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

It is useful to perform "TROUBLE DIAGNOSIS - SPECIFICATION VALUE". Refer to <u>EC-609</u>, "<u>Description</u>". If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning again:

- Engine stalls.
- · Erroneous idle.

>> INSPECTION END

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Description

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

MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement

INFOID:0000000007770360

INFOID:0000000007770359

1.START

(I) With CONSULT

< BASIC INSPECTION >

[MR18DE (FOR CALIFORNIA)]

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

With GST

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

>> END

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HOW TO SET SRT CODE

Description

OUTLINE

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

SRT ITEM

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

SRT item*1 (CONSULT indication)	Performance Priority*2	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420
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
		Heated oxygen sensor 2	P0137
		Heated oxygen sensor 2	P0138
		Heated oxygen sensor 2	P0139
EGR/VVT SYSTEM	3	Intake value timing control function	P0011

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

SRT SERVICE PROCEDURE

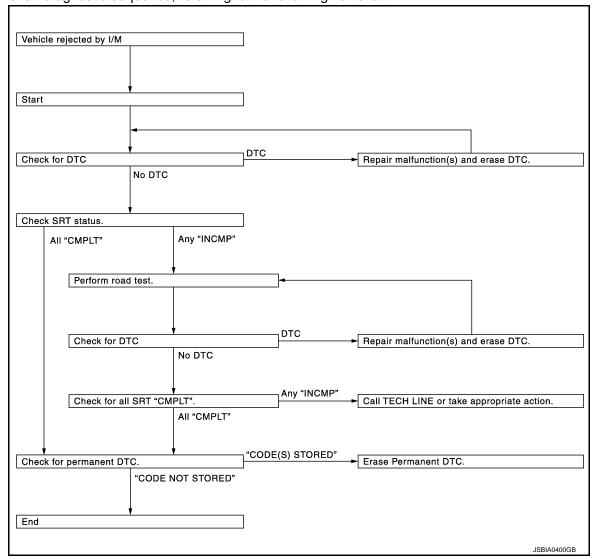
^{*2:} If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT.

HOW TO SET SRT CODE

< BASIC INSPECTION >

[MR18DE (FOR CALIFORNIA)]

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



SRT Set Driving Pattern

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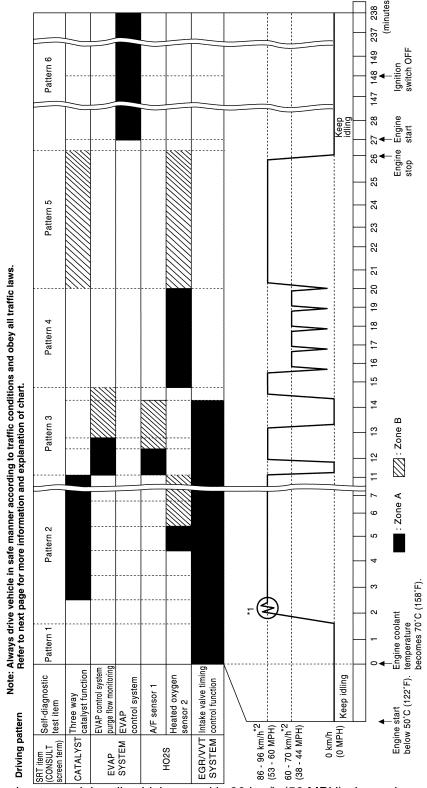
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Always drive the vehicle in safe manner according to traffic conditions and obey all traffic laws.



^{*1:} Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

^{*2:} Checking the vehicle speed with GST is advised.

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

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

HOW TO SET SRT CODE [MR18DE (FOR CALIFORNIA)] < BASIC INSPECTION > *: Normal conditions Sea level Α Flat road Ambient air temperature: 20 – 30°C (68 – 86°F) Diagnosis is performed as quickly as possible under normal conditions. However, under other conditions, diagnosis may also be performed. [For example: ambient air temperature other than 20 – 30°C (68 – 86°F)] Work Procedure 1. CHECK DTC Check DTC. Is any DTC detected? YES >> Repair malfunction(s) and erase DTC. Refer to EC-963, "DTC Index". NO >> GO TO 2. 2.CHECK SRT STATUS (P)With CONSULT Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT. Perform "SRT status" mode with <u>EC-597</u>, "On Board Diagnosis Function". Select Service \$01 with GST. Is SRT code(s) set? >> GO TO 11. YFS NO-1 >> With CONSULT: GO TO 3. NO-2 >> Without CONSULT: GO TO 4. 3.DTC CONFIRMATION PROCEDURE Select "SRT WORK SUPPORT" in "DTC & SRT CONFIRMATION" mode with CONSULT. For SRT(s) that is not set, perform the corresponding "DTC CONFIRMATION PROCEDURE" according to the "Performance Priority" in the "SRT ITEM" table. Refer to EC-504, "Description". Check DTC. Is any DTC detected? >> Repair malfunction(s) and erase DTC. Refer to EC-963, "DTC Index". >> GO TO 10. NO 4.PERFORM ROAD TEST Check the "Performance Priority" in the "SRT ITEM" table. Refer to EC-504, "Description" • Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to EC-505, "SRT Set Driv-In order to set all SRTs, the SRT set driving pattern must be performed at least once. >> GO TO 5.

5. PATTERN 1

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

NOTE:

ECM terminal voltage is follows;

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

Refer to EC-943, "Reference Value".

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>> GO TO 6.

6. PATTERN 2

- 1. Drive the vehicle. And depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds.
- 2. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again

NOTE:

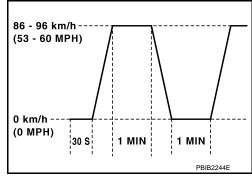
- Checking the vehicle speed with GST is advised.
- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

>> GO TO 7.

7. PATTERN 3

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

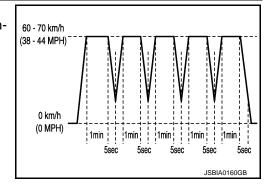
>> GO TO 8.



8. PATTERN 4

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

>> GO TO 9.



9. PATTERN 5

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

>> GO TO 10.

10. CHECK SRT STATUS

(P)With CONSULT

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

Perform "SRT status" mode with EC-597. "On Board Diagnosis Function".

With GST

Select Service \$01 with GST.

Is SRT(s) set?

YES >> GO TO 11.

NO >> Call TECH LINE or take appropriate action.

11. CHECK PERMANENT DTC

HOW TO SET SRT CODE

< BASIC INSPECTION >

[MR18DE (FOR CALIFORNIA)]

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

(P)With CONSULT

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

With GST

Select Service \$0A with GST.

Is permanent DTC(s) detected?

YES >> Proceed to EC-510, "Description".

NO >> END

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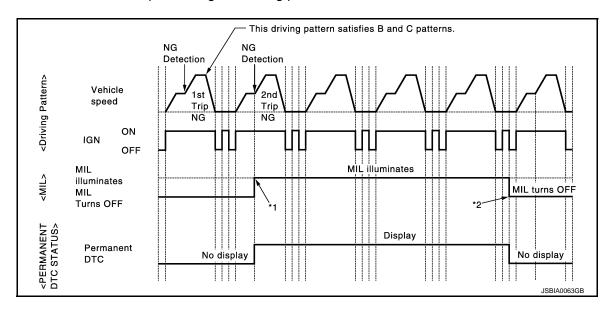
HOW TO ERASE PERMANENT DTC

Description

OUTLINE

When a DTC is stored in ECM

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



- *1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.
- *2: MIL will turn off after vehicle is driven 3 times (driving pattern B) without any malfunctions.

When a DTC is not stored in ECM

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

NOTE:

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

×: Applicable —: Not applicable

Croup*	Perform "DTC CONFIRMATION PROCEDURE"	Driving pattern	
Group	for applicable DTCs.	В	D
A	×	_	_
В	_	×	×

^{*:} For group, refer to EC-963, "DTC Index".

PERMANENT DTC ITEM

For permanent DTC items, MIL turns ON. Refer to EC-963, "DTC Index".

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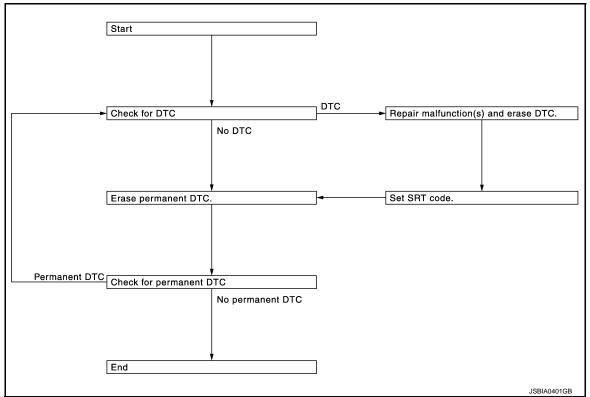
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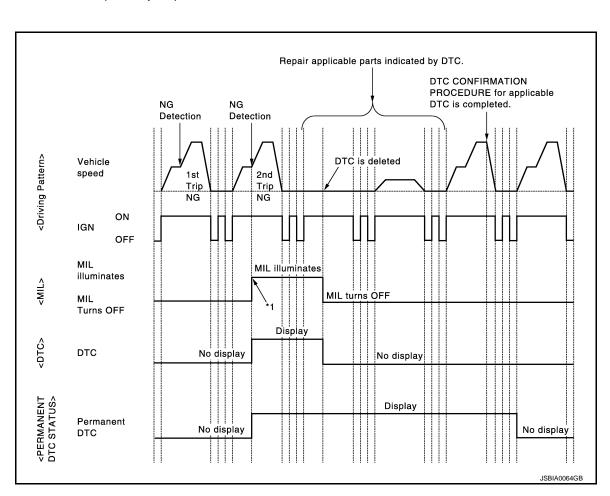
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PERMANENT DTC SERVICE PROCEDURE



Work Procedure (Group A)



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< BASIC INSPECTION >

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

1. CHECK DTC

Check DTC.

Is any DTC detected?

YES-1 >> (a) With CONSULT: Repair malfunction(s) and erase DTC. Refer to EC-600, "CONSULT Function".

YES-2 >> (a) Without CONSULT: Repair malfunction(s) and erase DTC. Refer to EC-597, "On Board Diagnosis Function".

NO >> GO TO 2.

2. CHECK PERMANENT DTC

(II) With CONSULT

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Select "PERMANENT DTC STATUS" mode with CONSULT.

@With GST

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

Is any permanent DTC detected?

YES >> GO TO 3. NO >> END

3.perform dtc confirmation procedure

Perform "DTC CONFIRMATION PROCEDURE" for DTCs which are the same as permanent DTCs stored in ECM. Refer to EC-963, "DTC Index".

>> GO TO 4.

4. CHECK PERMANENT DTC

With CONSULT

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 5. Select "PERMANENT DTC STATUS" mode with CONSULT.

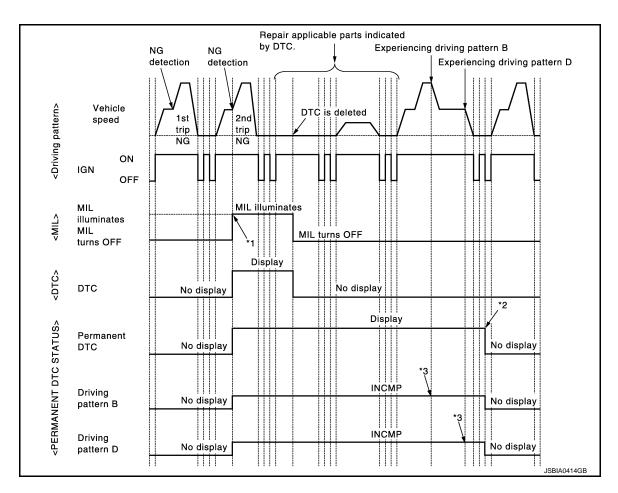
With GST

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Select Service \$0A with GST.

Is any permanent DTC detected?

YES >> GO TO 1. NO >> END Work Procedure (Group B)

INFOID:0000000007770366



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

NOTE:

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

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES-1 >> (a) With CONSULT: Repair malfunction(s) and erase DTC. Refer to EC-600, "CONSULT Function".

YES-2 >> \(\hat{R}\) Without CONSULT: Repair malfunction(s) and erase DTC. Refer to EC-597, "On Board Diagnosis Function".

>> GO TO 2. NO

2.CHECK PERMANENT DTC

(P)With CONSULT

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

With GST

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

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HOW TO ERASE PERMANENT DTC

< BASIC INSPECTION >

[MR18DE (FOR CALIFORNIA)]

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

Is any permanent DTC detected?

YES >> GO TO 3. NO >> END

3. DRIVE DRIVING PATTERN B

CAUTION:

- · Always drive at a safe speed.
- Never erase self-diagnosis results.
- If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset.

(P)With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Use "PERMANENT DTC WORK SUPPORT" mode with CONSULT to drive the vehicle according to driving pattern B. Refer to <u>EC-600</u>, "CONSULT Function", <u>EC-594</u>, "DIAGNOSIS DESCRIPTION: Driving Pattern".

With GST

- 1. Start engine and warm it up to normal operating temperature.
- Drive the vehicle according to driving pattern B. Refer to <u>EC-594, "DIAGNOSIS DESCRIPTION: Driving Pattern"</u>.

>> GO TO 4.

4. CHECK PERMANENT DTC

(P)With CONSULT

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- Select "PERMANENT DTC STATUS" mode with CONSULT.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- Select Service \$0A with GST.

Is any permanent DTC detected?

YES >> GO TO 5. NO >> END

 ${f 5.}$ DRIVE DRIVING PATTERN D

CAUTION:

- Always drive at a safe speed.
- Never erase self-diagnosis results.
- If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset.
- Drive the vehicle according to driving pattern D. Refer to <u>EC-594, "DIAGNOSIS DESCRIPTION: Driving Pattern"</u>.

>> GO TO 6.

6. CHECK PERMANENT DTC

(I) With CONSULT

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

HOW TO ERASE PERMANENT DTC

< BASIC INSPECTION >

[MR18DE (FOR CALIFORNIA)]

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

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- Select Service \$0A with GST.

Is any permanent DTC detected?

YES >> GO TO 1.

NO >> END

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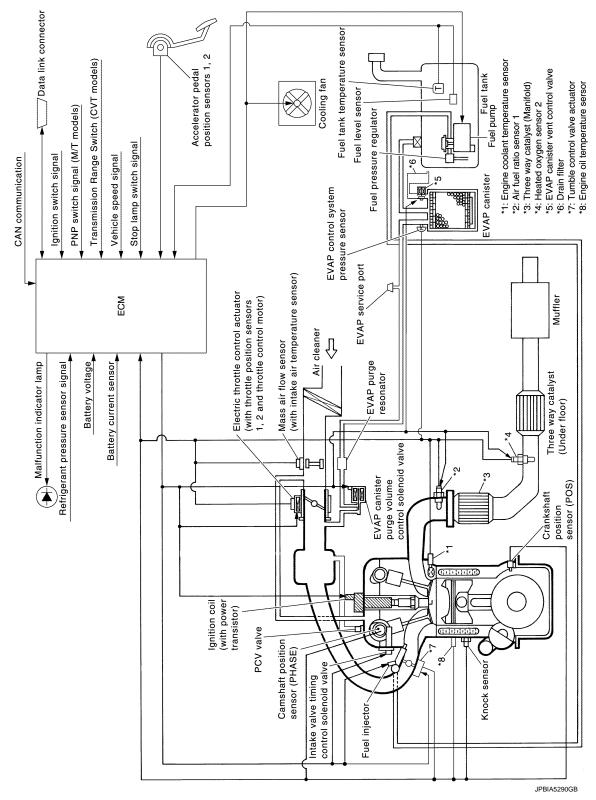
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SYSTEM DESCRIPTION

ENGINE CONTROL SYSTEM

System Diagram



System Description

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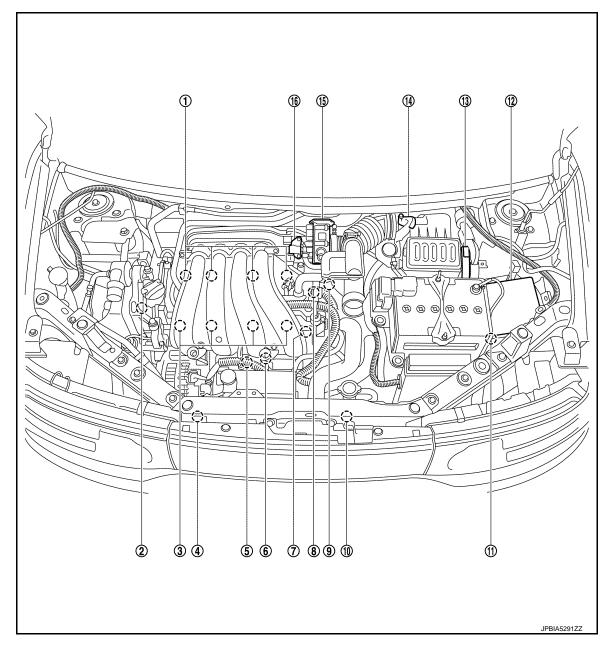
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ECM performs various controls such as fuel injection control and ignition timing control.

Component Parts Location

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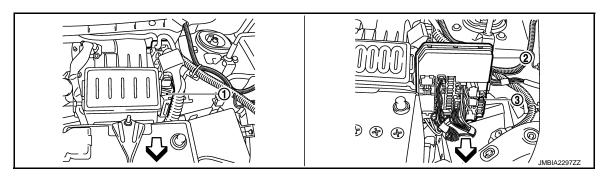


- Ignition coil (with power transistor) and spark plug
- 4. Refrigerant pressure sensor
- 7. Tumble control valve actuator
- 10. Cooling fan motor
- 13. ECM

- Intake valve timing control solenoid 3. valve
- 5. Knock sensor
- 8. Camshaft position sensor (PHASE)
- 11. Battery current sensor
- Mass air flow sensor (with intake air 15. temperature sensor)
- Fuel injector
- 6. Engine oil temperature sensor
- 9. Engine coolant temperature sensor
- 12. IPDM E/R
- Electric throttle control actuator (with built in throttle position sensor and throttle control motor)

16. EVAP canister purge volume control solenoid valve

Revision: 2011 November EC-517 2012 CUBE

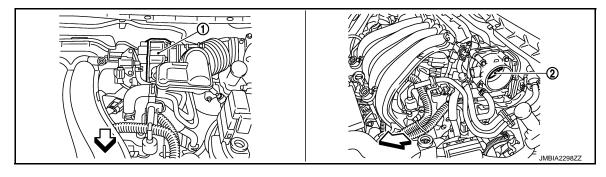


1. ECM

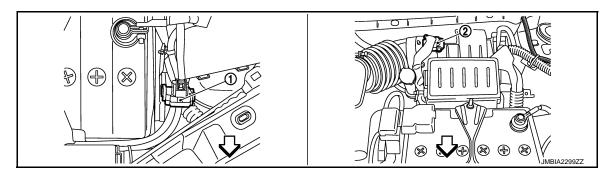
2. IPDM E/R

3. Fuel pump fuse (15 A)

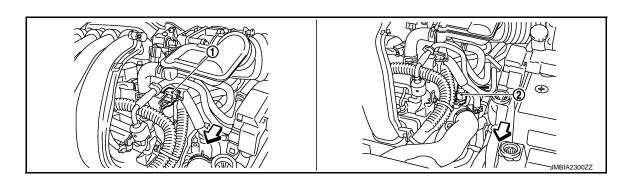




- Electric throttle control actuator (with built-in position sensor, throttle control motor)
- Throttle valve



- Battery current sensor
- Mass air flow sensor (with Intake air temperature sensor)



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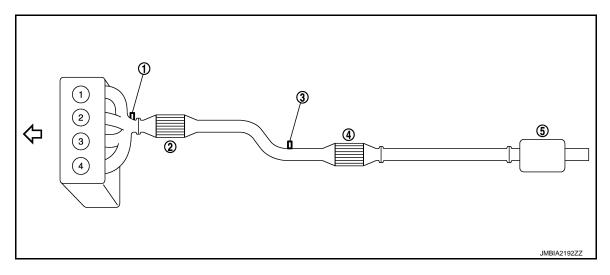
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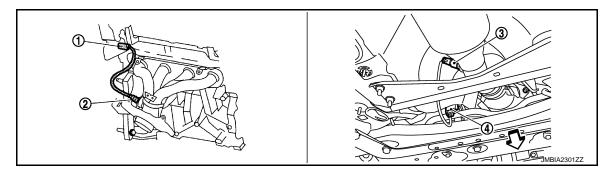
- Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor
- ⟨ Vehicle front



- Air fuel ratio (A/F) sensor 1
- Three way catalyst (under floor)
- Vehicle front

- 2. Three way catalyst (Manifold)
- Muffler

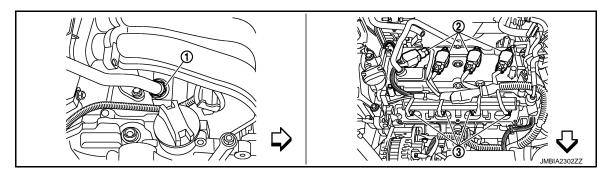
3. Heated oxygen sensor 2



- Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1 connector
- 3. Heated oxygen sensor 2

Fuel injector

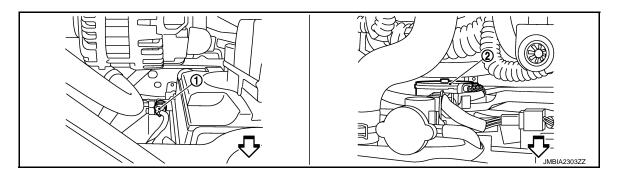
- Heated oxygen sensor 2 harness connector



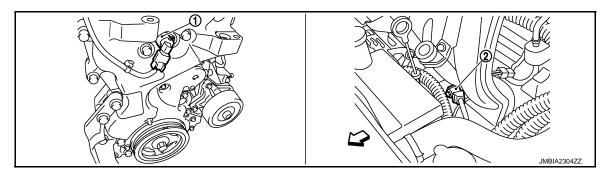
PCV valve

Ignition coil (with power transistor) and spark plug

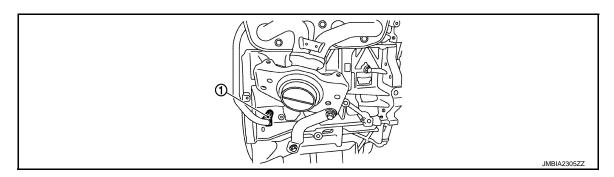
Vehicle front



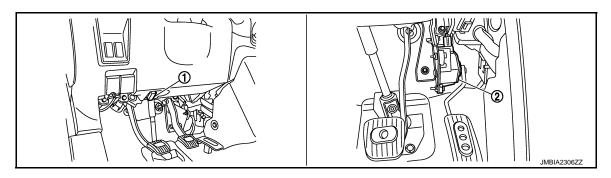
- 1. Refrigerant pressure sensor
- 2. Cooling fan motor



- Intake valve timing control solenoid 2. Knock sensor valve



1. Crankshaft position sensor (POS)



- 1. Data link connector
- 2. Accelerator pedal position sensor

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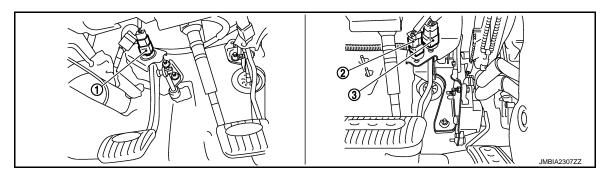
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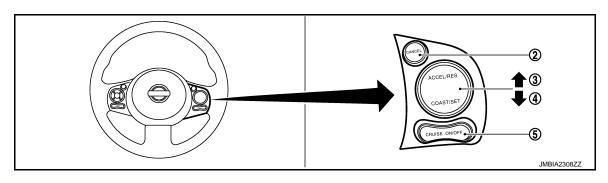
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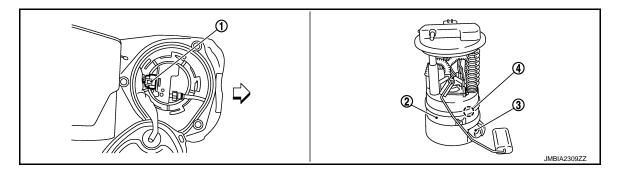
- ASCD clutch switch
- 2. ASCD brake switch
- 3. Stop lamp switch



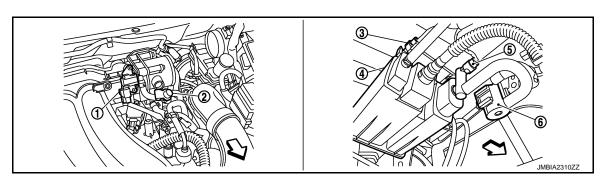
- ASCD steering switch 1.
- CANCEL switch 2.

RESUME/ACCELERATE switch

- SET/COST switch
- MAIN switch



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



EVAP canister purge volume control 2. EVAP service port solenoid valve

EVAP control system pressure sen-

ENGINE CONTROL SYSTEM

< SYSTEM DESCRIPTION >

Component Description

[MR18DE (FOR CALIFORNIA)]

4. EVAP canister

5. EVAP canister vent control valve

6. Drain filter

Throttle position sensor

INFOID:0000000007770370

Component	Reference		
A/F sensor 1	EC-666, "Description"		
A/F sensor 1 heater	EC-626, "Description"		
Accelerator pedal position sensor	EC-895, "Description"		
ASCD brake switch	EC-862, "Description"		
ASCD steering switch	EC-859, "Description"		
ASCD vehicle speed sensor	EC-869, "Description"		
Battery current sensor	EC-843, "Description"		
Camshaft position sensor (PHASE)	EC-738, "Description"		
Crankshaft position sensor (POS)	EC-734, "Description"		
Cooling fan motor	EC-555, "System Description"		
Electric throttle control actuator	EC-893, "Description"		
Engine coolant temperature sensor	EC-649, "Description"		
Engine oil temperature sensor	EC-717, "DTC Logic"		
EVAP canister purge volume control solenoid valve	EC-760, "Description"		
EVAP canister vent control valve	EC-768, "Description"		
EVAP control system pressure sensor	EC-776, "Description"		
Fuel injector	EC-922, "Description"		
Fuel level sensor	EC-803. "Description"		
Fuel pump	EC-925, "Description"		
Fuel tank temperature sensor	EC-709, "Description"		
Heated oxygen sensor 2	EC-676, "Description"		
Heated oxygen sensor 2 heater	EC-629, "Description"		
Ignition signal	EC-928, "Description"		
Intake air temperature sensor	EC-647, "Description"		
Intake valve timing control solenoid valve	EC-573, "System Description"		
Knock sensor	EC-732, "Description"		
Mass air flow sensor	EC-635, "Description"		
Park/neutral position switch (M/T models)	EC 035 "Deceription"		
Transmission range switch (CVT models)	EC-825, "Description"		
PCV valve	EC-940, "Description"		
Refrigerant pressure sensor	EC-941, "Description"		
Stop lamp switch	EC-873, "Description"		
Tumble control valve	EC-876, "Description"		
Tumble control valve position sensor	EC-881, "Description"		
Throttle control motor	EC-891, "Description"		
Throttle control motor relay	EC-884, "Description"		

EC-655, "Description"

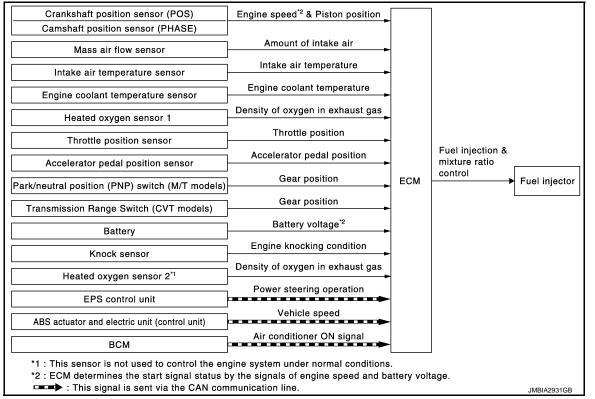
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MULTIPORT FUEL INJECTION SYSTEM

System Diagram



System Description

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INPUT/OUTPUT SIGNAL CHART

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

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

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

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

SYSTEM DESCRIPTION

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

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

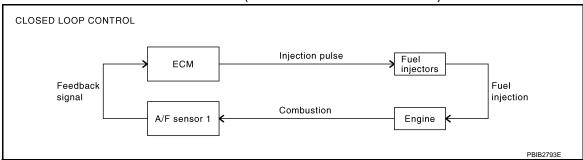
<Fuel increase>

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

<Fuel decrease>

- During deceleration
- · During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (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-666, "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 (CVT models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

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

MULTIPORT FUEL INJECTION SYSTEM

< SYSTEM DESCRIPTION >

[MR18DE (FOR CALIFORNIA)]

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.

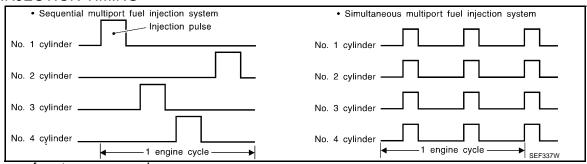
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"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 four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
 - The four injectors will then receive the signals two times for each engine cycle.
 - This system is used 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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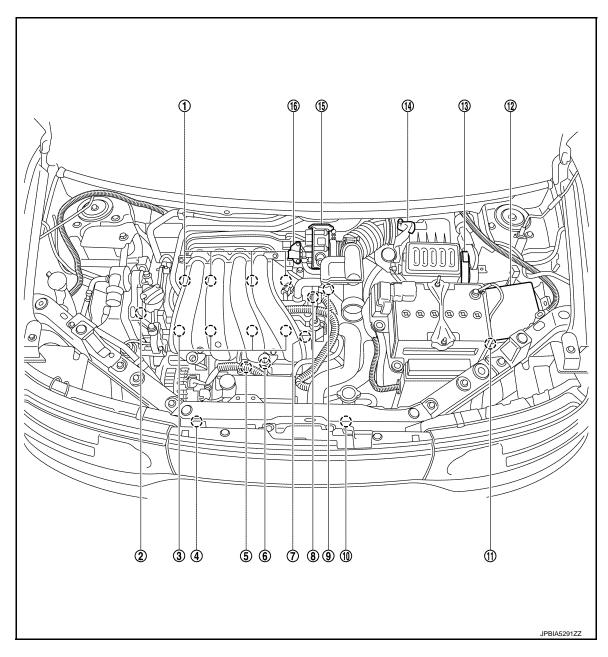
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Component Parts Location

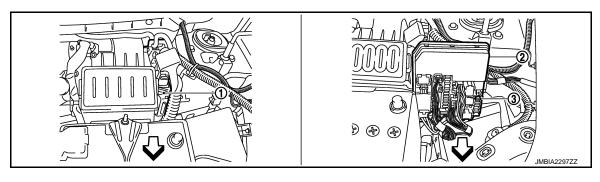
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- Ignition coil (with power transistor) and spark plug
- Refrigerant pressure sensor
- Tumble control valve actuator
- 10. Cooling fan motor
- 13. ECM

- Intake valve timing control solenoid 3. valve
- 5. Knock sensor
- Camshaft position sensor (PHASE)
- 11. Battery current sensor
- temperature sensor)
- Fuel injector
- Engine oil temperature sensor
- 9. Engine coolant temperature sensor
- 12. IPDM E/R
- 14. Mass air flow sensor (with intake air 15. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)

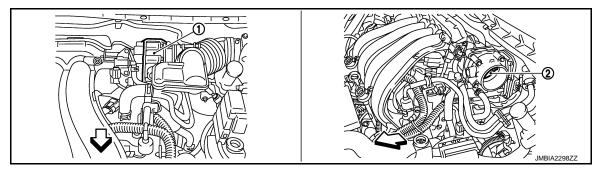
16. EVAP canister purge volume control solenoid valve



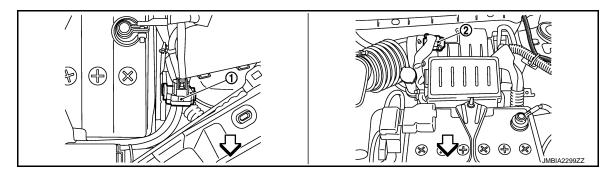
1. ECM

2. IPDM E/R

3. Fuel pump fuse (15 A)

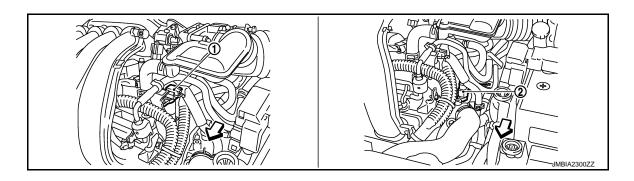


- Electric throttle control actuator (with built-in position sensor, throttle control motor)
- . Throttle valve



- Battery current sensor
- Mass air flow sensor (with Intake air temperature sensor)

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→ Vehicle front



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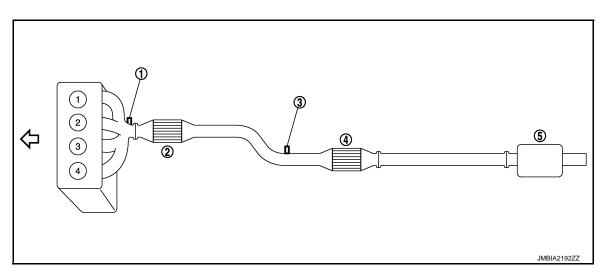
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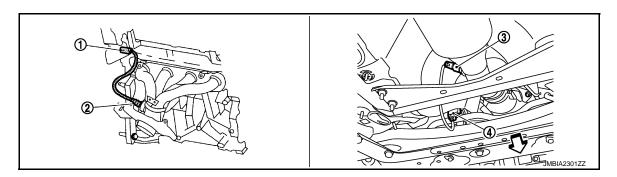
- 1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor



- 1. Air fuel ratio (A/F) sensor 1
- 4. Three way catalyst (under floor)
- ∠ Vehicle front

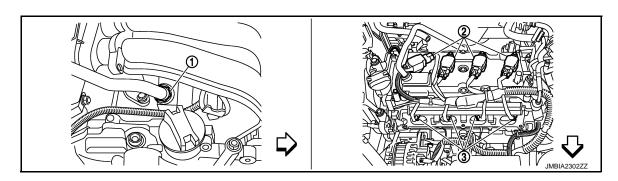
- 2. Three way catalyst (Manifold)
- 5. Muffler

3. Heated oxygen sensor 2



- Air fuel ratio (A/F) sensor 1 harness connector
- Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1
- 3. Heated oxygen sensor 2

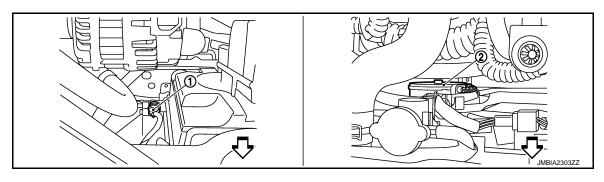
- Heated oxygen sensor 2 harness connector
- ⟨
 → Vehicle front



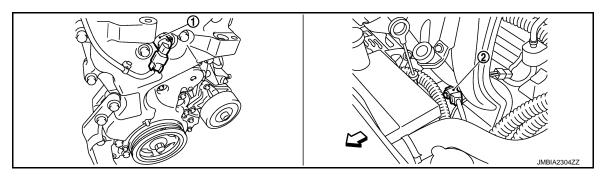
1. PCV valve

- 2. Ignition coil (with power transistor) and spark plug
- Fuel injector

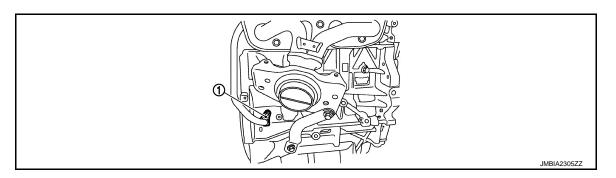
Vehicle front



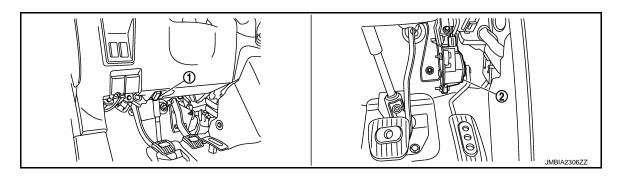
- Refrigerant pressure sensor
- 2. Cooling fan motor



- Intake valve timing control solenoid 2. Knock sensor



Crankshaft position sensor (POS)



- Data link connector
- Accelerator pedal position sensor

EC-529 Revision: 2011 November 2012 CUBE

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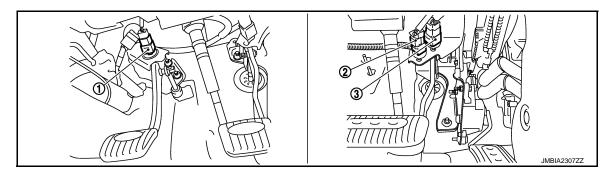
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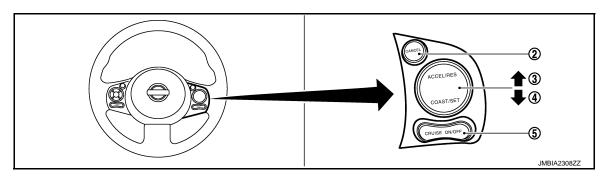
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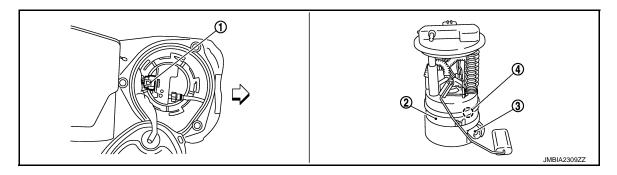


- ASCD clutch switch
- 2. ASCD brake switch
- Stop lamp switch



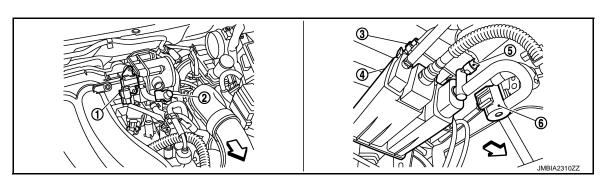
- ASCD steering switch 1.
- CANCEL switch
- RESUME/ACCELERATE switch 3.

- SET/COST switch
- MAIN switch



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

- Fuel tank temperature sensor



- EVAP canister purge volume control 2. solenoid valve
- **EVAP** service port
- EVAP control system pressure sen-

MULTIPORT FUEL INJECTION SYSTEM

< SYSTEM DESCRIPTION >

[MR18DE (FOR CALIFORNIA)]

4. EVAP canister

5. EVAP canister vent control valve

6. Drain filter

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→ Vehicle front

Component Description

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Component	Reference	
A/F sensor 1	EC-666, "Description"	
Accelerator pedal position sensor	EC-895, "Description"	
Camshaft position sensor (PHASE)	EC-738, "Description"	
Crankshaft position sensor (POS)	EC-734, "Description"	
Engine coolant temperature sensor	EC-649, "Description"	
Fuel injector	EC-922, "Description"	
Heated oxygen sensor 2	EC-676, "Description"	
Intake air temperature sensor	EC-647, "Description"	
Knock sensor	EC-732, "Description"	
Mass air flow sensor	EC-635, "Description"	
Park/neutral position switch (M/T models)	CC 025 "Description"	
Transmission range switch (CVT models)	EC-825, "Description"	
Throttle position sensor	EC-655, "Description"	

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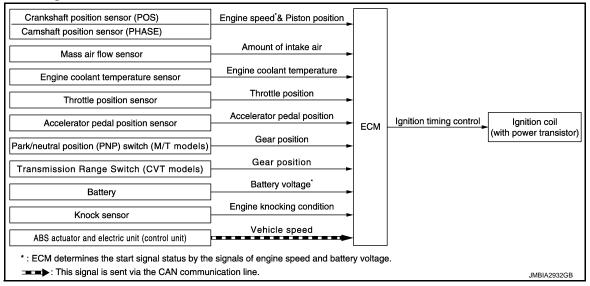
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ELECTRIC IGNITION SYSTEM

System Diagram

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System Description

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INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	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		
Accelerator pedal position sensor	Accelerator pedal position	Ignition timing control	Ignition coil (with power transistor)
Battery	Battery voltage*2	Control	
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch (M/T models)	Gear position		
Transmission range switch (CVT models)	Gear position		
ABS actuator and electric unit (control unit)	Vehicle speed*1		

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

SYSTEM DESCRIPTION

Ignition order: 1 - 3 - 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.

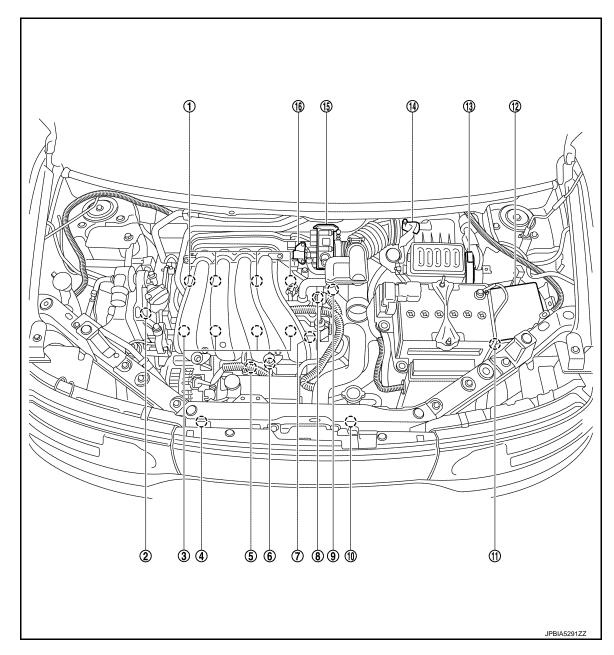
- · At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

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

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Component Parts Location

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- Ignition coil (with power transistor) and spark plug
- 4. Refrigerant pressure sensor
- 7. Tumble control valve actuator
- 10. Cooling fan motor
- 13. ECM

- Intake valve timing control solenoid valve
- 5. Knock sensor
- 8. Camshaft position sensor (PHASE)
- 11. Battery current sensor
- 14. Mass air flow sensor (with intake air 15. temperature sensor)
- Fuel injector

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- 6. Engine oil temperature sensor
- 9. Engine coolant temperature sensor
- 12. IPDM E/R
- Electric throttle control actuator (with built in throttle position sensor and throttle control motor)

 EVAP canister purge volume control solenoid valve

Revision: 2011 November EC-533 2012 CUBE

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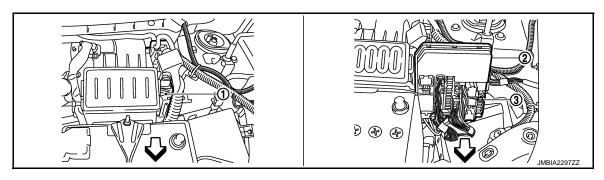
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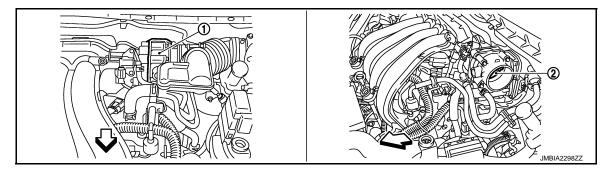


1. ECM

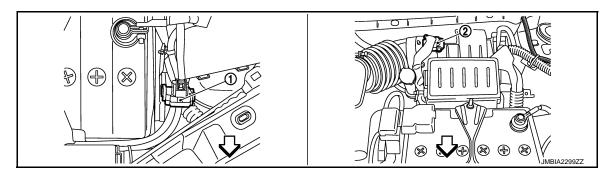
2. IPDM E/R

B. Fuel pump fuse (15 A)

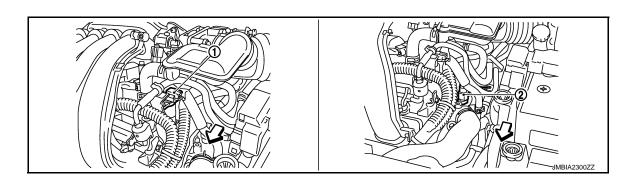




- Electric throttle control actuator (with built-in position sensor, throttle control motor)
- Throttle valve



- Battery current sensor
- Mass air flow sensor (with Intake air temperature sensor)



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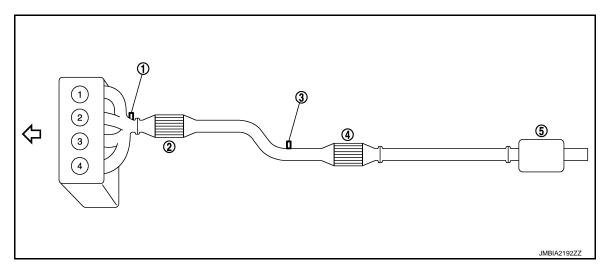
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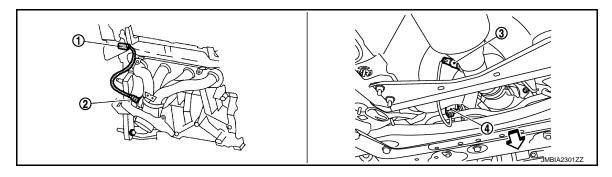
- Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor
- ⟨ Vehicle front



- Air fuel ratio (A/F) sensor 1
- Three way catalyst (under floor)
- Vehicle front

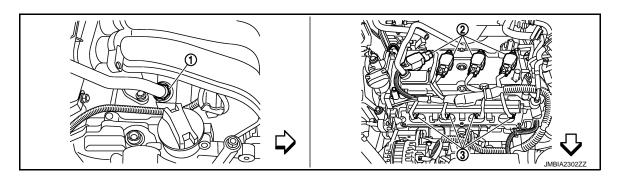
- 2. Three way catalyst (Manifold)
- Muffler

3. Heated oxygen sensor 2



- Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1 connector
- 3. Heated oxygen sensor 2

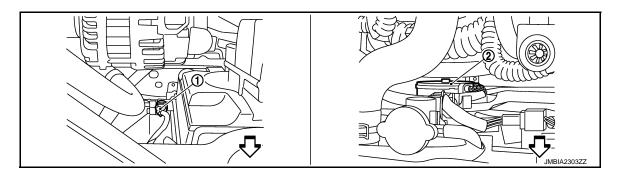
- Heated oxygen sensor 2 harness connector



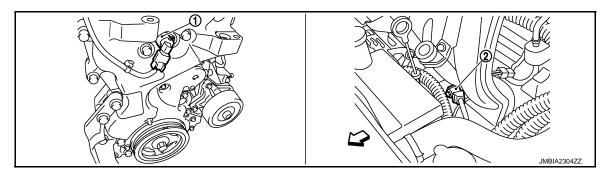
PCV valve

- Ignition coil (with power transistor) and spark plug
- Fuel injector

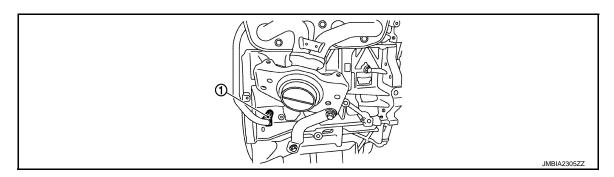
Vehicle front



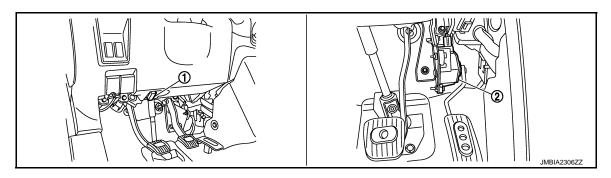
- 1. Refrigerant pressure sensor
- 2. Cooling fan motor



- Intake valve timing control solenoid 2. Knock sensor valve



1. Crankshaft position sensor (POS)



- 1. Data link connector
- 2. Accelerator pedal position sensor

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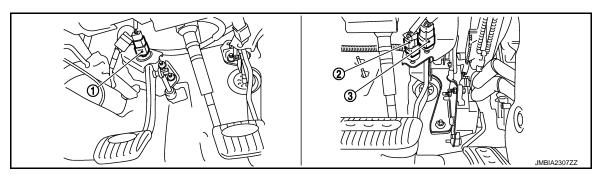
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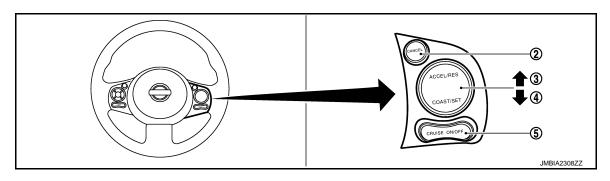
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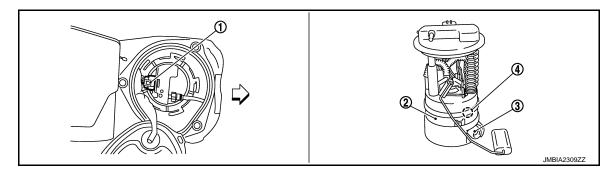


- ASCD clutch switch
- 2. ASCD brake switch
- 3. Stop lamp switch

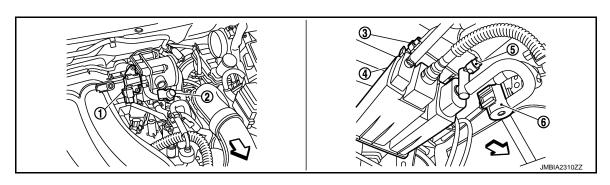


- ASCD steering switch 1.
- CANCEL switch 2.
- RESUME/ACCELERATE switch

- SET/COST switch
- MAIN switch



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



EVAP canister purge volume control 2. EVAP service port solenoid valve

EVAP control system pressure sen-

ELECTRIC IGNITION SYSTEM

< SYSTEM DESCRIPTION >

[MR18DE (FOR CALIFORNIA)]

4. EVAP canister

5. EVAP canister vent control valve

6. Drain filter

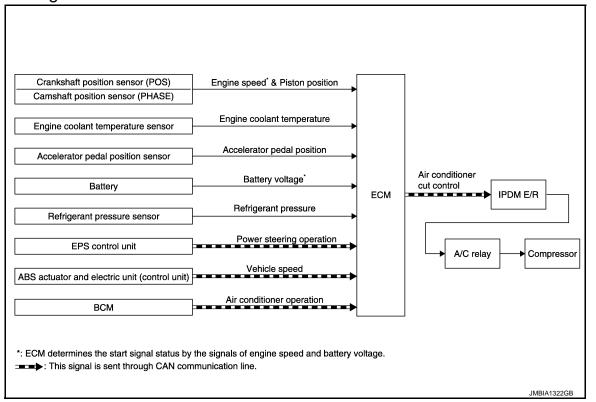
Component Description

INFOID:0000000007770378

Component	Reference	
Accelerator pedal position sensor	EC-895, "Description"	
Camshaft position sensor (PHASE)	EC-738, "Description"	
Crankshaft position sensor (POS)	EC-734, "Description"	
Engine coolant temperature sensor	EC-649, "Description"	
Ignition signal	EC-928, "Description"	
Knock sensor	EC-732, "Description"	
Mass air flow sensor	EC-635, "Description"	
Park/neutral position switch (M/T models)	EC-825, "Description"	
Transmission range switch (CVT models)		
Throttle position sensor	EC-655, "Description"	
Vehicle speed sensor	EC-809, "EXCEPT FOR M/T MODELS : Description"	

AIR CONDITIONING CUT CONTROL

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator		
Air conditioner switch*1	Air conditioner ON signal				
Accelerator pedal position sensor	Accelerator pedal position				
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed* ²		IPDM E/R		
Engine coolant temperature sensor	Engine coolant temperature	Air conditioner	↓ Air conditioner relay ↓ Compressor		
Battery	Battery voltage*2	cut control			
Refrigerant pressure sensor	Refrigerant pressure				
EPS control unit	Power steering operation				
ABS actuator and electric unit (control unit)	Vehicle speed*1				
ВСМ	Air conditioner ON signal*1				

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

SYSTEM DESCRIPTION

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

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

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.

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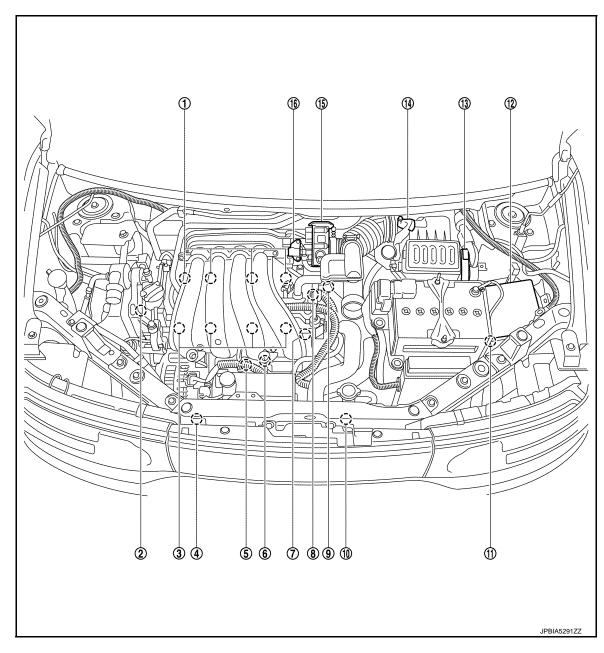
^{*2:} ECM determines the start signal status by the signals of engine speed and battery voltage.

< SYSTEM DESCRIPTION >

- · When engine speed is excessively low.
- · When refrigerant pressure is excessively low or high.

Component Parts Location

INFOID:0000000007770381



- Ignition coil (with power transistor) and spark plug
- 4. Refrigerant pressure sensor
- Tumble control valve actuator
- 10. Cooling fan motor
- 13. ECM

11. Battery current sensor

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valve

Knock sensor

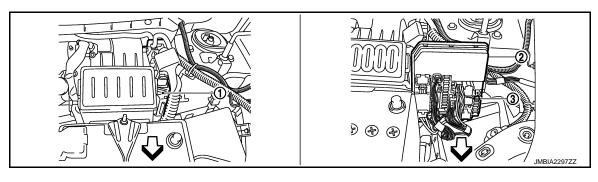
14. Mass air flow sensor (with intake air 15. Electric throttle control actuator temperature sensor)

Intake valve timing control solenoid

Camshaft position sensor (PHASE)

- 3. Fuel injector
- Engine oil temperature sensor
- 9. Engine coolant temperature sensor
- 12. IPDM E/R
- (with built in throttle position sensor and throttle control motor)

16. EVAP canister purge volume control solenoid valve

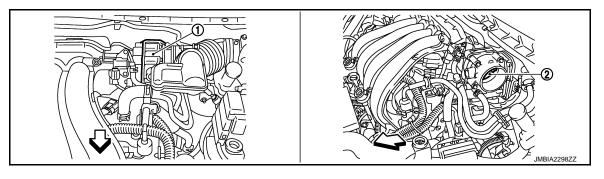


1. ECM

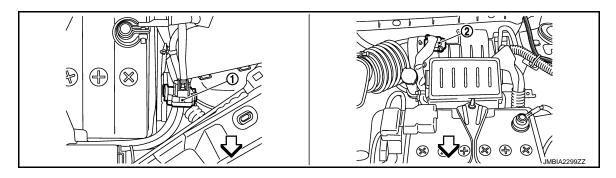
2. IPDM E/R

3. Fuel pump fuse (15 A)



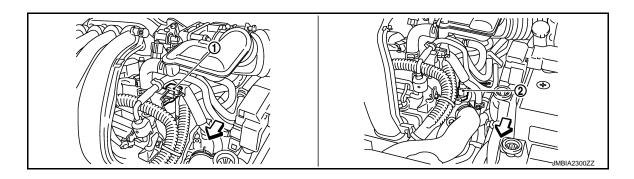


- Electric throttle control actuator (with built-in position sensor, throttle control motor)
- . Throttle valve



- Battery current sensor
- Mass air flow sensor (with Intake air temperature sensor)

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→ Vehicle front



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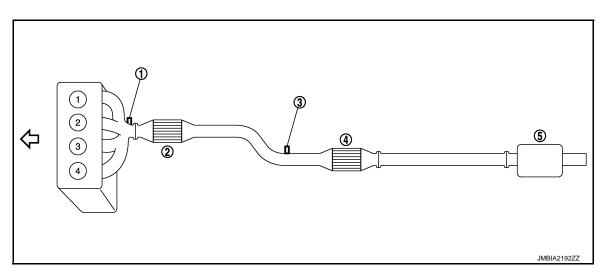
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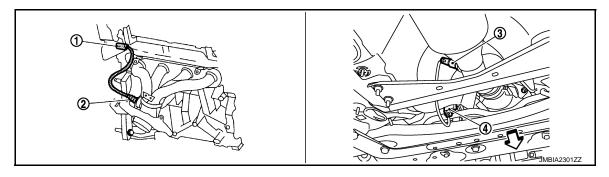
- Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor



- Air fuel ratio (A/F) sensor 1
- Three way catalyst (under floor)

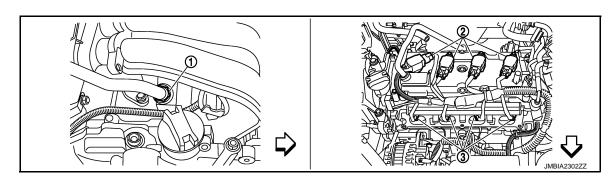
- 2. Three way catalyst (Manifold)
- 5. Muffler

3. Heated oxygen sensor 2



- Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1 connector
- Heated oxygen sensor 2

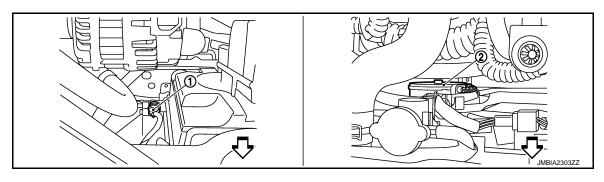
- Heated oxygen sensor 2 harness connector
- ⟨
 → Vehicle front



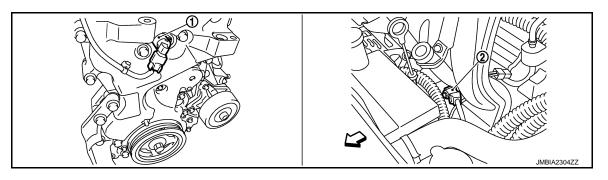
PCV valve

- Ignition coil (with power transistor) and spark plug
- Fuel injector

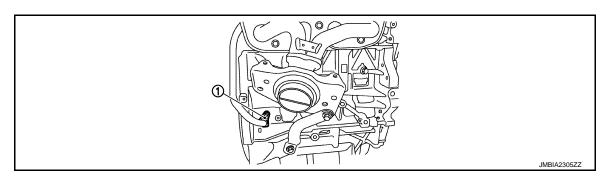
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→ Vehicle front



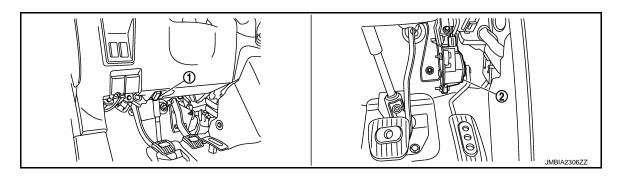
- Refrigerant pressure sensor
- 2. Cooling fan motor



- Intake valve timing control solenoid 2. Knock sensor



Crankshaft position sensor (POS)



- Data link connector
- Accelerator pedal position sensor

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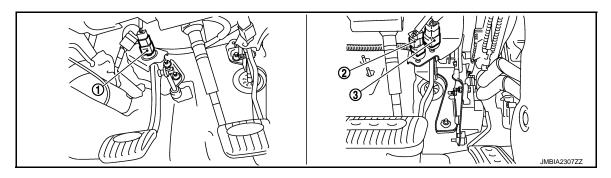
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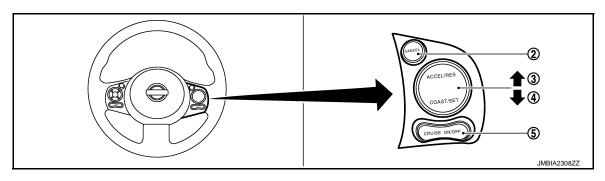
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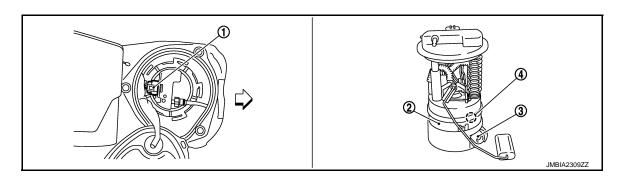


- ASCD clutch switch
- 2. ASCD brake switch
- Stop lamp switch



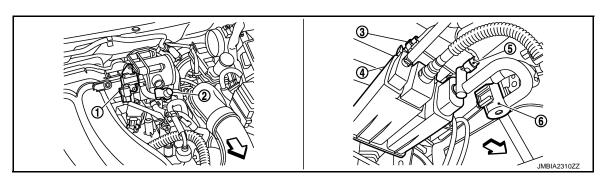
- ASCD steering switch 1.
- SET/COST switch
- CANCEL switch 2.
- MAIN switch

3. RESUME/ACCELERATE switch



- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector

- Fuel tank temperature sensor



- EVAP canister purge volume control 2. solenoid valve
- **EVAP** service port
- EVAP control system pressure sen-

AIR CONDITIONING CUT CONTROL

< SYSTEM DESCRIPTION >

[MR18DE (FOR CALIFORNIA)]

4. EVAP canister

5. EVAP canister vent control valve

6. Drain filter

Component Description

INFOID:0000000007770382

Component	Reference
Accelerator pedal position sensor	EC-895, "Description"
Camshaft position sensor (PHASE)	EC-738, "Description"
Crankshaft position sensor (POS)	EC-734, "Description"
Engine coolant temperature sensor	EC-649, "Description"
Refrigerant pressure sensor	EC-941, "Description"

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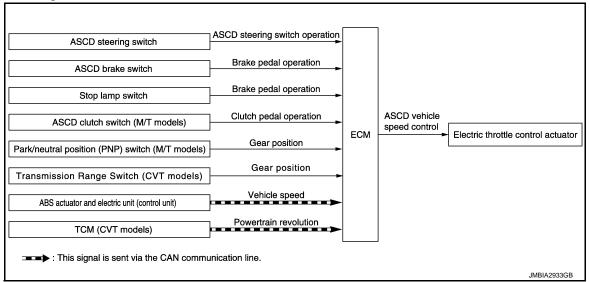
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AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram

INFOID:0000000007770383



System Description

INFOID:0000000007770384

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD steering switch	ASCD steering switch operation		Electric throttle control actuator
ASCD brake switch	Drake pedal aparation		
Stop lamp switch	Brake pedal operation		
ASCD clutch switch (M/T models)	Clutch pedal operation	ASCD vehicle	
Park/neutral position (PNP) switch (M/T models)	Gear position	speed control	
Transmission range switch (CVT models)	Gear position		
ABS actuator and electric unit (control unit)	Vehicle speed*		
TCM (M/T models)	Powertrain revolution*		

^{*:} This signal is sent to the ECM via the CAN communication line.

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.

Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH).

ECM controls throttle angle of electric throttle control actuator to regulate engine speed.

Operation status of ASCD is indicated by CRUISE lamp and SET lamp in combination meter. If any malfunction occurs in the ASCD system, it automatically deactivates control.

NOTE:

Always drive vehicle in a safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (The CRUISE lamp in combination meter illuminates.)

When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH), press SET/COAST switch.

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.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

< SYSTEM DESCRIPTION >

[MR18DE (FOR CALIFORNIA)]

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to neutral position (M/T models)
- Selector lever position is changed to N, P, 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 indicator lamp.

• Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.

When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ACCELERATE switch.

Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF while ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will maintain the new set speed.

RESUME OPERATION

When the RESUME/ACCELERATE switch is pressed after cancel operation other than pressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released
- Clutch pedal is released (M/T models)
- Selector lever position is other than P and N (CVT models)
- Vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)

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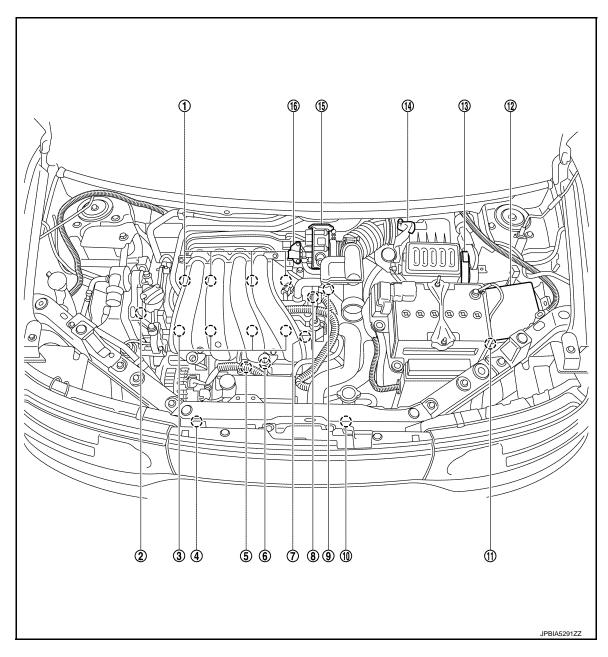
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Component Parts Location

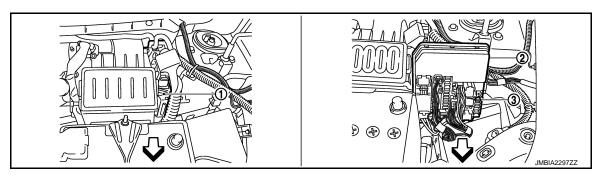
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- Ignition coil (with power transistor) and spark plug
- Refrigerant pressure sensor
- Tumble control valve actuator
- 10. Cooling fan motor
- 13. ECM

- Intake valve timing control solenoid 3. valve
- 5. Knock sensor
- Camshaft position sensor (PHASE)
- 11. Battery current sensor
- temperature sensor)
- Fuel injector
- Engine oil temperature sensor
- 9. Engine coolant temperature sensor
- 12. IPDM E/R
- 14. Mass air flow sensor (with intake air 15. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)

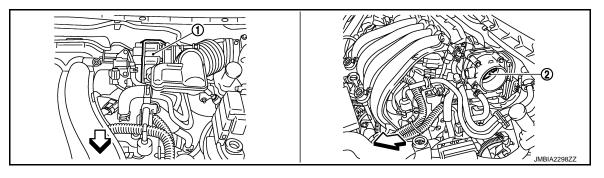
16. EVAP canister purge volume control solenoid valve



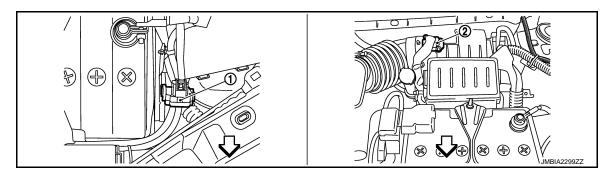
1. ECM

2. IPDM E/R

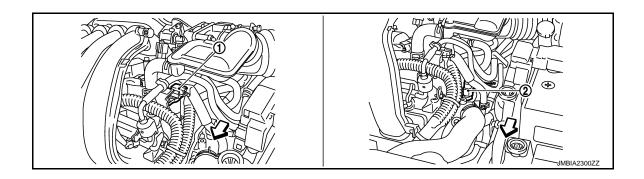
3. Fuel pump fuse (15 A)



- Electric throttle control actuator (with built-in position sensor, throttle control motor)
- . Throttle valve



- Battery current sensor
- Mass air flow sensor (with Intake air temperature sensor)



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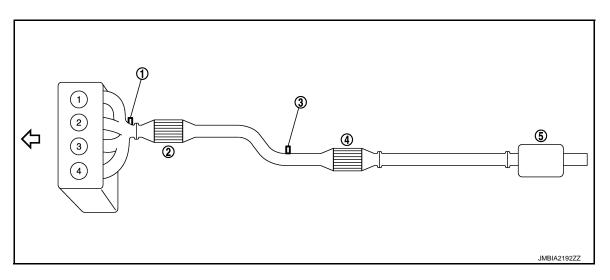
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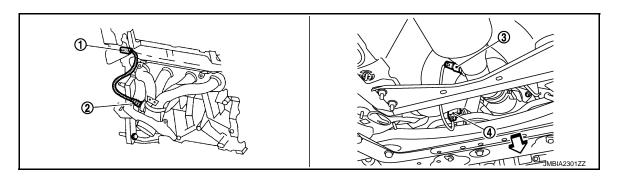
- 1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor



- 1. Air fuel ratio (A/F) sensor 1
- 4. Three way catalyst (under floor)
- ∠ Vehicle front

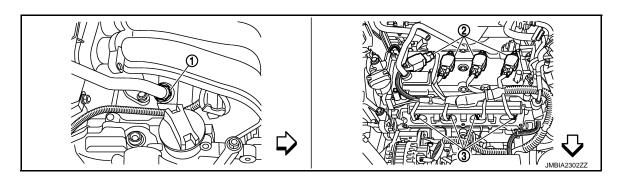
- 2. Three way catalyst (Manifold)
- 5. Muffler

3. Heated oxygen sensor 2



- Air fuel ratio (A/F) sensor 1 harness connector
- Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1
- 3. Heated oxygen sensor 2

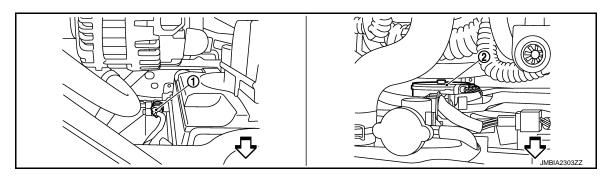
- 4. Heated oxygen sensor 2 harness connector



1. PCV valve

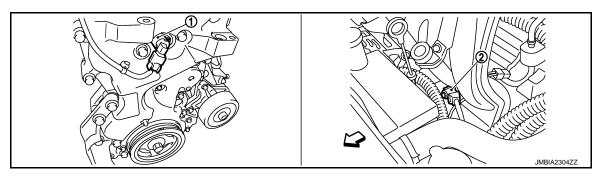
- 2. Ignition coil (with power transistor) and spark plug
- Fuel injector

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→ Vehicle front

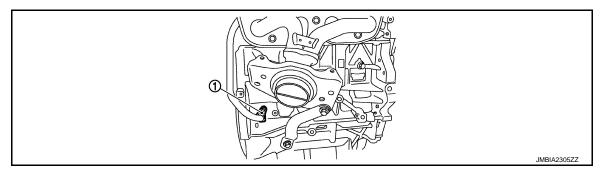


- Refrigerant pressure sensor
- 2. Cooling fan motor

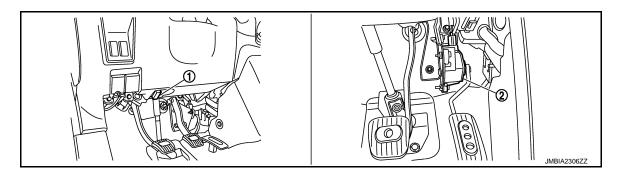
Vehicle front



- Intake valve timing control solenoid 2. Knock sensor



Crankshaft position sensor (POS)



Data link connector

Accelerator pedal position sensor

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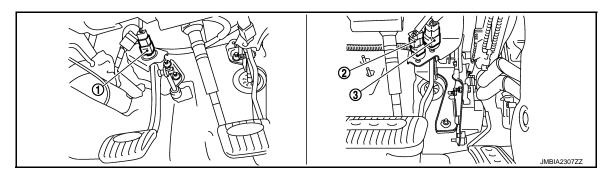
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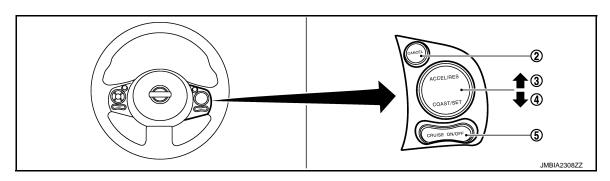
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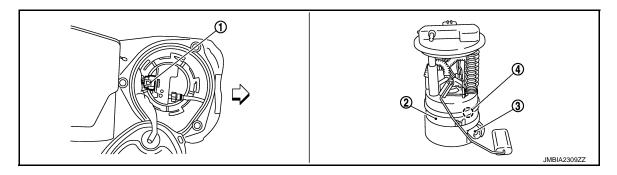
- 1. ASCD clutch switch
- 2. ASCD brake switch
- 3. Stop lamp switch



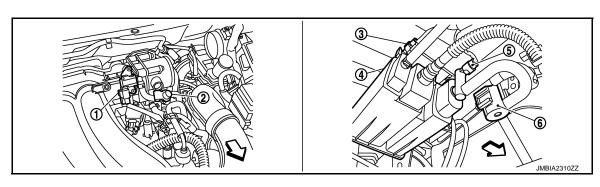
- 1. ASCD steering switch
- 2. CANCEL switch

3. RESUME/ACCELERATE switch

- 4. SET/COST switch
- 5. MAIN switch



- Fuel level sensor unit and fuel pump harness connector
- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator
- 4. Fuel tank temperature sensor



- EVAP canister purge volume control 2. solenoid valve
- EVAP service port
- 3. EVAP control system pressure sensor

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

< SYSTEM DESCRIPTION >

[MR18DE (FOR CALIFORNIA)]

4. EVAP canister

5. EVAP canister vent control valve

6. Drain filter

⟨
→ Vehicle front

Component Description

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Component	Reference
ASCD brake switch	EC-862, "Description"
ASCD steering switch	EC-859, "Description"
Electric throttle control actuator	EC-893, "Description"
Park/neutral position switch (M/T models)	EC 925 "Description"
Transmission range switch (CVT models)	EC-825, "Description"
Stop lamp switch	EC-873, "Description"

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CAN COMMUNICATION

< SYSTEM DESCRIPTION >

[MR18DE (FOR CALIFORNIA)]

CAN COMMUNICATION

System Description

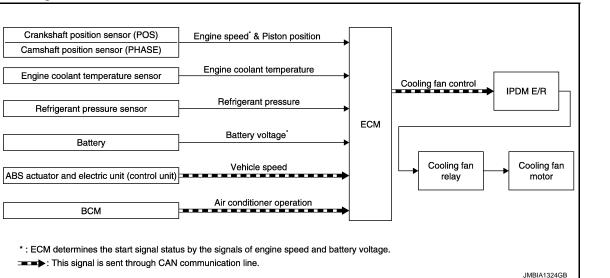
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CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

Refer to LAN-22, "CAN Communication Signal Chart", about CAN communication for detail.

COOLING FAN CONTROL

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	Cooling fan control	IPDM E/R ↓ Cooling fan relay ↓ Cooling fan motor
Battery	Battery voltage*1		
ABS actuator and electric unit (control unit)	Vehicle speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
ВСМ	Air conditioner ON signal*2		
Refrigerant pressure sensor	Refrigerant pressure		

^{*1:} The ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pressure, air conditioner ON signal. Then control system has 3-step control [HIGH/LOW/OFF].

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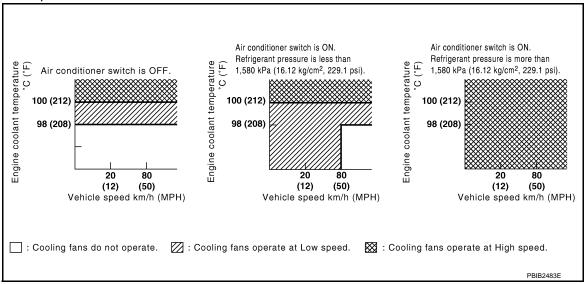
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^{*2:} This signal is sent to ECM via the CAN communication line.

Cooling Fan Operation



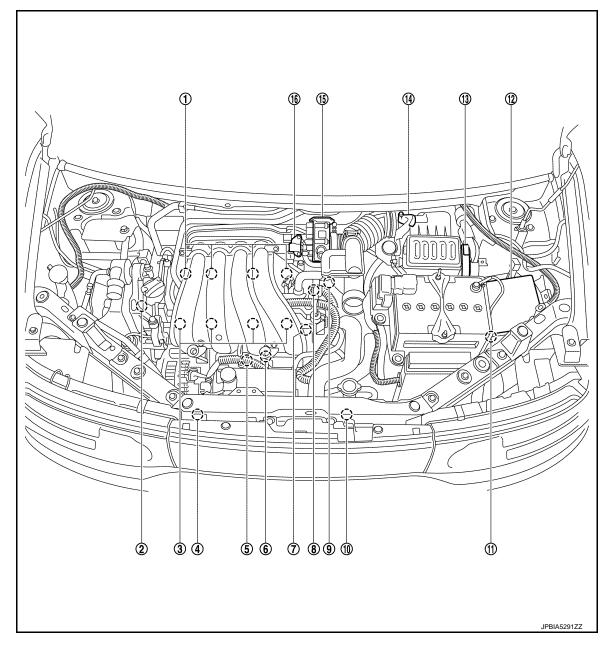
Cooling Fan Relay Operation

The ECM controls cooling fan relays via the CAN communication line.

Cooling for around	Cooling fan relay		
Cooling fan speed	1	2	3
Stop (OFF)	OFF	OFF	OFF
Low (LOW)	ON	OFF	OFF
High (HI)	ON	ON	ON

Component Parts Location

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- Ignition coil (with power transistor) and spark plug
- 4. Refrigerant pressure sensor
- Tumble control valve actuator
- 10. Cooling fan motor
- 13. ECM

- 2. Intake valve timing control solenoid valve
- 5. Knock sensor
- Camshaft position sensor (PHASE)
- 11. Battery current sensor
- 14. Mass air flow sensor (with intake air 15. Electric throttle control actuator temperature sensor)
- Fuel injector
- 6. Engine oil temperature sensor
- 9. Engine coolant temperature sensor
- 12. IPDM E/R
 - (with built in throttle position sensor and throttle control motor)

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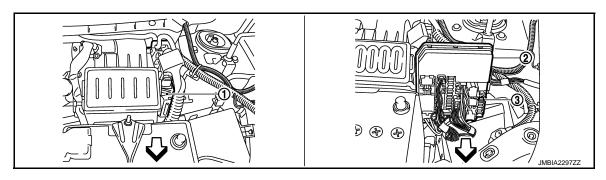
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16. EVAP canister purge volume control solenoid valve

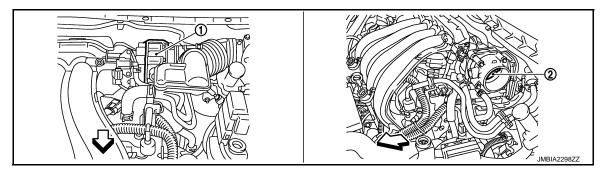


1. ECM

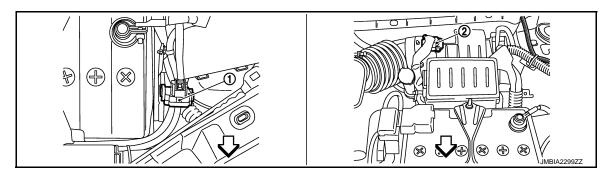
2. IPDM E/R

3. Fuel pump fuse (15 A)

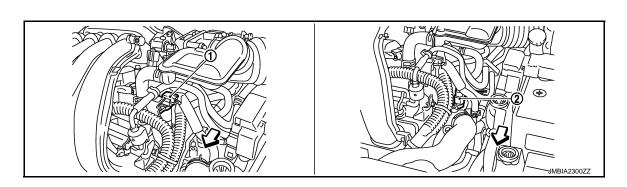




- Electric throttle control actuator (with built-in position sensor, throttle control motor)
- Throttle valve



- Battery current sensor
- Mass air flow sensor (with Intake air temperature sensor)



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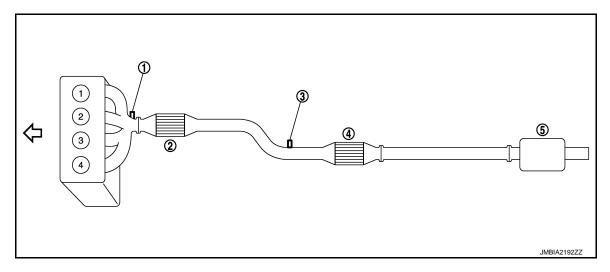
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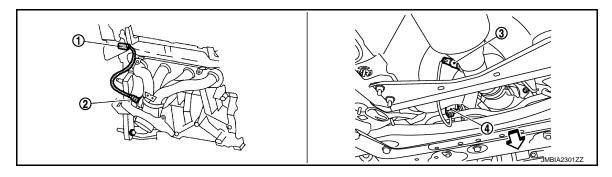
- Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor
- ⟨ Vehicle front



- Air fuel ratio (A/F) sensor 1
- Three way catalyst (under floor)
- Vehicle front

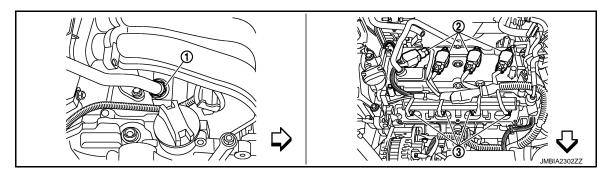
- 2. Three way catalyst (Manifold)
- Muffler

3. Heated oxygen sensor 2



- connector
- Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1
- 3. Heated oxygen sensor 2

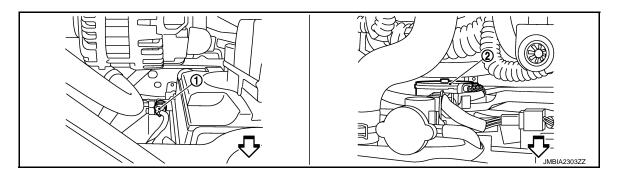
- Heated oxygen sensor 2 harness connector
- ⟨ Vehicle front



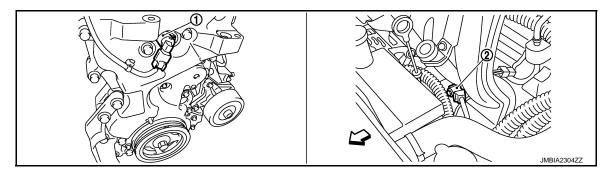
PCV valve

- Ignition coil (with power transistor) and spark plug
- Fuel injector

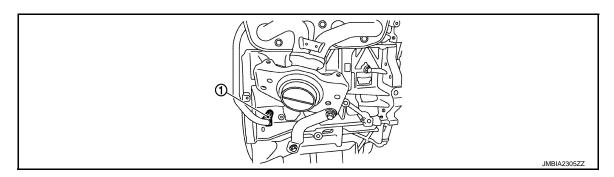
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→ Vehicle front



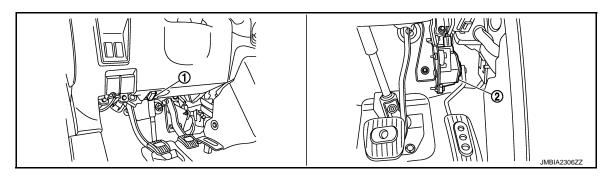
- 1. Refrigerant pressure sensor
- 2. Cooling fan motor



- Intake valve timing control solenoid 2. Knock sensor valve



1. Crankshaft position sensor (POS)



- 1. Data link connector
- 2. Accelerator pedal position sensor

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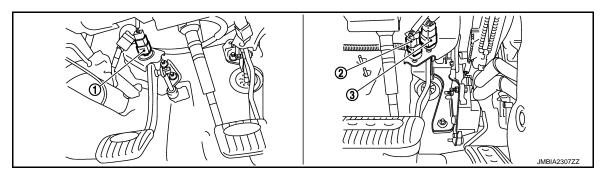
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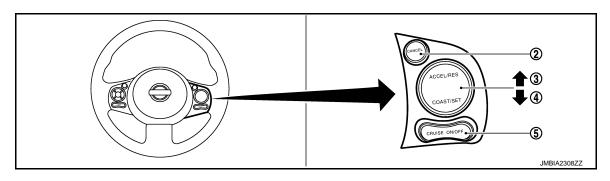
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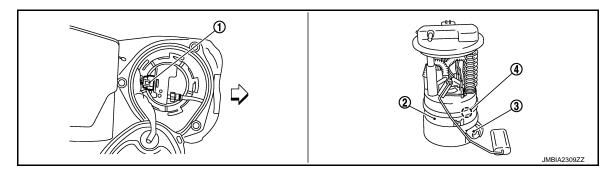


- ASCD clutch switch
- 2. ASCD brake switch
- 3. Stop lamp switch

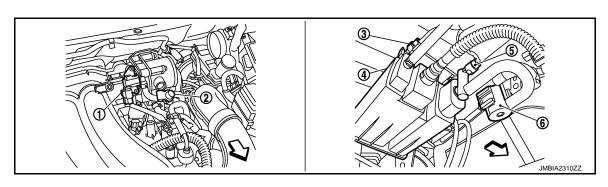


- ASCD steering switch 1.
- CANCEL switch 2.
- RESUME/ACCELERATE switch

- SET/COST switch
- MAIN switch



- harness connector
- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator
- Fuel tank temperature sensor
- Vehicle front



EVAP canister purge volume control 2. EVAP service port solenoid valve

EVAP control system pressure sen-

COOLING FAN CONTROL

< SYSTEM DESCRIPTION >

[MR18DE (FOR CALIFORNIA)]

4. EVAP canister

5. EVAP canister vent control valve

6. Drain filter

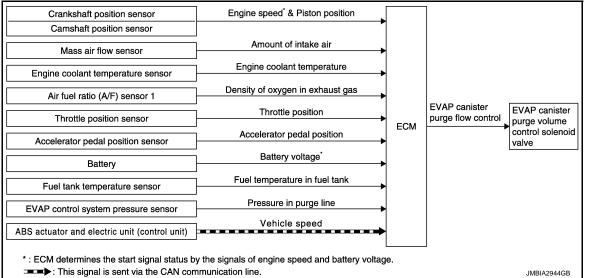
Component Description

INFOID:0000000007770391

Component	Reference
Camshaft position sensor (PHASE)	EC-738, "Description"
Crankshaft position sensor (POS)	EC-734, "Description"
Cooling fan motor	EC-555, "System Description"
Engine coolant temperature sensor	EC-649, "Description"
Refrigerant pressure sensor	EC-941, "Description"

EVAPORATIVE EMISSION SYSTEM

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1				
Mass air flow sensor	Amount of intake air		EVAP canister purge vol- ume control solenoid valve		
Engine coolant temperature sensor	Engine coolant temperature				
Battery	Battery voltage*1	EVAP canister purge flow control			
Throttle position sensor	Throttle position				
Accelerator pedal position sensor	Accelerator pedal position				
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)				
Fuel tank temperature sensor	Fuel temperature in fuel tank				
EVAP control system pressure sensor	Pressure in purge line				
ABS actuator and electric unit (control unit)	Vehicle speed*2				

^{*1:} ECM determines the start signal status by the signals of engine speed and battery voltage.

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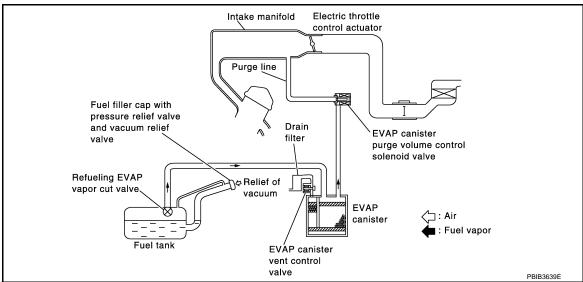
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^{*2:} This signal is sent to the ECM via the CAN communication line.

SYSTEM DESCRIPTION



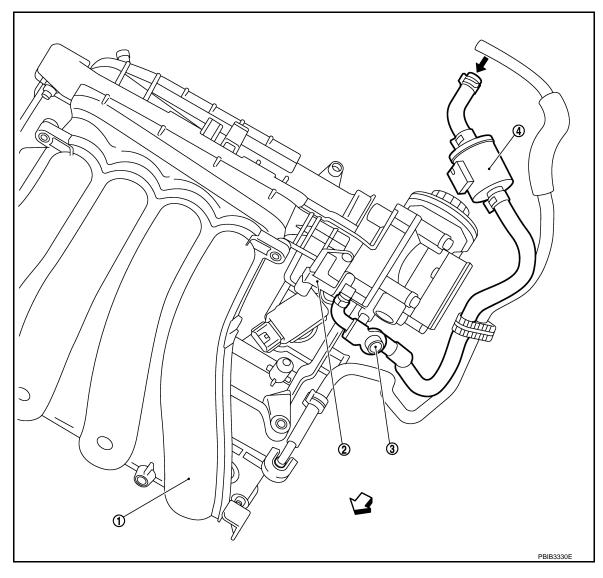
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

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



- 1. Intake manifold collector
- EVAP purge resonator

- EVAP canister purge volume control 3. EVAP service port solenoid valve
- From next figure

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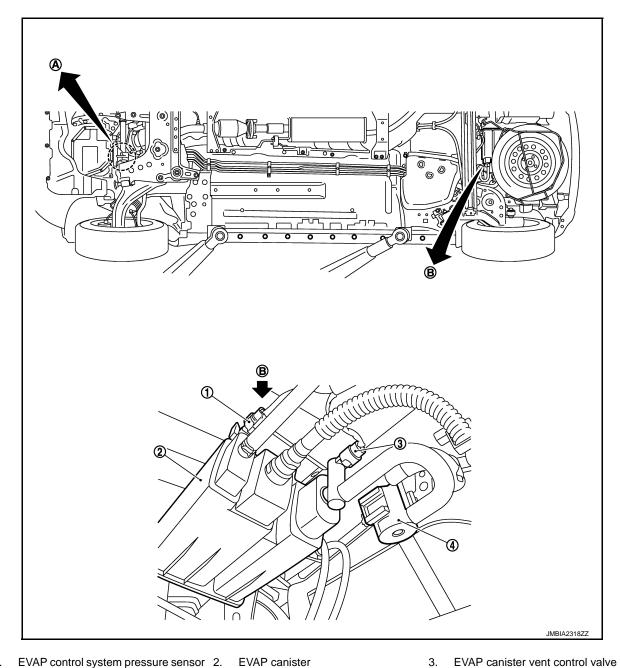
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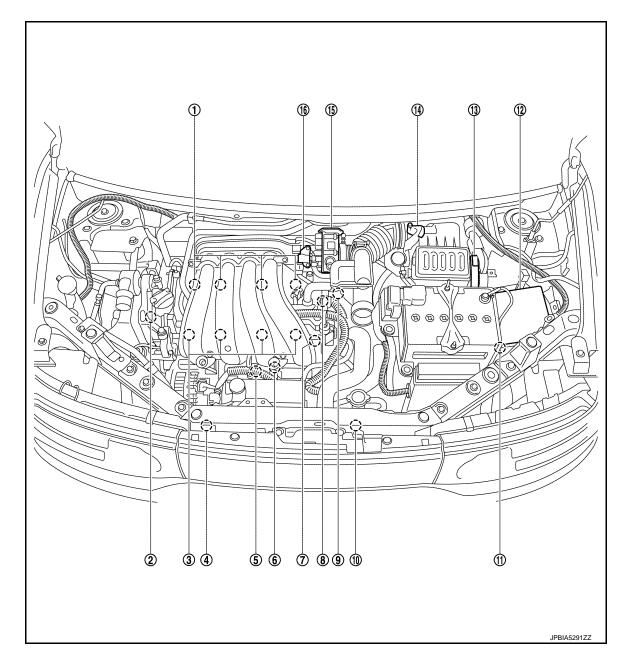
- EVAP control system pressure sensor 2. EVAP canister
- Drain filter
- A. To previous figure

NOTE:

Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

Component Parts Location

INFOID:0000000007770394



- Ignition coil (with power transistor) and spark plug
- 4. Refrigerant pressure sensor
- Tumble control valve actuator
- 10. Cooling fan motor

solenoid valve

13. ECM

- 2. Intake valve timing control solenoid valve
- 5. Knock sensor
- Camshaft position sensor (PHASE)
- 11. Battery current sensor
- temperature sensor)
- Fuel injector
- 6. Engine oil temperature sensor
- 9. Engine coolant temperature sensor
- 12. IPDM E/R
- 14. Mass air flow sensor (with intake air 15. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)

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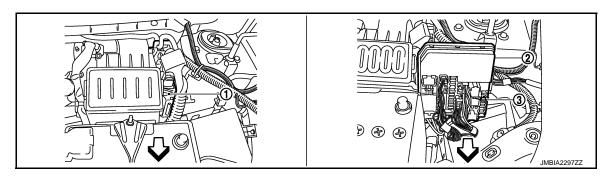
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16. EVAP canister purge volume control

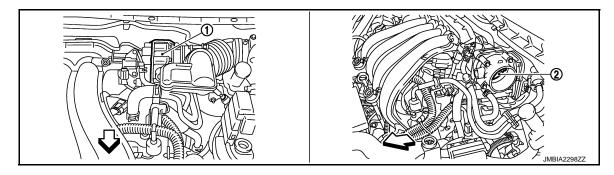


1. ECM

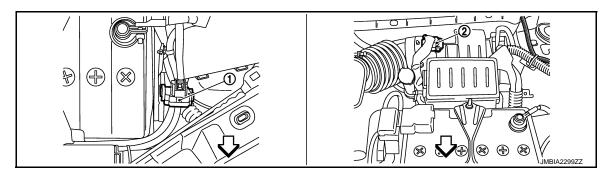
2. IPDM E/R

3. Fuel pump fuse (15 A)

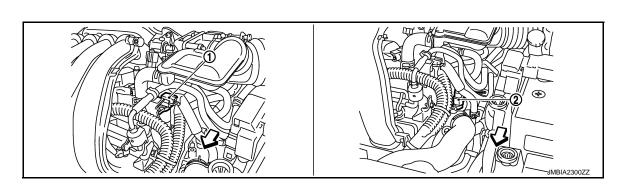




- Electric throttle control actuator (with built-in position sensor, throttle control motor)
- Throttle valve



- Battery current sensor
- Mass air flow sensor (with Intake air temperature sensor)



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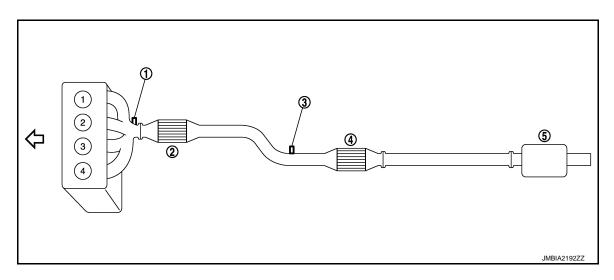
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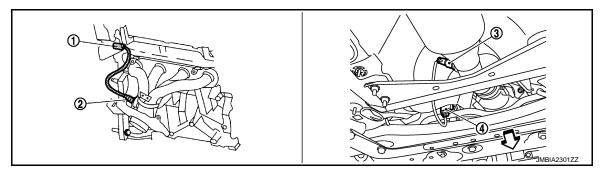
- Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor



- Air fuel ratio (A/F) sensor 1
- Three way catalyst (under floor)
- Vehicle front

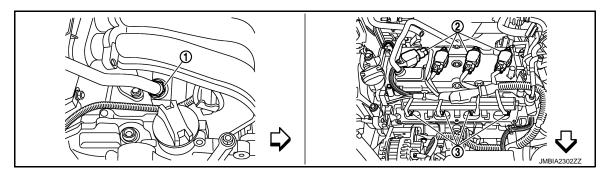
- 2. Three way catalyst (Manifold)
- Muffler

3. Heated oxygen sensor 2



- connector
- Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1
- 3. Heated oxygen sensor 2

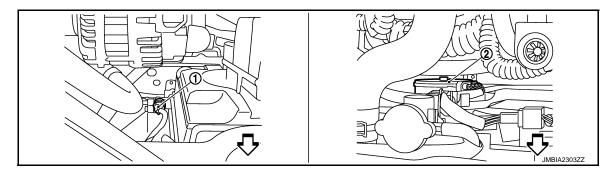
- Heated oxygen sensor 2 harness connector



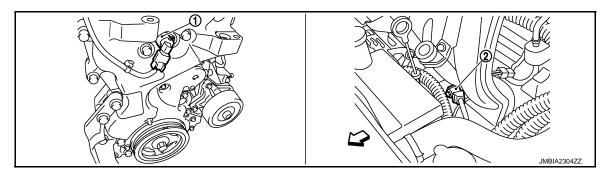
PCV valve

- Ignition coil (with power transistor) and spark plug
- Fuel injector

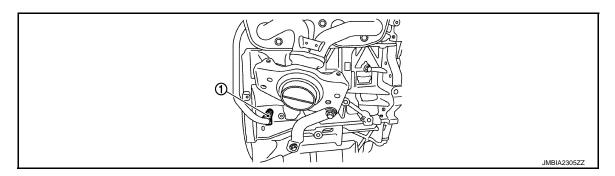
Vehicle front



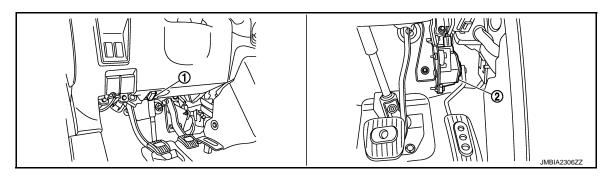
- 1. Refrigerant pressure sensor
- 2. Cooling fan motor



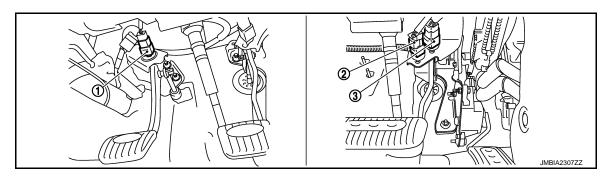
- Intake valve timing control solenoid 2. Knock sensor valve



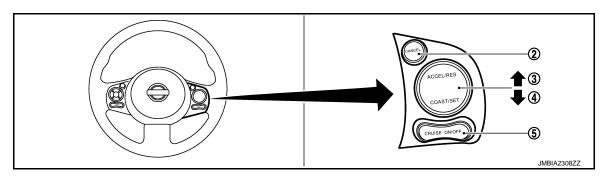
1. Crankshaft position sensor (POS)



- 1. Data link connector
- 2. Accelerator pedal position sensor

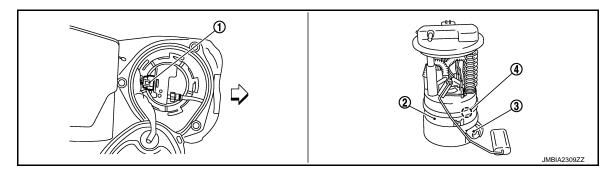


- ASCD clutch switch
- 2. ASCD brake switch
- 3. Stop lamp switch

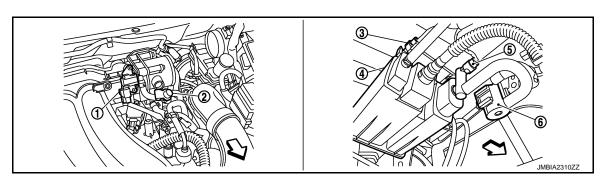


- ASCD steering switch 1.
- CANCEL switch 2.
- RESUME/ACCELERATE switch

- SET/COST switch
- MAIN switch



- harness connector
- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator
- Fuel tank temperature sensor
- Vehicle front



EVAP canister purge volume control 2. EVAP service port solenoid valve

- EVAP control system pressure sen-

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EVAPORATIVE EMISSION SYSTEM

< SYSTEM DESCRIPTION >

[MR18DE (FOR CALIFORNIA)]

4. EVAP canister

5. EVAP canister vent control valve

6. Drain filter

Component Description

INFOID:0000000007770395

Component	Reference
A/F sensor 1	EC-666, "Description"
Accelerator pedal position sensor	EC-895, "Description"
Camshaft position sensor (PHASE)	EC-738, "Description"
Crankshaft position sensor (POS)	EC-734, "Description"
Engine coolant temperature sensor	EC-649, "Description"
EVAP canister purge volume control solenoid valve	EC-760, "Description"
EVAP control system pressure sensor	EC-776, "Description"
Fuel tank temperature sensor	EC-709, "Description"
Mass air flow sensor	EC-635, "Description"
Throttle position sensor	EC-655, "Description"

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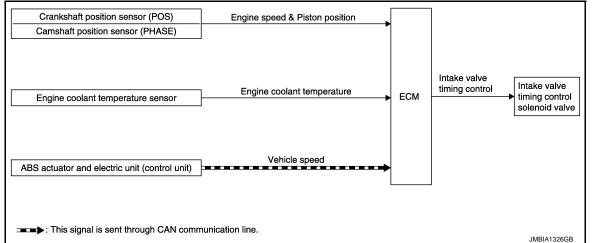
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INTAKE VALVE TIMING CONTROL

System Diagram



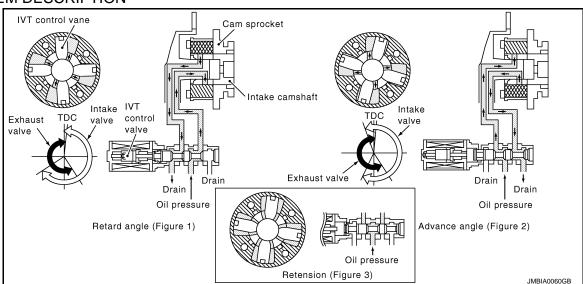
System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	 Engine speed and piston position 		
Camshaft position sensor (PHASE)	- Lingine speed and piston position	Intake valve timing control	Intake valve timing control solenoid valve
Engine coolant temperature sensor	Engine coolant temperature		
ABS actuator and electric unit (control unit)	- Vehicle speed*		
Combination meter	- veriicie speed		

^{*:} This signal is sent to the ECM via the CAN communication line

SYSTEM DESCRIPTION

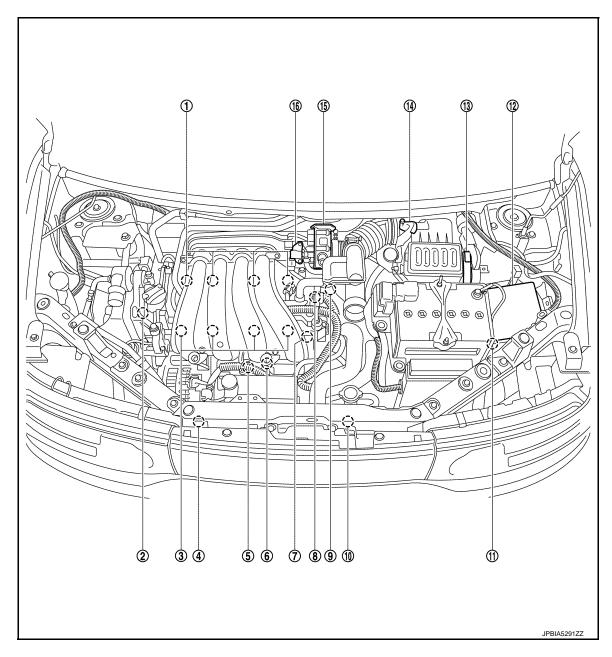


This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing (IVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

Component Parts Location

INFOID:0000000007770398



- Ignition coil (with power transistor) and spark plug
- Refrigerant pressure sensor
- Tumble control valve actuator
- 10. Cooling fan motor
- 13. ECM

- Intake valve timing control solenoid 3. valve
- 5. Knock sensor
- Camshaft position sensor (PHASE)
- 11. Battery current sensor
- temperature sensor)
- Fuel injector
- Engine oil temperature sensor
- Engine coolant temperature sensor
- 12. IPDM E/R
- 14. Mass air flow sensor (with intake air 15. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)

16. EVAP canister purge volume control solenoid valve

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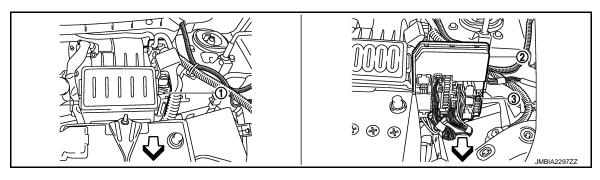
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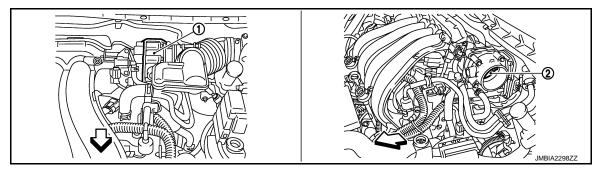
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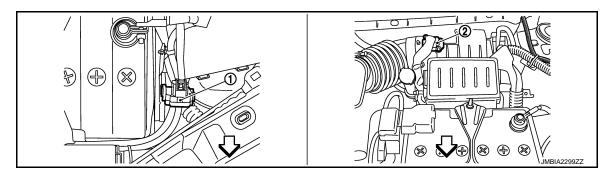
1. ECM

2. IPDM E/R

3. Fuel pump fuse (15 A)

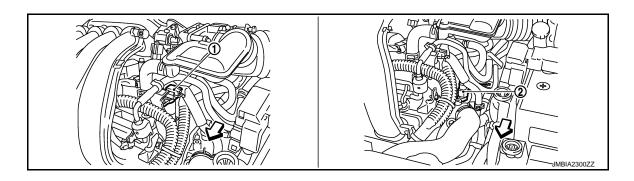


- Electric throttle control actuator (with built-in position sensor, throttle control motor)
- . Throttle valve

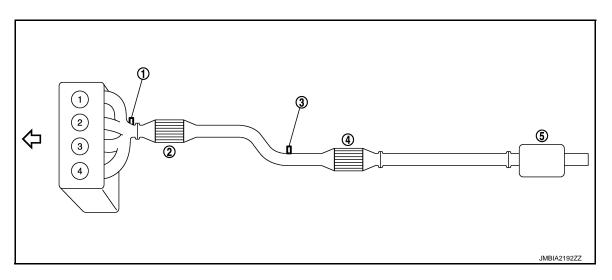


- Battery current sensor
- Mass air flow sensor (with Intake air temperature sensor)

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→ Vehicle front



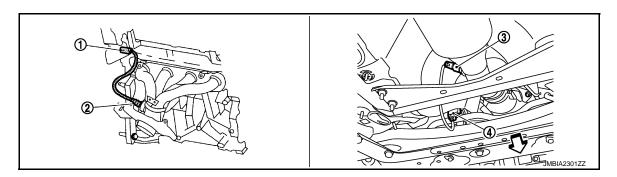
- 1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor



- 1. Air fuel ratio (A/F) sensor 1
- 4. Three way catalyst (under floor)

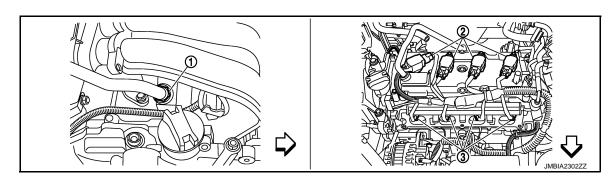
- 2. Three way catalyst (Manifold)
- 5. Muffler

3. Heated oxygen sensor 2



- Air fuel ratio (A/F) sensor 1 harness connector
- Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1
- 3. Heated oxygen sensor 2

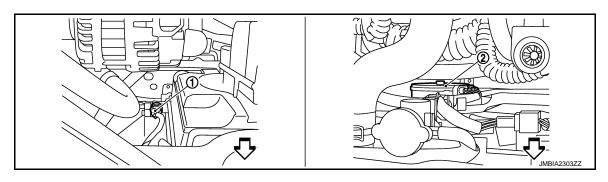
- Heated oxygen sensor 2 harness connector
- ⟨
 → Vehicle front



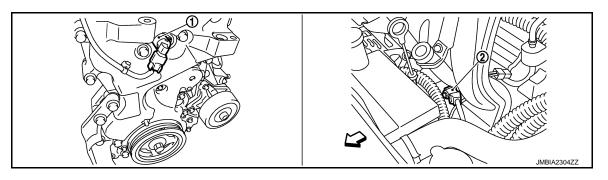
1. PCV valve

- Ignition coil (with power transistor) and spark plug
- 3. Fuel injector

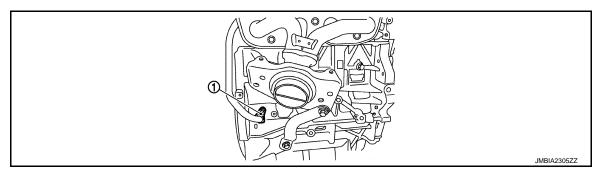
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→ Vehicle front



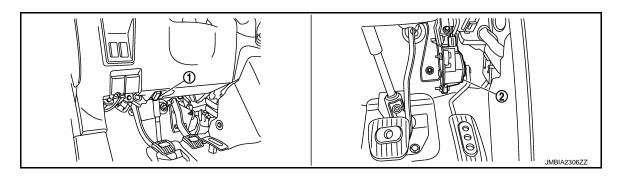
- Refrigerant pressure sensor
- 2. Cooling fan motor



- Intake valve timing control solenoid 2. Knock sensor



Crankshaft position sensor (POS)



- Data link connector
- Accelerator pedal position sensor

EC-577 Revision: 2011 November 2012 CUBE

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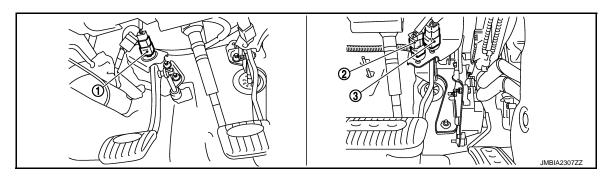
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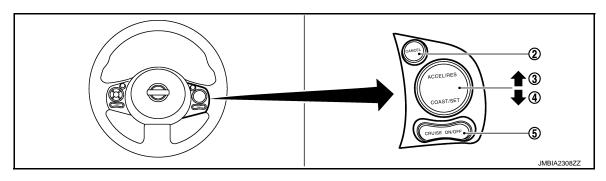
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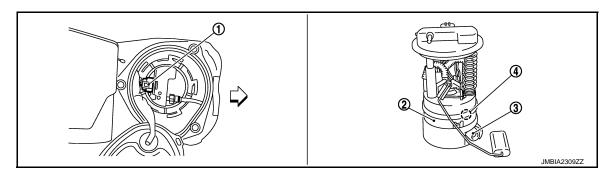


- ASCD clutch switch
- 2. ASCD brake switch
- Stop lamp switch



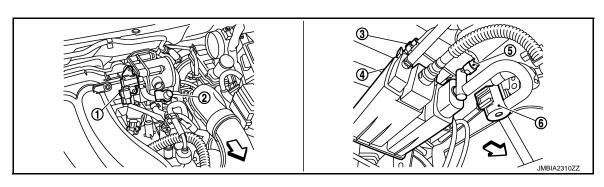
- ASCD steering switch 1.
- SET/COST switch
- CANCEL switch
- MAIN switch

3. RESUME/ACCELERATE switch



- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector

- Fuel tank temperature sensor



- EVAP canister purge volume control 2. solenoid valve
- **EVAP** service port
- EVAP control system pressure sen-

INTAKE VALVE TIMING CONTROL

< SYSTEM DESCRIPTION >

[MR18DE (FOR CALIFORNIA)]

4. EVAP canister

5. EVAP canister vent control valve

6. Drain filter

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Component Description

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Component	Reference
Camshaft position sensor (PHASE)	EC-738, "Description"
Crankshaft position sensor (POS)	EC-734, "Description"
Engine coolant temperature sensor	EC-649, "Description"
Intake valve timing control solenoid valve	EC-573, "System Description"

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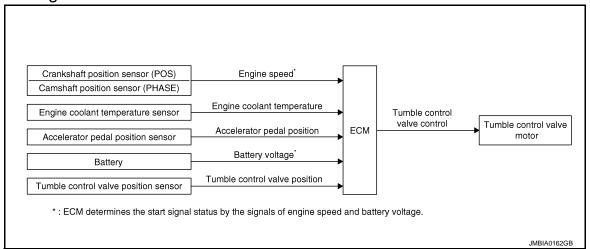
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TUMBLE CONTROL VALVE CONTROL

System Diagram

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System Description

INFOID:0000000007770401

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator		
Crankshaft position sensor (POS)	Engine speed*				
Camshaft position sensor (PHASE)	Engine speed*		Tumble control valve motor		
Battery	Battery voltage*	Tumble control			
Engine coolant temperature sensor	Engine coolant temperature	valve control	rumble control valve motor		
Accelerator pedal position sensor	Accelerator pedal position				
Tumble control valve position sensor	Tumble control valve position				

^{*:} ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

Tumble control valve has a valve portion in the intake passage of each cylinder.

While idling and during low engine coolant temperature, the tumble control valve closes. Thus the velocity of the air in the intake passage increases, promoting the vaporization of the fuel and producing a tumble in the combustion chamber.

Because of this operation, this system tends to increase the burning speed of the gas mixture, improve fuel consumption, and increase the stability in running conditions.

Also, except when idling and during low engine coolant temperature, this system opens the tumble control valve.

In this condition, this system tends to increase power by improving intake efficiency via reduction of intake flow resistance.

The tumble control valve is operated by the ECM.

Component Parts Location

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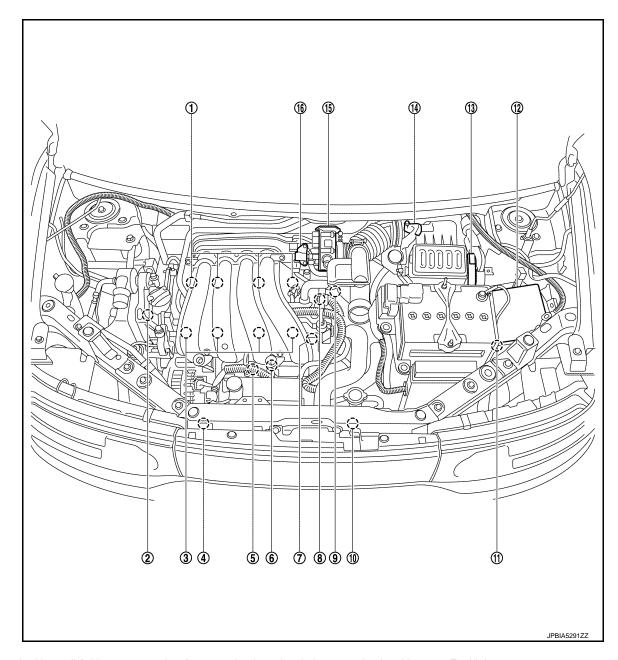
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- Ignition coil (with power transistor) and spark plug
- 4. Refrigerant pressure sensor
- Tumble control valve actuator
- 10. Cooling fan motor

solenoid valve

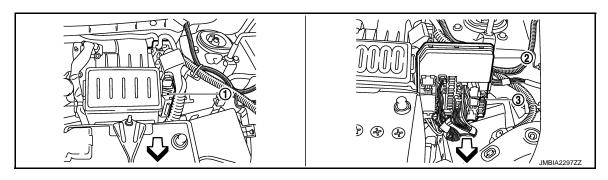
- 2. Intake valve timing control solenoid valve
- 5. Knock sensor
- Camshaft position sensor (PHASE)
- 11. Battery current sensor
- 14. Mass air flow sensor (with intake air 15. Electric throttle control actuator temperature sensor)
- Fuel injector
- 6. Engine oil temperature sensor
- 9. Engine coolant temperature sensor
- 12. IPDM E/R
 - (with built in throttle position sensor and throttle control motor)

13. ECM

16. EVAP canister purge volume control

EC-581 Revision: 2011 November

2012 CUBE

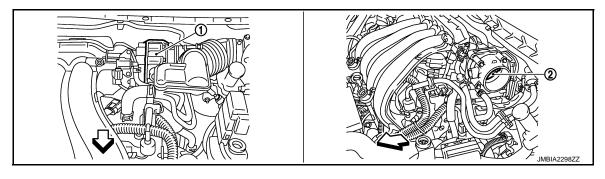


1. ECM

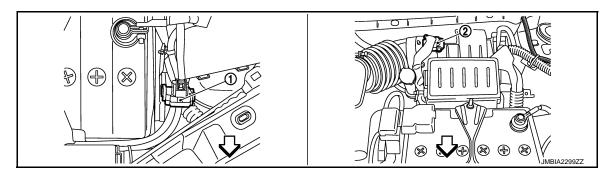
2. IPDM E/R

B. Fuel pump fuse (15 A)

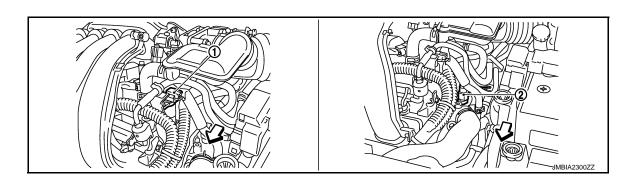




- Electric throttle control actuator (with built-in position sensor, throttle control motor)
- Throttle valve



- Battery current sensor
- Mass air flow sensor (with Intake air temperature sensor)



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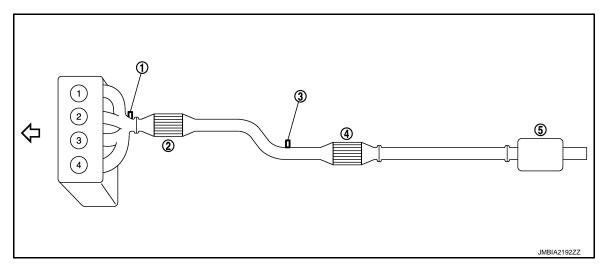
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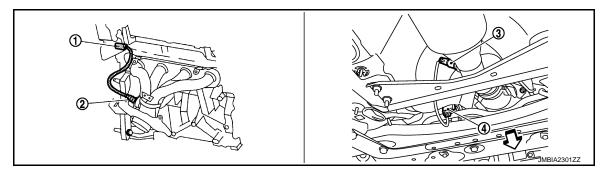
- 1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor



- 1. Air fuel ratio (A/F) sensor 1
- 4. Three way catalyst (under floor)
- ∠ Vehicle front

- 2. Three way catalyst (Manifold)
- 5. Muffler

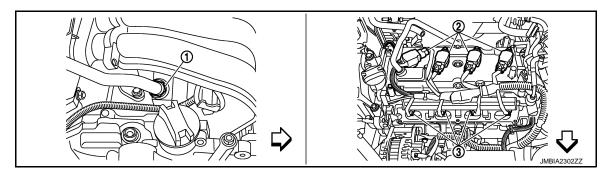
3. Heated oxygen sensor 2



- Air fuel ratio (A/F) sensor 1 harness connector
- Air fuel ratio (A/F) sensor 1 harness 2. Air fuel ratio (A/F) sensor 1
- 3. Heated oxygen sensor 2

Fuel injector

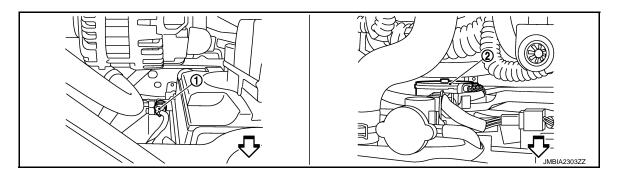
- 4. Heated oxygen sensor 2 harness connector



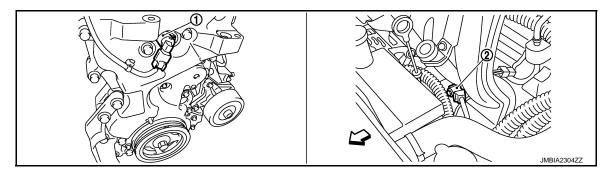
1. PCV valve

Ignition coil (with power transistor) and spark plug

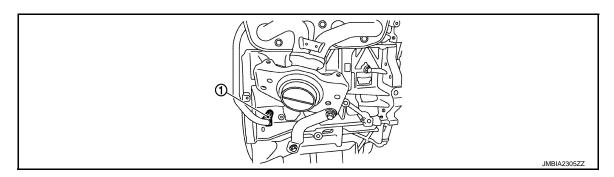
Vehicle front



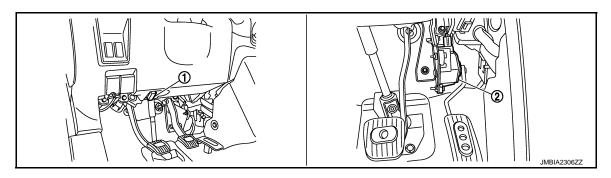
- 1. Refrigerant pressure sensor
- 2. Cooling fan motor



- Intake valve timing control solenoid 2. Knock sensor valve



1. Crankshaft position sensor (POS)



- 1. Data link connector
- 2. Accelerator pedal position sensor

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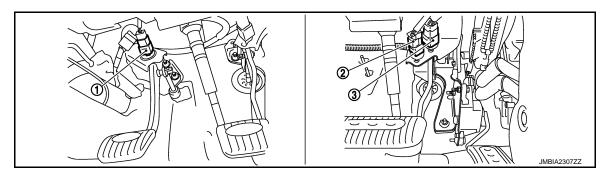
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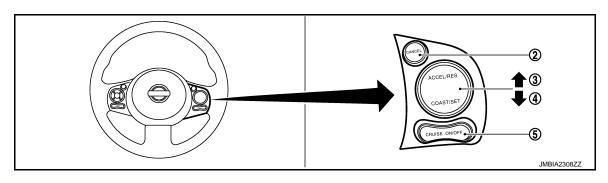
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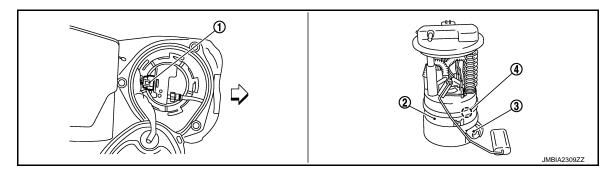


- ASCD clutch switch
- 2. ASCD brake switch
- 3. Stop lamp switch

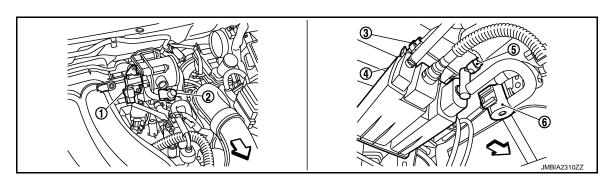


- ASCD steering switch 1.
- CANCEL switch
- RESUME/ACCELERATE switch

- SET/COST switch
- MAIN switch



- harness connector
- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator
- Fuel tank temperature sensor
- Vehicle front



EVAP canister purge volume control 2. EVAP service port solenoid valve

EVAP control system pressure sen-

TUMBLE CONTROL VALVE CONTROL

< SYSTEM DESCRIPTION >

[MR18DE (FOR CALIFORNIA)]

4. EVAP canister

5. EVAP canister vent control valve

6. Drain filter

Component Description

INFOID:0000000007770403

Component	Reference
Accelerator pedal position sensor	EC-895, "Description"
Camshaft position sensor (PHASE)	EC-738, "Description"
Crankshaft position sensor (POS)	EC-734, "Description"
Engine coolant temperature sensor	EC-649, "Description"
Tumble control valve	EC-876, "Description"
Tumble control valve position sensor	EC-881, "Description"

[MR18DE (FOR CALIFORNIA)]

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FUEL FILLER CAP WARNING SYSTEM

System Diagram

Pressure in purge line

Fuel level signal
Fuel filler cap warning reset signal
Fuel filler cap warning display signal

Fuel level sensor unit

Meter control switch

This signal is sent via the CAN communication line.

System Description

INPUT/OUTPUT SIGNAL CHART

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Unit/Sensor	Input signal to ECM	ECM function
EVAP control system pressure sensor	Pressure in purge line	
Combination meter	Fuel level signal [*]	Fuel filler cap warning control
Combination meter	Fuel filler cap warning reset signal*	

^{*:} This signal is sent to the ECM via the CAN communication line.

Output

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Unit	Output signal	Actuator
ECM	Fuel filler cap warning display signal*	Combination meter

^{*:} This signal is sent to the combination meter via the CAN communication line.

SYSTEM DESCRIPTION

The fuel filler cap warning system alerts the driver to the prevention of the fuel filler being left uncapped and malfunction occurrences after refueling, by turning ON the fuel filler cap warning display on the combination meter.

ECM judges a refueled state, based on a fuel level signal transmitted from the combination meter.

When a very small leak is detected through the EVAP leak diagnosis performed after judging the refueled state, ECM transmits a fuel filler cap warning display signal (request for display ON) to the combination meter via CAN communication.

When receiving the signal, the combination meter turns ON the fuel filler cap warning display.

CAUTION:

Check fuel filler cap installation condition when the fuel filler cap warning display turns ON.

Reset Operation

The fuel filler cap warning lamp tunes OFF, according to any condition listed below:

- Reset operation is performed by operating the meter control switch on the combination meter. Refer to <u>MWI-24</u>, "INFORMATION DISPLAY: System Description".
- When the reset operation is performed, the combination meter transmits a fuel filler cap warning reset signal to ECM via CAN communication. ECM transmits a fuel filler cap warning display signal (request for display OFF) to the combination meter via CAN communication. When receiving the signal, the combination meter turns OFF the fuel filler cap warning display.
- EVAP leak diagnosis result is normal.

FUEL FILLER CAP WARNING SYSTEM

< SYSTEM DESCRIPTION >

[MR18DE (FOR CALIFORNIA)]

- Fuel refilled.
- DTC erased by using CONSULT.

NOTE:

MIL turns ON if a malfunction is detected in leak diagnosis results again at the trip after the fuel filler cap warning display turns ON/OFF.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SYSTEM DESCRIPTION >

[MR18DE (FOR CALIFORNIA)]

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

This system is an on board diagnostic system that records exhaust emission-related diagnostic information and detects a sensors/actuator-related malfunction. A malfunction is indicated by the malfunction indicator lamp (MIL) and stored in ECU memory as a DTC. The diagnostic information can be obtained with the diagnostic tool (GST: Generic Scan Tool).

GST (Generic Scan Tool)

When GST is connected with a data link connector equipped on the vehicle side, it will communicate with the control unit equipped in the vehicle and then enable various kinds of diagnostic tests. Refer to GI-49, "Description".

NOTE:

Service \$0A is not applied for regions where it is not mandated.

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DIAGNOSIS SYSTEM (ECM) DIAGNOSIS DESCRIPTION

DIAGNOSIS DESCRIPTION: 1st Trip Detection Logic and Two Trip Detection Logic

NFOID:0000000007770408

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not illuminate at this stage. <1st trip>

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL illuminates. The MIL illuminates at the same time when the DTC is stored. <2nd trip> The "trip" in the "Two Trip Detection Logic" means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to illuminate or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

		M	IIL		D.	TC	1st trip DTC		
Items	1s ⁻	t trip	2nd	l trip	1st trip	2nd trip	1st trip	2nd trip display- ing	
	Blinking	Illuminat- ed	Blinking	Illuminat- ed	displaying	displaying	displaying		
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0304 is being detected	×	_	_	_	_	_	×	_	
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0304 is being detected	_	_	×	_	_	×	_	_	
One trip detection diagnoses (Refer to EC-963, "DTC Index".)	_	×	_	_	×	_	_	_	
Except above	_	_	_	×	_	×	×	_	

DIAGNOSIS DESCRIPTION: DTC and Freeze Frame Data

INFOID:0000000007770409

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not recur, the 1st trip DTC will not be displayed.

If a malfunction is detected during the 1st trip, the 1st trip DTC is saved in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are saved in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

For malfunctions in which 1st trip DTCs are displayed, refer to <u>EC-963, "DTC Index"</u>. These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT.

1st trip DTC is specified in Service \$07 of SAE J1979/ISO 15031-5. 1st trip DTC detection occurs without illuminating the MIL and therefore does not warn the driver of a malfunction.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to <u>EC-490, "Work Flow"</u>. Then perform DTC Confirmation Procedure or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen.

< SYSTEM DESCRIPTION >

[MR18DE (FOR CALIFORNIA)]

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 – P0304 Fuel Injection System Function — DTC: P0171						
2		Except the above items						
3	1st trip freeze frame data							

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was saved in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased.

DIAGNOSIS DESCRIPTION: Counter System

RELATIONSHIP BETWEEN MIL, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on.
- The MIL will turn OFF after the vehicle is driven 3 times (driving pattern B) with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The "TIME" in "SELF-DIAGNOSTIC RESULTS" mode of CONSULT will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

COUNTER SYSTEM CHART

Items	Fuel Injection System	Misfire	Other
MIL (turns OFF)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns B and C under "Fuel Injection System" and "Misfire", see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM".

For details about patterns A and B under Other, see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM".

- *1: Clear timing is at the moment OK is detected.
- *2: Clear timing is when the same malfunction is detected in the 2nd trip.

Relationship Between MIL, DTC, 1st Trip DTC and Driving Patterns for "Misfire <Exhaust Quality Deterioration>", "Fuel Injection System"

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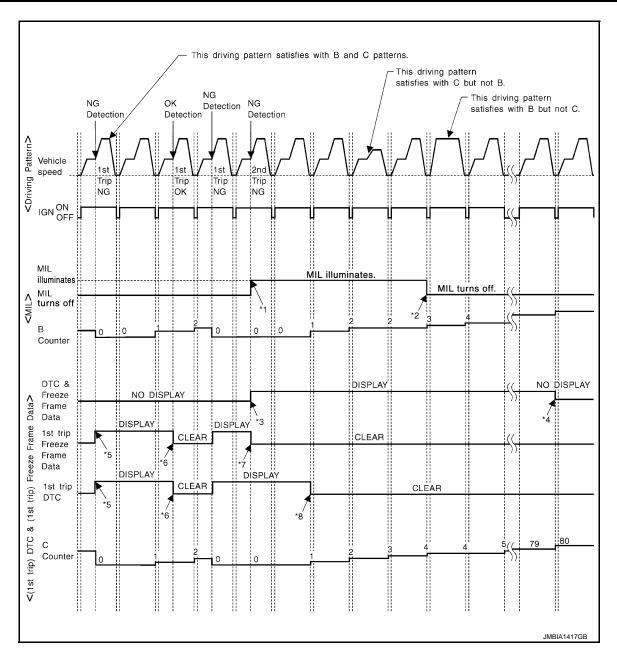
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- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

- *2: MIL will turn OFF after vehicle is driv- *3: When the same malfunction is deen 3 times (pattern B) without any malfunctions.
- *5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- *8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.
- tected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.
- *6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

Explanation for Driving Patterns for "Misfire < Exhaust Quality Deterioration>", "Fuel Injection System"

Driving Pattern B

Refer to EC-594, "DIAGNOSIS DESCRIPTION: Driving Pattern".

Driving Pattern C

Refer to EC-594, "DIAGNOSIS DESCRIPTION: Driving Pattern".

Example:

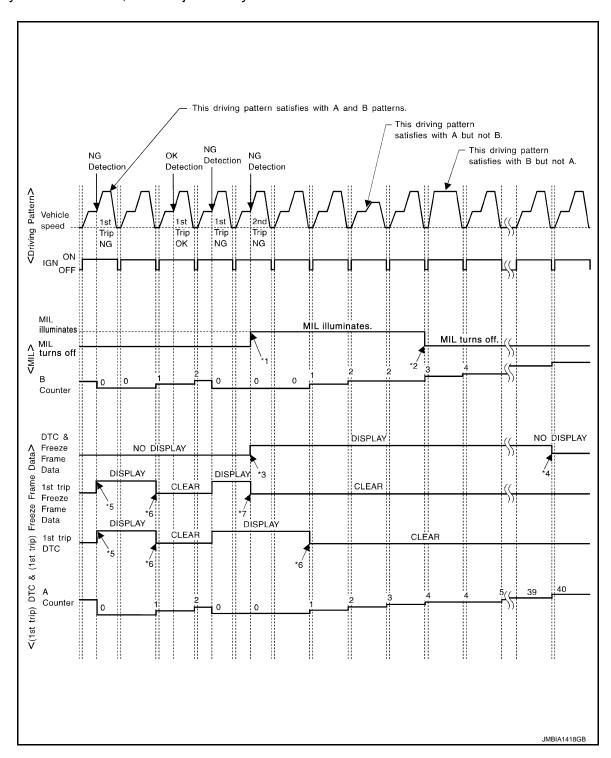
If the stored freeze frame data is as per the following:

Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)

To be satisfied with driving pattern C, the vehicle should run under the following conditions:

Engine speed: 475 – 1,225 rpm, Calculated load value: 27 – 33%, Engine coolant temperature: more than 70°C (158°F)

Relationship Between MIL, DTC, 1st Trip DTC and Driving Patterns Except For "Misfire <Exhaust Quality Deterioration>", "Fuel Injection System"



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[MR18DE (FOR CALIFORNIA)]

- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

- *2: MIL will turn OFF after vehicle is driv- *3: When the same malfunction is deen 3 times (pattern B) without any malfunctions.
- *5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- tected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.
- *6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

Explanation for Driving Patterns Except for "Misfire < Exhaust Quality Deterioration>", "Fuel Injection System"

Driving Pattern A

Refer to EC-594, "DIAGNOSIS DESCRIPTION: Driving Pattern".

Driving Pattern B

Refer to EC-594, "DIAGNOSIS DESCRIPTION: Driving Pattern".

DIAGNOSIS DESCRIPTION: Driving Pattern

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CAUTION:

Always drive at a safe speed.

DRIVING PATTERN A

Driving pattern A means a trip satisfying the following conditions.

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature rises by 20°C (36°F) or more after starting the engine.
- Engine coolant temperature reaches 70°C (158°F) or more.
- The ignition switch is turned from ON to OFF.

NOTE:

- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern A.

DRIVING PATTERN B

Driving pattern B means a trip satisfying the following conditions.

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature reaches 70°C (158°F) or more.
- Vehicle speed of 70 120 km/h (44 75 MPH) is maintained for 60 seconds or more under the control of closed loop.
- Vehicle speed of 30 60 km/h (19 37 MPH) is maintained for 10 seconds or more under the control of closed loop.
- Under the closed loop control condition, the following state reaches 12 seconds or more in total: Vehicle speed of 4 km/h (2 MPH) or less with idling condition.
- The state of driving at 10 km/h (7 MPH) or more reaches 10 minutes or more in total.
- A lapse of 22 minutes or more after engine start.

NOTE:

- Drive the vehicle at a constant velocity.
- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern B.

DRIVING PATTERN C

Driving pattern C means operating vehicle as per the following:

The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data) ±375 rpm

< SYSTEM DESCRIPTION >

[MR18DE (FOR CALIFORNIA)]

Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%] Engine coolant temperature condition:

 When the freeze frame data shows lower than 70°C (158°F), engine coolant temperature should be lower than 70°C (158°F).

• When the freeze frame data shows higher than or equal to 70°C (158°F), engine coolant temperature should be higher than or equal to 70°C (158°F).

NOTE

- When the same malfunction is detected regardless of the above vehicle conditions, reset the counter of driving pattern C.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern C.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

DRIVING PATTERN D

Driving pattern D means a trip satisfying the following conditions.

- The state of driving at 40 km/h (25 MPH) reaches 300 seconds or more in total.
- Idle speed lasts 30 seconds or more.
- A lapse of 600 seconds or more after engine start.

NOTE:

- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern D.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern D.

DIAGNOSIS DESCRIPTION: System Readiness Test (SRT) Code

System Readiness Test (SRT) code is specified in Service \$01 of SAE J1979/ISO 15031-5.

As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.

If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating "INCMP", use the information in this Service Manual to set the SRT to "CMPLT".

In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate "CMPLT" for each application system. Once set as "CMPLT", the SRT status remains "CMPLT" until the self-diagnosis memory is erased.

Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate "INCMP" for these items.

NOTE:

The SRT will also indicate "INCMP" if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.

If, during the state emissions inspection, the SRT indicates "CMPLT" for all test items, the inspector will continue with the emissions test. However, if the SRT indicates "INCMP" for one or more of the SRT items the vehicle is returned to the customer untested.

NOTE:

If MIL is ON during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates "CMPLT" for all test items. Therefore, it is important to check SRT ("CMPLT") and DTC (No DTCs) before the inspection.

SRT SET TIMING

SRT is set as "CMPLT" after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

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				Example						
Self-diagno	osis result	Diagnosis	$\begin{array}{cccccccccccccccccccccccccccccccccccc$							
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)				
		P0402	OK (1)	—(1)	— (1)	OK (2)				
		P1402	OK (1)	OK (2)	— (2)	— (2)				
		SRT of EGR	"CMPLT"	"CMPLT"	"CMPLT"	"CMPLT"				
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)				
		P0402	— (0)	— (0)	OK (1)	— (1)				
		P1402	OK (1)	OK (2)	— (2)	— (2)				
		SRT of EGR	"INCMP"	"INCMP"	"CMPLT"	"CMPLT"				
NG exists	Case 3	P0400	OK	OK	_	_				
		P0402	_	_	_	_				
		P1402	NG	_	NG	NG (Consecutive NG)				
		(1st trip) DTC	1st trip DTC	_	1st trip DTC	DTC (= MIL ON)				
		SRT of EGR	"INCMP"	"INCMP"	"INCMP"	"CMPLT"				

OK: Self-diagnosis is carried out and the result is OK.

NG: Self-diagnosis is carried out and the result is NG.

When all SRT related self-diagnoses show OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate "CMPLT". \rightarrow Case 1 above

When all SRT related self-diagnoses show OK results through several different cycles, the SRT will indicate "CMPLT" at the time the respective self-diagnoses have at least one OK result. → Case 2 above

If one or more SRT related self-diagnoses show NG results in 2 consecutive cycles, the SRT will also indicate "CMPLT". \rightarrow Case 3 above

The table above shows that the minimum number of cycles for setting SRT as "INCMP" is the number one (1) for each self-diagnosis (Case 1 & 2) or the number two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

- The SRT will indicate "CMPLT" at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires "CMPLT" of the SRT only with OK self-diagnosis results.
- During SRT driving pattern, the 1st trip DTC (NG) is detected prior to "CMPLT" of SRT and the self-diagnosis memory must be erased from the ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate "INCMP".

NOTE:

SRT can be set as "CMPLT" together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates "CMPLT".

DIAGNOSIS DESCRIPTION: Malfunction Indicator Lamp (MIL)

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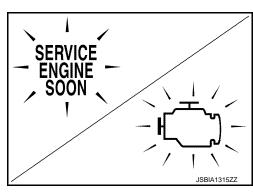
When emission-related ECU detects a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions), it turns on/blinks MIL to inform the driver that a malfunction has been detected.

 The MIL illuminates when ignition switch is turned ON (engine is not running).

NOTE:

Check the MIL circuit if MIL does not illuminate. Refer to EC-933, "Diagnosis Procedure".

When the engine is started, the MIL should go off. NOTE:



^{-:} Self-diagnosis is not carried out.

< SYSTEM DESCRIPTION >

[MR18DE (FOR CALIFORNIA)]

If MIL continues to illuminate/blink, perform self-diagnoses and inspect/repair accordingly because an emission-related ECU has detected a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions).

On Board Diagnosis Function

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ON BOARD DIAGNOSIS ITEM

The on board diagnostic system has the following functions.

Diagnostic test mode	Function
Bulb check	MIL can be checked.
SRT status	ECM can read if SRT codes are set.
Malfunction warning	If ECM detects a malfunction, it illuminates or blinks MIL to inform the driver that a malfunction has been detected.
Self-diagnostic results	DTCs or 1st trip DTCs stored in ECM can be read.
Accelerator pedal released position learning	ECM can learn the accelerator pedal released position. Refer to EC-500, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to EC-500, "THROTTLE VALVE CLOSED PO-SITION LEARNING: Special Repair Requirement".
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-501, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".
Mixture ratio self-learning value clear	Mixture ratio self-learning value can be erased. Refer to <u>EC-502</u> , "MIXTURE RATIO SELF-LEARN-ING VALUE CLEAR: Special Repair Requirement".

BULB CHECK MODE

Description

This function allows damage inspection in the MIL bulb (blown, open circuit, etc.).

Operation Procedure

- 1. Turn ignition switch ON.
- The MIL on the instrument panel should stay ON.
 If it remains OFF, check MIL circuit. Refer to <u>EC-933</u>, "<u>Diagnosis Procedure</u>".

SRT STATUS MODE

Description

This function allows to read if ECM has completed the self-diagnoses of major emission control systems and components. For SRT, refer to EC-595, "DIAGNOSIS DESCRIPTION: System Readiness Test (SRT) Code".

Operation Procedure

- 1. Turn ignition switch ON and wait 20 seconds.
- 2. SRT status is indicated as shown blow.
 - ECM continues to illuminate MIL if all SRT codes are set.

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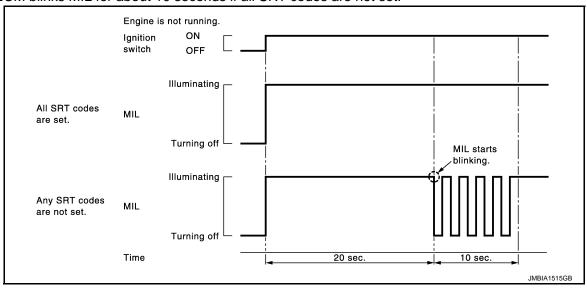
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ECM blinks MIL for about 10 seconds if all SRT codes are not set.



MALFUNCTION WARNING MODE

Description

In this function ECM turns on or blinks MIL when it detects a malfunction in the emission control system components and/or the powertrain control components (which affect vehicle emissions) to inform the driver that a malfunction has been detected.

Operation Procedure

- 1. Turn ignition switch ON.
- Check that MIL illuminates.
 - If it remains OFF, check MIL circuit. Refer to EC-933, "Diagnosis Procedure".
- Start engine and let it idle.
 - For two trip detection logic diagnoses, ECM turns on MIL when it detects the same malfunction twice in the two consecutive driving cycles.
 - For 1st trip detection logic diagnoses, ECM turns on MIL when it detects a malfunction in one driving cycle.
 - ECM blinks MIL when it detects a malfunction that may damage the three way catalyst (misfire).

SELF-DIAGNOSTIC RESULTS MODE

Description

This function allows to indicate DTCs or 1st trip DTCs stored in ECM according to the number of times MIL is blinking.

How to Set Self-diagnostic Results Mode

NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- After ignition switch is turned off, ECM is always released from the "self-diagnostic results" mode.
- 1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- 2. Repeat the following procedure quickly five times within 5 seconds.
 - Fully depress the accelerator pedal.
 - Fully release the accelerator pedal.
- Wait 7 seconds, fully depress the accelerator pedal and keep it depressed for approx. 10 seconds until the MIL starts blinking.

NOTE:

Do not release the accelerator pedal for 10 seconds if MIL starts blinking during this period. This blinking is displaying SRT status and is continued for another 10 seconds.

4. Fully release the accelerator pedal.

ECM has entered to "Self-diagnostic results" mode.

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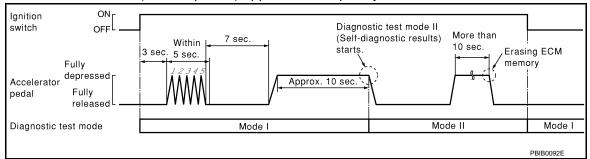
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NOTE:

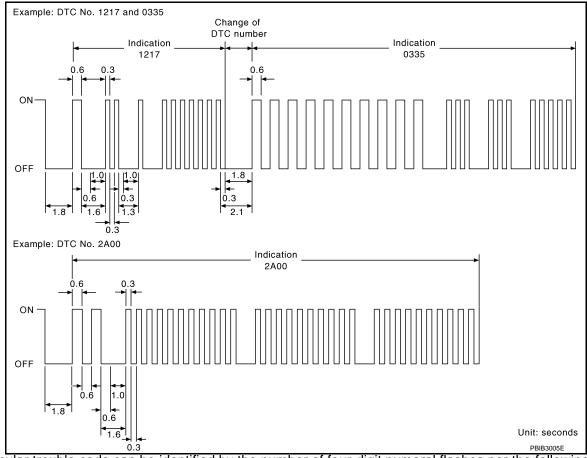
Wait until the same DTC (or 1st trip DTC) appears to completely confirm all DTCs.



How to Read Self-diagnostic Results

The DTC and 1st trip DTC are indicated by the number of blinks of the MIL as shown below.

The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in "malfunction warning" mode, it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes per the following.

Number	0	1	2	3	4	5	6	7	8	9	Α	В	С	D	Е	F
Flashes	10	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16

The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-seconds) - OFF (0.6-seconds) cycle.

The 100th-digit numeral and lower digit numerals consist of a 0.3-seconds ON and 0.3-seconds OFF cycle. A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.

A change from one trouble code to another occurs at an interval of 1.8-seconds OFF.

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In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. Refer to <u>EC-963</u>, "<u>DTC Index</u>".

How to Erase Self-diagnostic Results

By performing this procedure, ECM memory is erased and the following diagnostic information is erased as well.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- · Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

NOTE:

Also, if a battery terminal is disconnected, ECM memory is erased and the diagnostic information as listed above is erased. (The amount of time required for erasing may vary from a few seconds to several hours.)

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Set ECM in "self-diagnostic results" mode.
- The diagnostic information has been erased from the backup memory in the ECM. Fully depress the accelerator pedal and keep it depressed for more than 10 seconds.
- 7. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

CONSULT Function

INFOID:0000000007770415

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 screen.	
Self diagnostic result	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*	
Data monitor	Input/Output data in the ECM can be read.	
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.	
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/results can be confirmed.	
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.	
ECU Identification	ECM part number can be read.	

^{*:} The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- · 1st trip diagnostic trouble codes
- · Freeze frame data
- · 1st trip freeze frame data
- · System readiness test (SRT) codes
- Test values

WORK SUPPORT MODE

Work Item

[MR18DE (FOR CALIFORNIA)]

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 ratio returns to the original coefficient.	When clearing mixture ratio self- learning value
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 temp. is more than 0°C (32°F). Within 10 minutes after starting "EVAP system close" When trying to execute "EVAP system close" under the condition except above, CONSULT will discontinue it and display appropriate instruction. NOTE: When starting engine, CONSULT may display "Battery voltage is low. Charge battery", even in using charged battery.		When detecting EVAP vapor leak point of EVAP system
VIN REGISTRATION	In this mode, VIN is registered in ECM.	When registering VIN in ECM
TARGET IDLE RPM ADJ*	Idle condition	When setting target idle speed
TARGET IGN TIM ADJ*	Idle condition	When adjusting target ignition timing
CLSD THL POS LEARN • Ignition on and engine stopped. When learning the closed position		When learning the throttle valve closed position

^{*:} 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 <a>EC-963, <a>"DTC Index".

How to Read DTC and 1st Trip DTC

DTCs and 1st trip DTCs related to the malfunction are displayed in "self-diag results".

- When ECM detects a 1st trip DTC, "1t" is displayed for "TIME".
- When ECM has detected a current DTC, "0" is displayed for "TIME".
- If "TIME" is neither "0" nor "1t", the DTC occurred in the past and ECM shows the number of times the vehicle has been driven since the last detection of the DTC.

How to Erase DTC and 1st Trip DTC

NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
- If the DTC is not for CVT related items (see EC-963, "DTC Index"), skip step 1.
- 1. Erase DTC in TCM. Refer to TM-179, "DTC Index".
- 2. Select "ENGINE" with CONSULT.
- Select "SELF-DIAG RESULTS".
- 4. Touch "ERASE". (DTC in ECM will be erased.)

Freeze Frame Data and 1st Trip Freeze Frame Data

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Freeze frame data item*	Description	
DTC	 The engine control component part/control system has a trouble code that is displayed as DTC. (Refer to <u>EC-963, "DTC_Index"</u>.) 	
FUEL SYS-B1	 "Fuel injection system status" at the moment a malfunction is detected is displayed. One mode in the following is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop 	
CAL/LD VALUE [%]	The calculated load value at the moment a malfunction is detected is displayed.	
COOLANT TEMP [°C] or [°F]	The engine coolant temperature at the moment a malfunction is detected is displayed.	
L-FUEL TRM-B1 [%]	 "Long-term fuel trim" at the moment a malfunction is detected is displayed. 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. The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule. 	
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed.	
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed.	
ABSOL TH.P/S [%]	The throttle valve opening angle at the moment a malfunction is detected is displayed.	
B/FUEL SCHDL [msec]	The base fuel schedule at the moment a malfunction is detected is displayed.	
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.	
FUEL SYS-B2		
L-FUEL TRM-B2 [%]		
S-FUEL TRM-B2 [%]	These items displayed but are not applicable to this model.	
INT MANI PRES [kPa]		
COMBUST CONDITION		

^{*:} The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE

Monitored Item

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	 Accuracy becomes poor if engine speed drops below the idle rpm. If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1	V	The signal voltage of the mass air flow sensor is displayed.	 When the engine is stopped, a certain value is indicated. When engine is running specification range is indicated in "SPEC".
B/FUEL SCHDL	ms	"Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	When engine is running specifica- tion range is indicated in "SPEC".
A/F ALPHA-B1	%	The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	 When the engine is stopped, a certain value is indicated. This data also includes the data for the air-fuel ratio learning control. When engine is running specification range is indicated in "SPEC".

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Monitored item	Unit	Description	Remarks
COOLAN TEMP/S	°C or °F	The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
A/F SEN1 (B1)	V	 The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed. 	
HO2S2 (B1)	V	The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 MNTR(B1)	RICH/LEAN	Display of heated oxygen sensor 2 signal: RICH: means the amount of oxygen after three way catalyst is relatively small. LEAN: means the amount of oxygen after three way catalyst is relatively large.	When the engine is stopped, a certain value is indicated.
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT	V	The power supply voltage of ECM is displayed.	
ACCEL SEN 1	V	The accelerator pedal position sensor signal voltage is	ACCEL SEN 2 signal is converted by ECM interpally. Thus, it differs
ACCEL SEN 2	V	displayed.	by ECM internally. Thus, it 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
TP SEN 2-B1	V	played.	by ECM internally. Thus, it differs from ECM terminal voltage signal.
FUEL T/TMP SE	°C or °F	The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.	
INT/A TEMP SE	°C or °F	The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
EVAP SYS PRES	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 displayed regardless of the starter signal.
CLSD THL POS	ON/OFF	 Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor sig- nal. 	
AIR COND SIG	ON/OFF	Indicates [ON/OFF] condition of the air conditioner switch determined by the air conditioner ON signal.	
P/N POSI SW	ON/OFF	Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal (M/T models) or Transmission range switch signal (CVT models).	
PW/ST SIGNAL	ON/OFF	 [ON/OFF] condition of the power steering system (de- termined by the signal sent from EPS control unit) 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.	

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Monitored item	Unit	Description	Remarks
BRAKE SW	ON/OFF	Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1	msec	Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	When the engine is stopped, a certain computed value is indicat- ed.
IGN TIMING	BTDC	Indicates the ignition timing computed by ECM according to the input signals.	When the engine is stopped, a certain value is indicated.
CAL/LD VALUE	%	"Calculated load value" indicates the value of the current air flow divided by peak air flow.	
MASS AIRFLOW	g/s	Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow sensor.	
PURG VOL C/V	%	 Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. The opening becomes larger as the value increases. 	
INT/V TIM(B1)	°CA	Indicates [°CA] of intake camshaft advance angle.	
INT/V SOL(B1)	%	 The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. The advance angle becomes larger as the value increases. 	
SWRL CONT S/V	ON/OFF	The control condition of the tumble control valve (determined by ECM according to the input signals) is indicated. ON: Closed OFF: Open	
TMBL POS SEN	V	The tumble control valve position sensor signal voltage is displayed.	
AIR COND RLY	ON/OFF	The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY	ON/OFF	Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
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.	
COOLING FAN	HI/LOW/ OFF	Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI: High speed operation LOW: Low speed operation OFF: Stop	
HO2S2 HTR (B1)	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 shaft revolution signal.	
VEHICLE SPEED	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
IDL A/V LEARN	YET/CMPLT	Display the condition of Idle Air Volume Learning YET: Idle air volume learning has not been performed yet. CMPLT: Idle air volume learning has already been performed successfully.	

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Monitored item	Unit	Description	Remarks
TRVL AFTER MIL	km or mile	Distance traveled while MIL is activated.	
ENG OIL TEMP	°C or °F	The engine oil temperature (determined by thesignal voltage of the engine oil temperature sensor) is dis- played.	
A/F S1 HTR(B1)	%	 Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals. The current flow to the heater becomes larger as the value increases. 	
AC PRESS SEN	V	The signal voltage from the refrigerant pressure sensor is displayed.	
A/F ADJ-B1	_	Indicates the correction of factor stored in ECM. The factor is calculated from the difference between the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 signal.	
BUT 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 ac- tive.	
		OFF: Power generation voltage variable control is inactive.	
ALT DUTY	%	Indicates the duty ratio of the power generation com- mand value. The ratio is calculated by ECM based on the battery current sensor signal.	
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
SET VHCL SPD	km/h or mph	The preset vehicle speed is displayed.	
MAIN SW	ON/OFF	Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW	ON/OFF	Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW	ON/OFF	Indicates [ON/OFF] condition from RESUME/ACC switch signal.	
SET SW	ON/OFF	Indicates [ON/OFF] condition from SET switch signal.	
BRAKE SW1	ON/OFF	Indicates [ON/OFF] condition from ASCD brake switch signal and ASCD clutch switch signal (M/T models).	
BRAKE SW2	ON/OFF	Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT	NON/CUT	Indicates the vehicle cruse 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 cruse 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 CVT O/D according to the input signal from the TCM.	
AT OD CANCEL	ON/OFF	Indicates [ON/OFF] condition of CVT O/D cancel request signal from the TCM.	

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Monitored item	Unit	Description	Remarks
CRUISE LAMP	ON/OFF	Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP	ON/OFF	Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
THRTL STK CNT B1 [*]	_	_	
EVAP LEAK DIAG	YET/CMPLT	Indicates the condition of EVAP leak diagnosis. YET: EVAP leak diagnosis has not been performed yet. CMPLT: EVAP leak diagnosis has been performed successfully.	
EVAP DIAG READY	ON/OFF	Indicates the ready condition of EVAP leak diagnosis. ON: Diagnosis has been ready condition. OFF: Diagnosis has not been ready condition.	
HO2 S2 DIAG1 (B1)	INCMP/CM- PLT	Indicates DTC P0139 self-diagnosis (delayed response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	
HO2 S2 DIAG2 (B1)	INCMP/CM- PLT	Indicates DTC P0139 self-diagnosis (slow response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	
A/F SEN1 DIAG2(B1)	INCMP/CM- PLT	Indicates DTC P014C or P014D self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	
A/F SEN1 DIAG3(B1)	ABSNT/ PRSNT	Indicates DTC P014C, P014D, P015A or P015B self-diagnosis condition. ABSNT: The vehicle condition is not within the diagnosis range. PRSNT: The vehicle condition is within the diagnosis range. Output Description:	
SYSTEM 1 DIAG- NOSIS A B1	INCMP/CM- PLT	Indicates DTC P117A self-daiagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	
SYSTEM 1 DIAG- NOSIS B B1	ABSENT/ PRSENT	Indicates DTC P117A self-daiagnosis condition. ABSENT: Self-diagnosis standby PRSENT: Under self-diagnosis	

^{*:} The item is indicated, but not used.

NOTE

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

Test Item

Test item	Condition	Judgment	Check item (Remedy)
FUEL INJECTION	Engine: Return to the original trouble condition Change the amount of fuel injection using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	Harness and connectors Fuel injector Air fuel ratio (A/F) sensor 1
IGNITION TIMING	Engine: Return to the original trouble condition Timing light: Set Retard the ignition timing using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	Perform Idle Air Volume Learning.

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Test item	Condition	Judgment	Check item (Remedy)	•
POWER BALANCE	 Engine: After warming up, idle the engine. A/C switch OFF Selector lever: P or N position (CVT), Neutral position (M/T) Cut off each fuel injector signal one at a time using CONSULT. 	Engine runs rough or dies.	Harness and connectors Compression Fuel injector Power transistor Spark plug Ignition coil	EC
COOLING FAN*	Ignition switch: ON Turn the cooling fan "LOW", "HI" and "OFF" using CONSULT.	Cooling fan moves and stops.	Harness and connectors IPDM E/R (Cooling fan relay) Cooling fan motor	- C
ENG COOLANT TEMP	Engine: Return to the original trouble condition Change the engine coolant temperature using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	Harness and connectors Engine coolant temperature sensor Fuel injector	D
FUEL PUMP RELAY	Ignition switch: ON (Engine stopped) Turn the fuel pump relay "ON" and "OFF" using CONSULT and listen to operating sound.	Fuel pump relay makes the operating sound.	Harness and connectors Fuel pump relay	F
PURG VOL CONT/V	 Engine: After warming up, run engine at 1,500 rpm. Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT. 	Engine speed changes according to the opening percent.	Harness and connectors Solenoid valve	G
FUEL/T TEMP SEN	Change the fuel tank temperature	e using CONSULT.		-
VENT CONTROL/V	Ignition switch: ON (Engine stopped) Turn solenoid valve "ON" and "OFF" using the CONSULT and listen to operating sound.	Solenoid valve makes an operating sound.	Harness and connectors Solenoid valve	
V/T ASSIGN ANGLE	Engine: Return to the original trouble condition Change intake valve timing using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	Harness and connectors Intake valve timing control solenoid valve	K
ALTERNATOR DUTY	Engine: idle. Change duty ratio using CON-SULT.	Battery voltage charges.	Harness and connectors IPDM E/R Alternator	L
TUMBLE CONTROL VALVE	Ignition switch: ON Turn tumble control valve "ON" and "OFF" with CONSULT and listen to operating sound.	Tumble control valve motor makes an operating sound.	Harness and connectors Tumble control valve motor	M

^{*:} Leaving cooling fan OFF with CONSULT while engine is running may cause the engine to overheat.

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

- For items whose SRT codes are set, "CMPLT" is displayed on the CONSULT screen; for items whose SRT codes are not set, "INCMP" is displayed.
- "SRT STATUS" provides the presence or absence of permanent DTCs stored in ECM memory.

PERMANENT DTC STATUS Mode

How to display permanent DTC status

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds. 3.
- Turn ignition switch ON.
- Select "PERMANENT DTC STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

NOTE:

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Permanent DTCs stored in ECM memory are displayed on the CONSULT screen to show if a driving pattern required for erasing permanent DTCs is complete (CMPLT) or incomplete (INCMP).

CAUTION:

Since the "PERMANENT DTC STATUS" screen displays the previous trip information, repeat the following twice to update the information: "Ignition switch OFF", "Wait for more than 10 seconds" and "Ignition switch ON".

CAUTION: Turn ignition switch from O status screen.	N to OFF twice to update the informa	ation on the
PERMANENT DTC	DRIVING PATTERN B	DRIVING PATTERN D
xxxx	INCMP	INCMP
xxxx	CMPLT	INCMP
xxxx	INCMP	CMPLT
XXXX	CMPLT	INCMP
XXXX	INCMP	INCMP
XXXX	INCMP	INCMP

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NOTE:

This mode is not used in regions that permanent DTCs are not regulated by law.

SRT WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

PERMANENT DTC WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to complete the driving pattern that is required for erasing permanent DTC.

NOTE:

This mode is not used in regions that permanent DTCs are not regulated by law.

DTC WORK SUPPORT Mode

Test mode	Test item	Corresponding DTC No.	Reference page
	EVP SML LEAK P0442/P1442*	P0455	EC-791
	EVP V/S LEAK P0456/P1456*	P0442	EC-753
EVAPORATIVE SYSTEM	EVF V/3 LLAN F0430/F1430	P0456	EC-797
	PURG VOL CN/V P1444	P0443	EC-760
	PURG FLOW P0441	P0441	EC-747
A/F SEN1	A/F SEN1 (B1) P1278/P1279	_	_
	A/F SEN1 (B1) P1276	P0130	EC-666
HO2S2	HO2S2 (B1) P1146	P0138	EC-682
	HO2S2 (B1) P1147	P0137	EC-676
	HO2S2 (B1) P139	P0139	EC-690

^{*:} DTC P1442, P1456 does not apply to this model but appears in DTC Work Support Mode screens.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

DTC/CIRCUIT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description INFOID:0000000007770416

The specification (SP) value indicates the tolerance of the value that is displayed in "SPEC" of "DATA MONI-TOR" mode of CONSULT during normal operation of the Engine Control System. When the value in "SPEC" of "DATA MONITOR" mode is within the SP value, the Engine Control System is confirmed OK. When the value in "SPEC" of "DATA MONITOR" mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.

The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.

The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correc-
- A/F ALPHA-B1 (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)

Component Function Check

1.START

Make sure that all of the following conditions are satisfied.

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 104.3 kPa (1.003 1.064 kg/cm², 14.25 15.12 psi)
- Atmospheric temperature: 20 30°C (68 86°F)
- Engine coolant temperature: 75 95°C (167 203°F)
- Transmission: Warmed-up
- CVT models: After the engine is warmed up to normal operating temperature, drive vehicle until "FLUID TEMP SE" (CVT fluid temperature sensor signal) indicates more than 60°C (140°F).
- M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied
- Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.
- · Engine speed: Idle

>> GO TO 2.

2 PERFORM "SPEC" OF "DATA MONITOR" MODE

(P)With CONSULT

NOTE:

Perform "SPEC" in "DATA MONITOR" mode in maximum scale display.

- 1. Perform EC-495, "BASIC INSPECTION: Special Repair Requirement".
- Select "B/FUEL SCHDL", "A/F ALPHA-B1" and "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode with CONSULT.
- 3. Make sure that monitor items are within the SP value.

Is the inspection result normal?

YES >> END

NO >> Go to EC-610, "Diagnosis Procedure".

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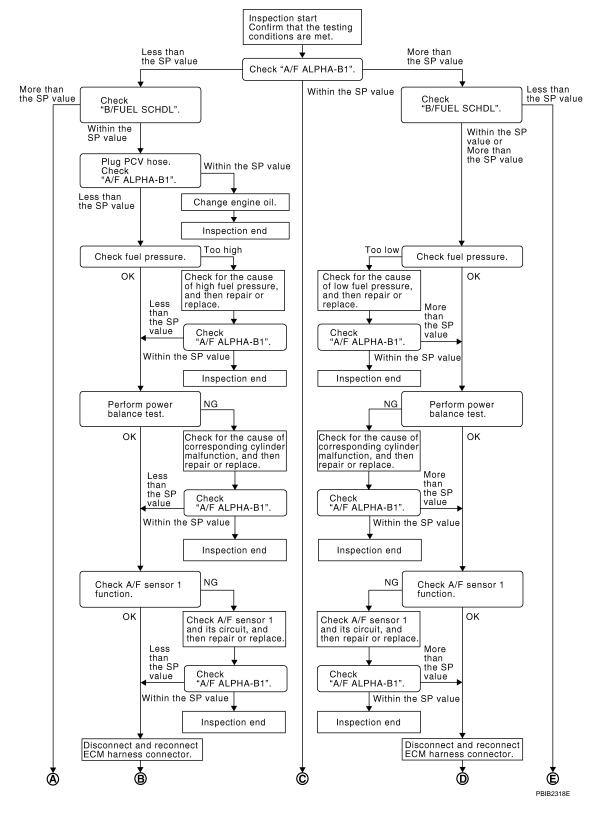
< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

INFOID:0000000007770418

Diagnosis Procedure

OVERALL SEQUENCE

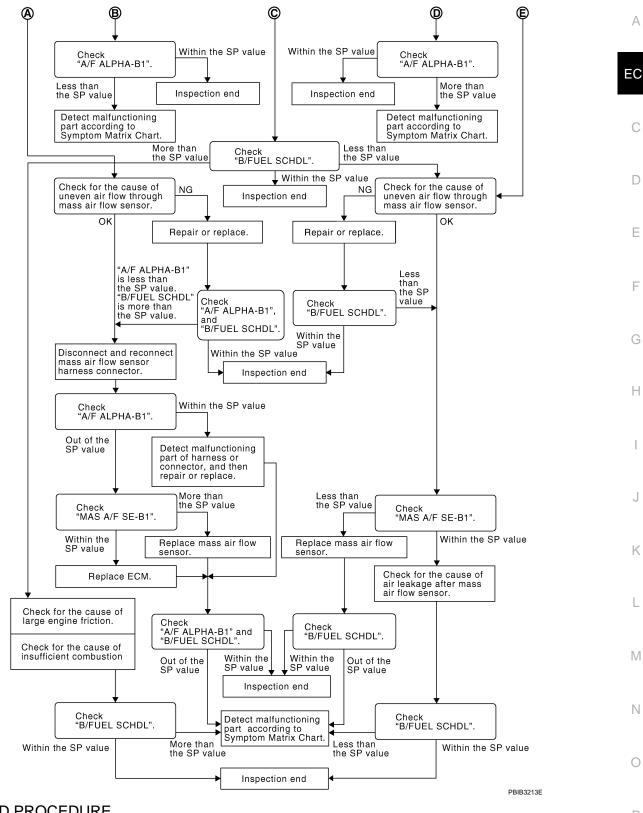


[MR18DE (FOR CALIFORNIA)]

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DETAILED PROCEDURE

1.CHECK "A/F ALPHA-B1"

(I) With CONSULT

- 2. Confirm that the testing conditions are met. Refer to EC-609, "Component Function Check".
- Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within 3. the SP value.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

NOTE:

Check "A/F ALPHA-B1" for approximately 1 minute because it may fluctuate. It is NG if the indication is out of the SP value even a little.

Is the measurement value within the SP value?

YES >> GO TO 17.

NO-1 >> Less than the SP value: GO TO 2.

NO-2 >> More than the SP value: GO TO 3.

2.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 4.

NO >> More than the SP value: GO TO 19.

${f 3.}$ CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 6.

NO-1 >> More than the SP value: GO TO 6.

NO-2 >> Less than the SP value: GO TO 25.

4.CHECK "A/F ALPHA-B1"

- 1. Stop the engine.
- 2. Disconnect PCV hose, and then plug it.
- 3. Start engine.
- Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 5.

NO >> GO TO 6.

5. CHANGE ENGINE OIL

- 1. Stop the engine.
- Change engine oil.

NOTE:

This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving conditions (such as when engine oil temperature does not rise enough since a journey distance is too short during winter). The symptom will not be detected after changing engine oil or changing driving condition.

>> INSPECTION END

6.CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-985, "Inspection".)

Is the inspection result normal?

YES >> GO TO 9.

NO-1 >> Fuel pressure is too high: Replace "fuel filter and fuel pump assembly" and then GO TO 8.

NO-2 >> Fuel pressure is too low: GO TO 7.

7.DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly" and then GO TO 8.

NO >> Repair or replace and then GO TO 8.

8.CHECK "A/F ALPHA-B1"

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

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Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

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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.

- Ignition coil and its circuit (Refer to EC-928. "Component Function Check".)
- Fuel injector and its circuit (Refer to EC-922, "Component Function Check".)
- Intake air leakage
- Low compression pressure (Refer to EM-21, "Inspection".)

Is the inspection result normal?

YES >> Replace fuel injector and then GO TO 11.

NO >> Repair or replace malfunctioning part and then GO TO 11.

11.CHECK "A/F ALPHA-B1"

Start engine.

Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> GO TO 12.

12.CHECK A/F SENSOR 1 FUNCTION

Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1.

- For DTC P0130, refer to <u>EC-666, "DTC Logic"</u>.
 For DTC P0131, refer to <u>EC-670, "DTC Logic"</u>.
- For DTC P0132, refer to <u>EC-673, "DTC Logic"</u>.
- For DTC P014C, P014D, P015A, P015B, refer to EC-696, "DTC Logic".
- For DTC P2A00, refer to <u>EC-909</u>, "<u>DTC Logic</u>".

Is any DTC detected?

YES >> GO TO 15.

NO >> GO TO 13.

13. CHECK A/F SENSOR 1 CIRCUIT

Perform DIAGNOSTIC PROCEDURE according to corresponding DTC.

>> GO TO 14.

14.CHECK "A/F ALPHA-B1"

1. Start engine.

Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> GO TO 15.

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

Stop the engine.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

- 2. Disconnect ECM harness connector.
- 3. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

16.CHECK "A/F ALPHA-B1"

- 1. Start engine.
- 2. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to EC-973, "Symptom Table".

17. CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO-1 >> More than the SP value: GO TO 18.

NO-2 >> Less than the SP value: GO TO 25.

18. DETECT MALFUNCTIONING PART

- 1. Check for the cause of large engine friction. Refer to the following.
- Engine oil level is too high
- Engine oil viscosity
- Belt tension of power steering, alternator, A/C compressor, etc. is excessive
- Noise from engine
- Noise from transmission, etc.
- 2. Check for the cause of insufficient combustion. Refer to the following.
- Valve clearance malfunction
- Intake valve timing control function malfunction
- Camshaft sprocket installation malfunction, etc.

>> Repair or replace malfunctioning part, and then GO TO 30.

19. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- · Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- · Improper specification of intake air system

Is the inspection result normal?

YES >> GO TO 21.

NO >> Repair or replace malfunctioning part, and then GO TO 20.

20.CHECK "A/F ALPHA-B1", AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1" and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> "B/FUEL SCHDL" is more, "A/F ALPHA-B1" is less than the SP value: GO TO 21.

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

- Stop the engine.
- 2. Disconnect mass air flow sensor harness connector.
- 3. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

22.CHECK "A/F ALPHA-B1"

Start engine.

Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

>> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-635, "DTC Logic". Then GO TO 29.

NO >> GO TO 23.

23.CHECK "MAS A/F SE-B1"

Select "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 24.

NO >> More than the SP value: Replace mass air flow sensor, and then GO TO 29.

24.REPLACE ECM

Replace ECM.

Perform EC-498, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Special Repair Requirement".

>> GO TO 29.

25. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

Crushed air ducts

- Malfunctioning seal of air cleaner element
- · Uneven dirt of air cleaner element
- Improper specification of intake air system

Is the inspection result normal?

YES >> GO TO 27.

NO >> Repair or replace malfunctioning part, and then GO TO 26.

26.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Less than the SP value: GO TO 27.

27.CHECK "MAS A/F SE-B1"

Select "MAS A/F SE-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 28.

NO >> Less than the SP value: Replace 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 of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts

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EC-615

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

· Malfunctioning seal of intake air system, etc.

>> GO TO 30.

$29.\mathsf{CHECK}$ "A/F ALPHA-B1" AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1" and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to EC-973, "Symptom Table".

30.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and then make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to EC-973, "Symptom Table".

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000007770419

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect ECM harness connectors.
- 2. Check the continuity between ECM harness connector and ground.

E	CM	Ground	Continuity
Connector	Connector Terminal		Continuity
F7	11		
	107		Existed
E16	108	Ground	
LIO	109		
	112		

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 F1, E8
- 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 connectors.
- Turn ignition switch ON.
- Check the voltage between ECM harness connector and ground.

E	СМ	Ground	Voltage
Connector	Terminal	Giodila	voltage
E16	93	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

- 15 A fuse (No. 62)
- Harness for open or short between ECM and fuse
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

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POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

6. CHECK ECM POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON and then OFF.
- 3. Check the voltage between ECM harness connector and ground.

E	CM	Ground	Voltage	
Connector Terminal		Ground	voltage	
E16	105	Ground	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0 V.	

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 9.

7. CHECK ECM POWER SUPPLY CIRCUIT-III

- 1. Turn ignition switch ON.
- 2. Check the voltage between IPDM E/R harness connector and ground.

IPDN	И E/R	Ground	Voltage
Connector	Terminal	Glound	voltage
E14	44	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace IPDM E/R. Refer to <u>PCS-33</u>, "Removal and Installation" (With I-KEY) or <u>PCS-62</u>, "Removal and Installation" (Without I-KEY).

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

9. CHECK ECM POWER SUPPLY CIRCUIT-IV

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Check the voltage between ECM harness connector and ground.

E	CM	Ground	Voltage	
Connector	Terminal		Voltage	
F7	32	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 10.

10. CHECK ECM POWER SUPPLY CIRCUIT-V

- Disconnect ECM harness connector.
- 2. Disconnect IPDM E/R harness connector E14.
- 3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F7	32	E14	40	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

YES >> GO TO 12. NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- 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 FUSE

- Disconnect 20 A fuse (No. 43) from IPDM E/R.
- Check 20 A fuse.

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace 20 A fuse.

13. CHECK ECM POWER SUPPLY CIRCUIT-VI

- Disconnect ECM harness connector.
- Disconnect IPDM E/R harness connector E14.
- Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E16	105	E14	43	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 14.

14.detect malfunctioning part

Check the following.

- Harness connectors E8, F1
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

>> Replace IPDM E/R, Refer to PCS-33, "Removal and Installation" (With I-KEY) or PCS-62, YES "Removal and Installation" (Without I-KEY) .

>> Repair open circuit or short to ground or short to power in harness or connectors. NO

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U0101 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

U0101 CAN COMM CIRCUIT

Description INFOID:0000000007770420

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0101	Lost communication with TCM	When ECM is not transmitting or receiving CAN communication signal of OBD (emission-related diagnosis) with TCM for 2 seconds or more.	CAN communication line between TCM and ECM (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 3 seconds.
- Check DTC.

Is DTC detected?

YES >> EC-620, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:00000000007770422

Perform the trouble diagnosis for CAN communication system. Refer to <u>LAN-13</u>, "Trouble <u>Diagnosis Flow Chart"</u>.

U1001 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

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U1001 CAN COMM CIRCUIT

Description INFOID:0000000007770426

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-621, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

Perform the trouble diagnosis for CAN communication system. Refer to <u>LAN-13</u>, "Trouble <u>Diagnosis Flow Chart"</u>.

INFOID:0000000007770428

Revision: 2011 November

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for EC-823, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0011	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Intake valve control solenoid valve Accumulation of debris to the signal pick-up portion of the camshaft Timing chain installation Foreign matter caught in the oil groove for intake valve timing control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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:

Before performing the following procedure, confirm that battery voltage is between 10 V and 16 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

(P)With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to 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
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 4.2 msec
Selector lever	P or N position (CVT) Neutral position (M/T)

- 4. Stop vehicle with engine running and let engine idle for 10 seconds.
- Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-623, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

(P)With CONSULT

Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,200 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 65°C (149°F)

< DTC/CIRCUIT DIAGNOSIS >

Check the following.

[MR18DE (FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGN	NOSIS >	[MR18DE (FOR CALIFORNIA)]
Selector lever 1st or 2	2nd position	
Driving location (Increa	vehicle uphill sed engine load will help maintain the driving ons required for this test.)	
CAUTION: Always drive at a s Check 1st trip DTC.	afe speed.	
With GST Follow the procedure "W Is 1st trip DTC detected?		
NO >> INSPECTIO		
Diagnosis Procedu	re	INFOID:0000000007770430
1.CHECK OIL PRESSU	JRE WARNING LAMP	
 Start engine. Check oil pressure nated. 	warning lamp and confirm it is not illumi	-
Is oil pressure warning la YES >> Go to <u>LU-13</u> NO >> GO TO 2.		- 4-
2.CHECK INTAKE VAL	VE TIMING CONTROL SOLENOID VALVE	PBIA8559J
Refer to EC-624, "Comp		
Is the inspection result n	ormal?	
•	ake valve timing control solenoid valve. Refe FT POSITION SENSOR (POS)	er to EM-44, "Exploded View".
Refer to EC-737, "Comp		
Is the inspection result n	· · · · · · · · · · · · · · · · · · ·	
YES >> GO TO 4.		
_ ·	nkshaft position sensor (POS). Refer to EM	-88, "Exploded View".
	POSITION SENSOR (PHASE)	
Refer to <u>EC-740</u> , "Comp		
Is the inspection result n YES >> GO TO 5.	ormar?	
_NO >> Replace car	nshaft position sensor (PHASE). Refer to \underline{E}	M-55, "Exploded View".
5. CHECK CAMSHAFT	(INTAKE)	

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

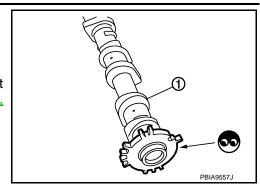
- Accumulation of debris to the signal plate of camshaft (1) rear end
- · Chipping signal plate of camshaft rear end

Is the inspection result normal?

YES >> GO TO 6.

NO

>> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to <u>EM-55</u>, "Exploded View".



6.CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

YES >> Check timing chain installation. Refer to EM-45, "Removal and Installation".

NO >> GO TO 7.

7.CHECK LUBRICATION CIRCUIT

Refer to LU-7, "Inspection", "INSPECTION AFTER INSTALLATION".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770431

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

- 1. Turn ignition switch OFF.
- Disconnect intake valve timing control solenoid valve harness connector.
- 3. Check resistance between intake valve timing control solenoid valve terminals as per the following.

Terminals	Resistance
1 and 2	6.7 - 7.7 Ω [at 20°C (68°F)]
1 or 2 and ground	$\stackrel{\scriptstyle \infty}{} \Omega$ (Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace intake valve timing control solenoid valve. Refer to EM-44, "Exploded View".

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

Remove intake valve timing control solenoid valve. Refer to EM-44, "Exploded View".

Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

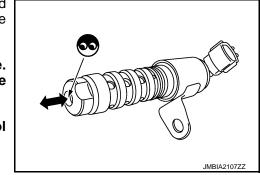
CAUTION:

Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.

Is the inspection result normal?



< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve. Refer to EM-44, "Exploded View".

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P0031, P0032 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P0031, P0032 A/F SENSOR 1 HEATER

Description INFOID:000000007770432

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Air fuel ratio (A/F) sensor 1	Air fuel ratio (A/F) sensor 1 heater
Mass air flow sensor	Amount of intake air	TICALOT COTILION	noator

The ECM performs ON/OFF duty control of the A/F sensor 1 heater corresponding to the engine operating condition to keep the temperature of A/F sensor 1 element at the specified range.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031	Air fuel ratio (A/F) sensor 1 heater 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 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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than between 11 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for at least 10 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-626, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770434

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.
- 2. Turn ignition switch ON.

P0031, P0032 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage	
Connector	Terminal	Glound	voltage	
F51	4	Ground	Battery voltage	

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Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3. С

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- IPDM E/R harness connector E15
- 15 A fuse (No. 61)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

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f 4.CHECK A/F SENSOR 1 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.

A/F se	A/F sensor 1 ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F51	3	F7	8	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5. CHECK A/F SENSOR 1 HEATER

Refer to EC-628, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

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6.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".

CAUTION:

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

.CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

>> Repair or replace.

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EC-627

P0031, P0032 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Component Inspection

INFOID:0000000007770435

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.

Terminals	Resistance
3 and 4	1.8 - 2.44 Ω [at 20°C (68°F)]
3 and 1, 2	∞ Ω
4 and 1, 2	(Continuity should not exist)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

P0037, P0038 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

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P0037, P0038 HO2S2 HEATER

Description INFOID:0000000007770436

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2	
Engine coolant temperature sensor	Engine coolant temperature	heater control	Heated oxygen sensor 2 heater
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

Engine speed	Heated oxygen sensor 2 heater	_ F
Above 3,600 rpm	OFF	_
Below 3,600 rpm after the following conditions are met. Engine: After warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON	G

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037	Heated oxygen sensor 2 heater 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 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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

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P0037, P0038 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

YES >> Go to EC-630, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770438

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK HO2S2 POWER SUPPLY CIRCUIT

- 1. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between HO2S2 harness connector and ground.

HO2S2		Ground	Voltage
Connector Terminal			
F49	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 E8, F1
- IPDM E/R connector E15
- 15 A fuse (No. 61)
- Harness for open or short between heated oxygen sensor 2 and fuse
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between HO2S2 harness connector and ECM harness connector.

НО	2S2	E(CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F49	3	F7	5	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-631, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to <u>EX-5, "Exploded View"</u>. CAUTION:

P0037, P0038 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

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>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770439

1. CHECK HEATED OXYGEN SENSOR 2 HEATER

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
- 3. Check resistance between HO2S2 terminals as per the following.

Terminals	Resistance
2 and 3	3.3 - 4.4 Ω [at 25°C (77°F)]
1 and 2, 3, 4	∞ Ω
4 and 1, 2, 3	(Continuity should not exist)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

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P0075 IVT CONTROL SOLENOID VALVE

Description INFOID:0000000007770440

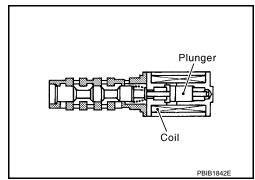
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.

The longer pulse width advances valve angle.

The shorter pulse width retards valve angle.

When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.



DTC Logic

INFOID:0000000007770441

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0075	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) Intake valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YFS >> Go to EC-632, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770442

${f 1.}$ CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect intake valve timing (IVT) control solenoid valve harness connector. 2.
- Turn ignition switch ON.
- Check the voltage between intake valve timing control solenoid valve harness connector and ground.

IVT control solenoid valve		Ground	Voltage
Connector	Terminal	Glound	voltage
F41	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Check the following.

- Harness connectors E8, F1
- IPDM E/R connector E14
- Harness for open or short between IVT control solenoid valve and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between IVT control solenoid valve harness connector and ECM harness connector.

IVT control s	solenoid valve	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F41	2	F8	73	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

f 4 .CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-633, "Component Inspection".

Is the inspection result normal?

>> GO TO 5. YFS

NO >> Replace intake valve timing control solenoid valve. Refer to EM-44, "Exploded View".

5. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

 ${f 1}$.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

- Turn ignition switch OFF.
- 2. Disconnect intake valve timing control solenoid valve harness connector.
- Check resistance between intake valve timing control solenoid valve terminals as per the following.

Terminals	Resistance
1 and 2	6.7 - 7.7 Ω [at 20°C (68°F)]
1 or 2 and ground	$\stackrel{\infty}{\Omega} \Omega$ (Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace intake valve timing control solenoid valve. Refer to EM-44. "Exploded View".

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

Remove intake valve timing control solenoid valve. Refer to EM-44, "Exploded View".

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INFOID:0000000007770443

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P0075 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

2. Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:

Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

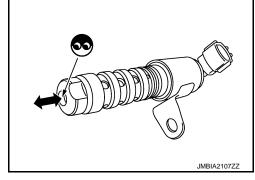
NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve. Refer to EM-44, "Exploded View".

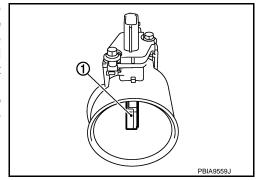


P0101 MAF SENSOR

Description

The mass air flow (MAF) 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 MAF sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss

Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0101 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause	
P0101	MAF SEN/CIRCUIT-B1 [Mass air flow (MAF) sensor circuit range/performance]	 A high voltage from the sensor is sent to ECM under light load driving condition. A low voltage from the sensor is sent to ECM under heavy load driving condition. 	Harness or connectors (The sensor circuit is open or shorted.) Intake air leaks MAF sensor EVAP control system pressure sensor Intake air temperature sensor	H

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and warm it up to normal operating temperature.
- 2. Drive the vehicle for at least 5 seconds under the following conditions:

CAUTION:

Always drive vehicle at safe speed.

Selector lever	Suitable position
Vehicle speed	40 km/h (25 MPH) or more

NOTE:

- The gear must be fixed while driving the vehicle.
- Keep the accelerator pedal as steady as possible during cruising.
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-636, "Diagnosis Procedure".

NO >> INSPECTION END

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[MR18DE (FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

INFOID:0000000007770446

1. CHECK INTAKE SYSTEM

Check the following for connection.

- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

Is the inspection result normal?

YES >> GO TO 2.

NO >> Reconnect the parts.

2.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3. CHECK MASS AIR FLOW (MAF) SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect MAF sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between MAF sensor harness connector and ground.

MAF :	MAF sensor		Voltage
Connector	Terminal	Ground	voltage
F4	5	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 E8, F1
- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and IPDM E/R
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

${f 5.}$ CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF	MAF sensor ECM Continuity		ECM	
Connector	Terminal	Connector	Terminal	Continuity
F4	4	F8	52	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between MAF sensor harness connector and ECM harness connector.

< DTC/CIRCUIT DIAGNOSIS >

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F4	3	F8	45	Existed
2. Also check harness for short to ground and short to power.			o power.	
Is the inspection result normal?				
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YES >> GO TO 7.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

.CHECK INTAKE AIR TEMPERATURE SENSOR

Check intake air temperature sensor. Refer to EC-646, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace MAF sensor (with intake air temperature sensor). Refer to EM-24, "Exploded View".

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check EVAP control system pressure sensor. Refer to EC-779, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View".

9. CHECK MAF SENSOR

Check MAF sensor. Refer to EC-637, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace MAF sensor. Refer to EM-24, "Exploded View".

10.check intermittent incident

Check intermittent incident. Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK MASS AIR FLOW SENSOR-I

(P)With CONSULT

- Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- Start engine and warm it up to normal operating temperature.
- Connect CONSULT and select "DATA MONITOR" mode.
- Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	MAS A/F SE-B1	
	Ignition switch ON (Engine stopped.)	Approx. 0.4 V	
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V	
WAG AT GE-DT	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V	
Idle to about 4,000 rpm		0.7 - 1.1 V to Approx. 2.4 V*	

^{*:} Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT

- Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- Start engine and warm it up to normal operating temperature.

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4. Check the voltage between ECM harness connector and ground.

E	ECM Ground		Condition	Voltage
Connector	Terminal	Glound	Ground	
			Ignition switch ON (Engine stopped.)	Approx. 0.4 V
F8	45 (MAF sensor	Ground	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
10	signal)		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
			Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

^{*:} Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MASS AIR FLOW SENSOR

- 1. Turn ignition switch OFF.
- 2. Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK MASS AIR FLOW SENSOR-II

(P)With CONSULT

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Connect CONSULT and select "DATA MONITOR" mode.
- 4. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	MAS A/F SE-B1
	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
MAS AVE SE-BI	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
	Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

^{*:} Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Check the voltage between ECM harness connector and ground.

E	ECM		Condition	Voltage
Connector	Terminal	Ground	Condition	voltage
			Ignition switch ON (Engine stopped.)	Approx. 0.4 V
F8	45 (MAE sonsor	Ground	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
10	F8 (MAF sensor signal)		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
			Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

^{*:} Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4. CHECK MASS AIR FLOW SENSOR-III

(P)With CONSULT

- Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT and select "DATA MONITOR" mode.
- 5. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	MAS A/F SE-B1
	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
	Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

^{*:} Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

♥Without CONSULT

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Start engine and warm it up to normal operating temperature.
- Check the voltage between ECM harness connector and ground.

E	ECM		Condition	Voltage
Connector	Terminal	Ground	Condition	voltage
			Ignition switch ON (Engine stopped.)	Approx. 0.4 V
F8	45 (MAF sensor	ensor Ground	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
10	signal)		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
			Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

^{*:} Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Clean or replace mass air flow sensor. Refer to EM-24, "Exploded View".

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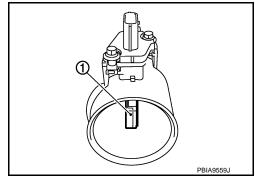
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P0102, P0103 MAF SENSOR

Description INFOID:0000000007770448

The mass air flow (MAF) 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 MAF sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



DTC Logic

INFOID:0000000007770449

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102	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 leaks Mass air flow sensor
P0103	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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

Which DTC is detected?

P0102 >> GO TO 2.

P0103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

- Start engine and wait at least 5 seconds.
- Check DTC.

Is DTC detected?

YES >> Go to EC-641, "Diagnosis Procedure".

NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-I

- 1. Turn ignition switch ON and wait at least 5 seconds.
- Check DTC.

Is DTC detected?

YES >> Go to EC-641, "Diagnosis Procedure".

NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-II

- 1. Start engine and wait at least 5 seconds.
- 2. Check DTC.

Is DTC detected?

YES >> Go to EC-641, "Diagnosis Procedure".

NO >> INSPECTION END

P0102, P0103 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

INFOID:0000000007770450

Diagnosis Procedure

1.INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

P0102 >> GO TO 2.

P0103 >> GO TO 3.

2.CHECK INTAKE SYSTEM

Check the following for connection.

- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold

Is the inspection result normal?

YES >> GO TO 3.

NO >> Reconnect the parts.

3.check ground connection

Turn ignition switch OFF.

Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace ground connection.

4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

- Disconnect mass air flow (MAF) sensor harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between MAF sensor harness connector and ground.

MAF	sensor	Ground	Voltage	
Connector	Terminal	Glound	voltage	
F4	5	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- 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.
- Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF	MAF sensor		ECM		
Connector	Terminal	Connector	Terminal	Continuity	
F4	4	F8	52	Existed	

Also check harness for short to ground and short to power.

Is the inspection result normal?

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P0102, P0103 MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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YES >> GO TO 7.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF	MAF sensor E		CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F4	3	F8	45	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK MASS AIR FLOW SENSOR

Refer to EC-642, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace mass air flow sensor. Refer to EM-24, "Exploded View".

9. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770451

1. CHECK MASS AIR FLOW SENSOR-I

(P)With CONSULT

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT and select "DATA MONITOR" mode.
- 5. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	MAS A/F SE-B1
	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
WAS AF SE-BT	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
	Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

^{*:} Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

⋈Without CONSULT

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Check the voltage between ECM harness connector and ground.

E	ECM		Condition	Voltage	
Connector	Terminal	Ground	Condition	voltage	
			Ignition switch ON (Engine stopped.)	Approx. 0.4 V	
F8	45 (MAE sonsor	ensor Ground	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V	
10	F8 (MAF sensor signal)		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V	
			Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*	

^{*:} Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

$2. \mathsf{CHECK}$ for the cause of uneven air flow through mass air flow sensor

- Turn ignition switch OFF.
- 2. Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

3. CHECK MASS AIR FLOW SENSOR-II

(P)With CONSULT

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Connect CONSULT and select "DATA MONITOR" mode.
- 4. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
	Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

^{*:} Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

⋈Without CONSULT

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Check the voltage between ECM harness connector and ground.

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E	ECM		Condition	Voltage
Connector	Terminal	Ground Condition		voltage
	45 F8 (MAF sensor Ground		Ignition switch ON (Engine stopped.)	Approx. 0.4 V
F8			Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
10	F8 (MAF sensor signal)	Glound	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
			Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

^{*:} Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4. CHECK MASS AIR FLOW SENSOR-III

(P)With CONSULT

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT and select "DATA MONITOR" mode.
- 5. Select "MAS A/F SE-B1" and check indication.

Monitor item	Condition	MAS A/F SE-B1	
	Ignition switch ON (Engine stopped.)	Approx. 0.4 V	
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V	
MAS AVE SE-BI	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V	
	Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*	

^{*:} Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Check the voltage between ECM harness connector and ground.

E0	ECM		Condition	Voltage
Connector	Terminal	Ground	Condition	vollage
			Ignition switch ON (Engine stopped.)	Approx. 0.4 V
FΩ	F8 (MAF sensor signal)	IAF sensor Ground	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1 V
10			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7 V
			Idle to about 4,000 rpm	0.7 - 1.1 V to Approx. 2.4 V*

^{*:} Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Clean or replace mass air flow sensor. Refer to EM-24, "Exploded View".

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P0111 IAT SENSOR

DTC Logic INFOID:0000000007770452

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0111	IAT SENSOR 1 B1 [Intake air temperature (IAT) sensor circuit range/perfor- mance]	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, FTT sensor, and EOT sensor, CVT fluid temperature sensor) shows that the voltage signal of the IAT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	Harness or connectors (High or low resistance in the IAT sensor circuit) IAT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 3. NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-646, "Component Function Check".

NOTE:

Use the component function check to check the overall function of the IAT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

>> Proceed to EC-646, "Diagnosis Procedure". NO

${f 3.}$ PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- Before performing the following procedure, do not add fuel.
- Before performing the following procedure, check that fuel level is between 1/4 and 4/4.
- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 4.

f 4 . PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for 60 minutes.
- 2. Move the vehicle to a cool place.

NOTE:

Cool the vehicle in an environment of ambient air temperature between -10°C (14°F) and 35°C (95°F).

3. Turn ignition switch OFF and soak the vehicle for 12 hours.

CAUTION:

Never turn ignition switch ON during soaking.

NOTE:

The vehicle must be cooled with the food open.

4. Start engine and let it idle for 5 minutes or more.

CAUTION:

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P0111 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Never turn ignition switch OFF during idling.

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-646, "Diagnosis Procedure".

NO >> INSPECTION END

Component Function Check

INFOID:0000000007770453

1. CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR

- 1. Turn ignition switch OFF.
- Disconnect mass air flow sensor harness connector.
- Check resistance between mass air flow sensor terminals as follows.

Terminals	Condition		Resistance ($k\Omega$)
1 and 2	Temperature [°C (°F)]	25 (77)	1.800 – 2.200

Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to EC-646, "Diagnosis Procedure".

2. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-646, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007770454

1. CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR

Check intake air temperature sensor. Refer to EC-646, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-24, "Exploded View"

2.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770455

1. CHECK INTAKE AIR TEMPERATURE SENSOR

- Turn ignition switch OFF.
- Disconnect mass air flow sensor harness connector.
- Check resistance between mass air flow sensor terminals as per the following.

Terminals	Condition		Resistance (k Ω)
1 and 2	Intake air temperature [°C (°F)]	25 (77)	1.800 - 2.200

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (with intake air temperature sensor).

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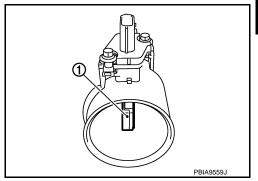
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P0112, P0113 IAT SENSOR

Description INFOID:0000000007770456

The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.

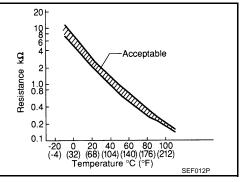
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

^{*:} These data are reference values and are measured between ECM terminal 46 (Intake air temperature sensor) and ground.



DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The sensor circuit is open or shorted.)
P0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Intake air temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> 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-647, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

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INFOID:0000000007770458

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect mass air flow sensor (with intake air temperature sensor) harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between mass air flow sensor harness connector and ground.

MAF	sensor	Ground	Voltage	
Connector Terminal		Giodila	voltage	
F4	5	Ground	Approx. 5 V	

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.check intake air temperature sensor ground circuit for open and short

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

MAF sensor		E(CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F4	4	F8	52	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

f 4.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-646, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace mass air flow sensor (with intake air temperature sensor).

5. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770459

1. CHECK INTAKE AIR TEMPERATURE SENSOR

- Turn ignition switch OFF.
- Disconnect mass air flow sensor harness connector.
- Check resistance between mass air flow sensor terminals as per the following.

Terminals	Condition		Resistance (k Ω)
1 and 2	Intake air temperature [°C (°F)]	25 (77)	1.800 - 2.200

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (with intake air temperature sensor).

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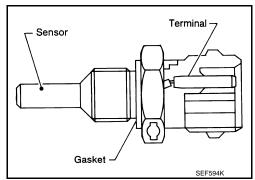
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P0116 ECT SENSOR

Description

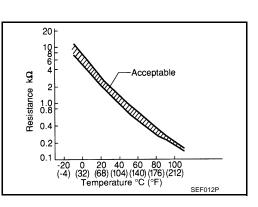
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

^{*:} These data are reference values and are measured between ECM terminal 38 (Engine coolant temperature sensor) and ground.



INFOID:00000000007770461

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause	K
P0116	ECT SEN/CIRC [Engine coolant temperature (ECT) sensor circuit range/per- formance]	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, FTT sensor, and EOT sensor, CVT fluid temperature sensor) shows that the voltage signal of the ECT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	Harness or connectors (High or low resistance in the ECT sensor circuit) ECT sensor	L

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 3. NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-650, "Component Function Check".

NOTE:

Use the component function check to check the overall function of the ECT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

[MR18DE (FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Proceed to EC-651, "Diagnosis Procedure".

3. PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- · Before performing the following procedure, do not add fuel.
- Before performing the following procedure, check that fuel level is between 1/4 and 4/4.
- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 60 minutes.
- 2. Move the vehicle to a cool place.

NOTE:

Cool the vehicle in an environment of ambient air temperature between -10°C (14°F) and 35°C (95°F).

3. Turn ignition switch OFF and soak the vehicle for 12 hours.

CAUTION:

Never turn ignition switch ON during soaking.

NOTE:

The vehicle must be cooled with the food open.

4. Start engine and let it idle for 5 minutes or more.

CAUTION:

Never turn ignition switch OFF during idling.

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-651, "Diagnosis Procedure".

NO >> INSPECTION END

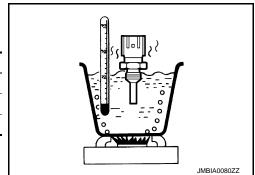
Component Function Check

INFOID:0000000007770462

1. CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect ECT sensor harness connector.
- Remove ECT sensor. Refer to <u>CO-24, "Exploded View"</u>.
- 4. Check resistance between ECT sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance ($k\Omega$)	
1 and 2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63
		50 (122)	0.68 – 1.00
		90 (194)	0.236 - 0.260



Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to EC-651, "Diagnosis Procedure".

2. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-651, "Diagnosis Procedure".

P0116 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Diagnosis Procedure

INFOID:0000000007770463

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1. CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

Check ECT sensor. Refer to EC-651, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace ECT sensor. Refer to CO-24, "Exploded View".

2.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770464

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- Remove engine coolant temperature sensor. Refer to <u>CO-24, "Exploded View"</u>.
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance
		20 (68)	2.37 - 2.63 kΩ
1 and 2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-24, "Exploded View"</u>.

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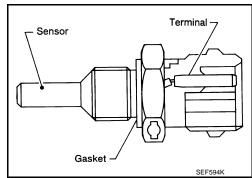
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P0117, P0118 ECT SENSOR

Description

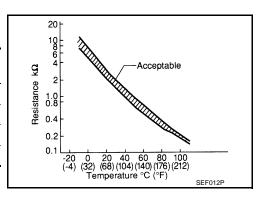
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The 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	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

^{*:} These data are reference values and are measured between ECM terminal 38 (Engine coolant temperature sensor) and ground.



INFOID:0000000007770466

INFOID:0000000007770467

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The sensor circuit is open or shorted.)
P0118	Engine coolant temperature sensor circuit 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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 5 seconds.
- 2. Check DTC.

Is DTC detected?

YES >> Go to EC-652, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.check ground connection

1. Turn ignition switch OFF.

Revision: 2011 November EC-652 2012 CUBE

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT

- Disconnect engine coolant temperature (ECT) sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between ECT sensor harness connector and ground.

ECT sensor		Ground	Voltage
Connector	Terminal	Glound	voltage
F28	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.check ect sensor ground circuit for open and short

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between ECT sensor harness connector and ECM harness connector.

ECT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F28	2	F8	44	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

f 4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-651, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace engine coolant temperature sensor. Refer to CO-24, "Exploded View".

5. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1 CHECK ENGINE COOLANT TEMPERATURE SENSOR

- Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor. Refer to CO-24, "Exploded View".
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance
1 and 2 T	Temperature [°C (°F)]	20 (68)	2.37 - 2.63 kΩ
		50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

EC-653 Revision: 2011 November 2012 CUBE

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INFOID:0000000007770468

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor. Refer to CO-24, "Exploded View".

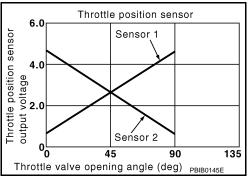
[MR18DE (FOR CALIFORNIA)]

P0122, P0123 TP SENSOR

Description INFOID:0000000007770469

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic INFOID:0000000007770470

DTC DETECTION LOGIC

NOTE:

If DTC P0122 or P0123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-823, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	Harness or connectors (TP sensor 2 circuit is open or shorted.)
P0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	Electric throttle control actuator (TP sensor 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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 let it idle for 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-655, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2 .CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

- Disconnect electric throttle control actuator harness connector.
- Turn ignition switch ON.

Revision: 2011 November

EC-655 2012 CUBE

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INFOID:000000000777047

P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage	
Connector	Terminal	Glound	voitage	
F29	2	Ground	Approx. 5 V	

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.check throttle position sensor 2 ground circuit for open and short

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F29	4	F8	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle	control actuator	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F29	3	F8	34	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

>> Repair open circuit or short to ground or short to power in harness or connectors.

${f 5}.$ CHECK THROTTLE POSITION SENSOR

Refer to EC-657, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-26, "Exploded View".

>> INSPECTION END

.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

P0122, P0123 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Component Inspection

INFOID:0000000007770472

1. CHECK THROTTLE POSITION SENSOR

- Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-500, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- Turn ignition switch ON.
- Set selector lever to D (CVT) or 1st (M/T) position.
- Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal	Ground	001	idition	voltage
	33 (TP sensor			Fully released	More than 0.36V
F8 Ground 34 (TP sensor 2 signal)	Ground	Accelerator	Fully de- pressed	Less than 4.75V	
		Cround	pedal	Fully released	Less than 4.75V
			Fully de- pressed	More than 0.36V	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to EM-26, "Exploded View". EC

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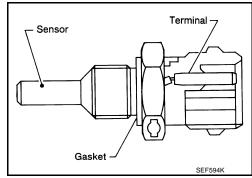
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P0125 ECT SENSOR

Description INFOID:0000000007770473

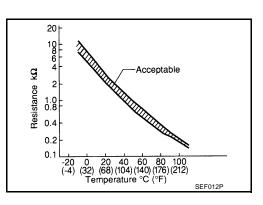
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

^{*:} These data are reference values and are measured between ECM terminal 38 (Engine coolant temperature sensor) and ground.



INFOID:0000000007770474

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P0125 is displayed with P0116, first perform the trouble diagnosis for DTC P0116. Refer to EC-649, "DTC Logic".
- If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to <u>EC-652</u>, "<u>DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0125	Insufficient engine coolant temperature for closed loop fuel control	 Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. Engine coolant temperature is insufficient for closed loop fuel control. 	Harness or connectors (High resistance in the circuit) Engine coolant temperature sensor Thermostat

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. CHECK ENGINE COOLANT TEMPERATURE SENSOR FUNCTION

(P)With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "DATA MONITOR" mode with CONSULT.
- Check that "COOLAN TEMP/S" is above 10°C (50°F).

With GST

P0125 ECT SENSOR [MR18DE (FOR CALIFORNIA)] < DTC/CIRCUIT DIAGNOSIS > Follow the procedure "With CONSULT" above. Α <u>Is it above 10°C (50°F)?</u> YES >> INSPECTION END NO >> GO TO 3. EC 3.PERFORM DTC CONFIRMATION PROCEDURE (P)With CONSULT 1. Start engine and run it for 65 minutes at idle speed. Check 1st tip DTC. 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. D **CAUTION:** Be careful not to overheat engine. Follow the procedure "With CONSULT" above. Е Is 1st trip DTC detected? YES >> EC-659, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure INFOID:0000000007770475 1. CHECK GROUND CONNECTION Turn ignition switch OFF. Check ground connection E38. Refer to GI-44, "Circuit Inspection". Н Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace ground connection. 2.CHECK ENGINE COOLANT TEMPERATURE SENSOR Refer to EC-659, "Component Inspection". Is the inspection result normal? YES >> GO TO 3. NO >> Replace engine coolant temperature sensor. Refer to CO-24, "Exploded View". K 3.CHECK THERMOSTAT OPERATION When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow. Is the inspection result normal? YES >> GO TO 4. >> Repair or replace thermostat. Refer to CO-22, "Removal and Installation". NO M 4. CHECK INTERMITTENT INCIDENT Refer to GI-41. "Intermittent Incident". N

>> INSPECTION END

Component Inspection

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

- Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor. Refer to CO-24, "Exploded View".
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

INFOID:0000000007770476

P0125 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Terminals	Condition		Resistance
		20 (68)	2.37 - 2.63 kΩ
1 and 2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END

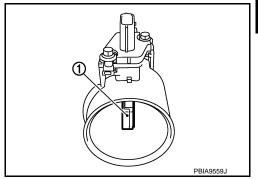
NO >> Replace engine coolant temperature sensor. Refer to CO-24. "Exploded View".

P0127 IAT SENSOR

Description INFOID:0000000007770477

The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.

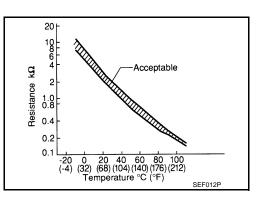
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

^{*:} These data are reference values and are measured between ECM terminal 46 (Intake air temperature sensor) and 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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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

(P)With CONSULT

- Wait until engine coolant temperature is less than 96°C (205°F)
- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT.
- Check the engine coolant temperature.
- 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).

EC-661 Revision: 2011 November 2012 CUBE

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P0127 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

- 2. Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT.
- 4. Start engine.
- 5. Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.

CAUTION:

Always drive vehicle at a safe speed.

6. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-662, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770479

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-662, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-24, "Exploded View".

3.check intermittent incident

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770480

1. CHECK INTAKE AIR TEMPERATURE SENSOR

- Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector.
- 3. Check resistance between mass air flow sensor terminals as per the following.

Terminals	Condition		Resistance (kΩ)
1 and 2	Intake air temperature [°C (°F)]	25 (77)	1.800 - 2.200

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-24, "Exploded View".

P0128 THERMOSTAT FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P0128 THERMOSTAT FUNCTION

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0128 is displayed with DTC P0300, P0301, P0302, P0303 or P0304, first perform the trouble diagnosis for DTC P0300, P0301, P0302, P0303, P0304. Refer to <u>EC-726</u>, "DTC Logic".

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough.

This is due to a leak in the seal or the thermostat stuck open.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	ThermostatLeakage from sealing portion of thermostatEngine coolant temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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 52°C (126°F).
- Before performing the following procedure, do not fill with the fuel.

>> GO TO 2.

2.PRECONDITIONING-II

(P)With CONSULT

- 1. Turn ignition switch ON.
- 2. Check the following conditions:

Ambient temperature	-10°C (14°F) or more
A/C switch	OFF
Blower fan switch	OFF

- 3. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- Check the following conditions:

COOLAN TEMP/S	−10°C − 52°C (14 − 126°F)

Is the condition satisfied?

YES >> GO TO 3.

NO >> 1. Satisfy the condition.

2. GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

- 1. Start engine.
- 2. Drive the vehicle until the following condition is satisfied.

CAUTION:

Always drive vehicle at safe speed.

STEP 1

Drive the vehicle under the conditions instructed below until the difference between "COOLAN TEMP/S" and "FUEL T/TMP SE" becomes at least 24°C (43°F).

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COOLAN TEMP/S	65°C (149°F) or less
FUEL T/TMP SE	Less than the value calculated by subtracting 24°C (43°F) from "COOLAN TEMP/S".*
*: Example	
COOLAN TEMP/S	FUEL T/TMP SE
70°C (158°F)	46°C (115°F) or less
65°C (149°F)	41°C (106°F) or less
60°C (140°F)	36°C (97°F) or less

STEP 2 (MT models)

Drive the vehicle at 60 km/h (37 MPH) or more with the difference between "COOLAN TEMP/S" and "FUEL T/TMP SE" maintained at 24°C (43°F) or more.

STEP 2 (CVT models)

Drive the vehicle at 50 km/h (32 MPH) or more with the difference between "COOLAN TEMP/S" and "FUEL T/TMP SE" maintained at 24°C (43°F) or more.

NOTE:

Keep the accelerator pedal as steady as possible during cruising.

STEP 3 (MT models)

Drive the vehicle at 60 km/h (37 MPH) or more until "COOLAN TEMP/S" increases by 6°C (11°F).

STEP 3 (CVT models)

Drive the vehicle at 50 km/h (32 MPH) or more until "COOLAN TEMP/S" increases by 6°C (11°F).

NOTE:

Keep the accelerator pedal as steady as possible during cruising.

Is the condition satisfied?

YES >> GO TO 4. NO >> GO TO 1.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

(P)With CONSULT

1. Drive the vehicle until the following condition is satisfied.

COOLAN TEMP/S	65°C (149°F) or more (MT models)
	59°C (139°F) or more (CVT models)

CAUTION:

Always drive vehicle at safe speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-664, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770482

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-665, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace engine coolant temperature sensor. Refer to CO-24. "Exploded View".

2. CHECK THERMOSTAT

Refer to CO-23, "Inspection".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace thermostat. Refer to CO-22, "Removal and Installation".

P0128 THERMOSTAT FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Component Inspection

INFOID:0000000007770483

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

- Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor. Refer to CO-24, "Exploded View".
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance
		20 (68)	2.37 - 2.63 kΩ
1 and 2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor. Refer to CO-24, "Exploded View". EC

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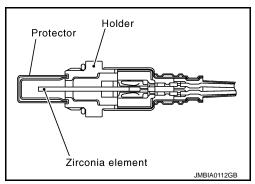
P0130 A/F SENSOR 1

Description

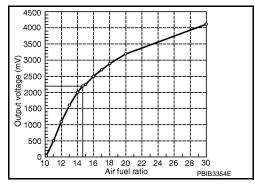
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



DTC Logic

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible Cause
P0130	Air fuel ratio (A/F) sensor 1	A)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in the range other than approx. 2.2 V.	Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
circuit	B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.	• A/F sensor 1	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

(P)With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Let it idle for 2 minutes.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-668, "Diagnosis Procedure".

P0130 A/F SENSOR 1

[MR18DE (FOR CALIFORNIA)] < DTC/CIRCUIT DIAGNOSIS > NO-1 >> With CONSULT: GO TO 3. NO-2 >> Without CONSULT: GO TO 7. Α 3.check air fuel ratio (a/f) sensor 1 function Select "A/F SEN1 (B1)" in "DATA MONITOR" mode with CONSULT. EC Check "A/F SEN1 (B1)" indication. Does the indication fluctuates around 2.2 V? >> GO TO 4. YES NO >> Go to EC-668, "Diagnosis Procedure". f 4 .PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-I Select "A/F SEN1 (B1) P1276" of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT. Touch "START". 2. When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Е **ENG SPEED** 1,000 - 3,200 rpm VHCL SPEED SE More than 64 km/h (40 mph) F B/FUEL SCHDL 1.0 - 8.0 msec D position (CVT) Selector lever 5th position (M/T) If "TESTING" is not displayed after 20 seconds, retry from step 2. **CAUTION:** Always drive vehicle at a safe speed. Н Is "TESTING" displayed on CONSULT screen? YES >> GO TO 5. NO >> Check A/F sensor 1 function again. GO TO 3. 5.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-II Release accelerator pedal fully. NOTE: Never apply brake during releasing the accelerator pedal. Which does "TESTING" change to? COMPLETED>>GO TO 6. OUT OF CONDITION>>Retry DTC CONFIRMATION PROCEDURE. GO TO 4. $\mathsf{6}.\mathsf{PERFORM}$ DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-III Touch "SELF-DIAG RESULT" Which is displayed on CONSULT screen? YES >> INSPECTION END NO >> Go to EC-668, "Diagnosis Procedure". PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B Perform Component Function Check. Refer to EC-667, "Component Function Check". N NOTE: Use component function check to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed. Is the inspection result normal? YES >> INSPECTION END NO >> Go to EC-668, "Diagnosis Procedure". Component Function Check INFOID:0000000007770486

1. PERFORM COMPONENT FUNCTION CHECK **With GST**

- Start engine and warm it up to normal operating temperature.
- Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.

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< DTC/CIRCUIT DIAGNOSIS >

3. Shift the selector lever to the D position (CVT) or 1st position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (31 MPH).

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

Never apply brake during releasing the accelerator pedal.

- 4. Repeat steps 2 to 3 for five times.
- 5. Stop the vehicle and turn ignition switch OFF.
- 6. Wait at least 10 seconds and restart engine.
- 7. Repeat steps 2 to 3 for five times.
- 8. Stop the vehicle.
- 9. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-668, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770487

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect A/F sensor 1 harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F se	ensor 1	Ground	Voltage
Connector	Terminal	Glound	
F51	4	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 E8. F1
- IPDM E/R harness connector E15
- 15 A fuse (No. 61)
- 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.
- Disconnect ECM harness connector.
- 3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F se	ensor 1	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F51	1	FΩ	49	Existed
131	2 F8		53	Existed

P0130 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F se	ensor 1	Ground	Continuity	
Connector	Terminal	Glodila	Continuity	
F51	1	Ground	Not existed	
131	2	Glodila	140t existed	

E	СМ	Ground	Continuity
Connector	Terminal	Glound	
F8	49	Ground Not	Not existed
го	53	Glound	Not existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace.

6.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

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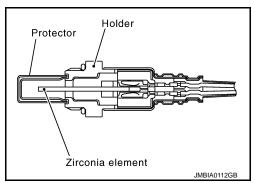
P0131 A/F SENSOR 1

Description

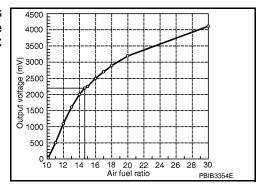
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



DTC Logic

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately low.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0131	Air fuel ratio (A/F) sensor 1 circuit low voltage	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0 V.	Harness or connectors (The A/F sensor 1 circuit is open or shorted.) A/F sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 2.

2. CHECK A/F SENSOR FUNCTION

(I) With CONSULT

- Start engine and warm it up to normal operating temperature.
- Select "A/F SEN1 (B1)" in "DATA MONITOR" mode with CONSULT.
- 3. Check "A/F SEN1 (B1)" indication.

With GST

Follow the procedure "With CONSULT" above.

Is the indication constantly approx. 0 V?

P0131 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

YES >> Go to EC-671, "Diagnosis Procedure". NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT

Turn ignition switch OFF, wait at least 10 seconds and then restart engine.

2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine. CAUTION:

Always drive vehicle at a safe speed.

3. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	Suitable position

NOTE:

- Keep the accelerator pedal as steady as possible during the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 1, return to step
- 4. Check 1st trip DTC.

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-671, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- Disconnect A/F sensor 1 harness connector.
- Turn ignition switch ON.
- Check the voltage between A/F sensor 1 harness connector and ground.

A/F se	ensor 1	Ground	Voltage
Connector	Terminal	Ground	
F51	4	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 E8. F1
- IPDM E/R harness connector E15
- 15 A fuse (No. 61)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

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4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F se	ensor 1	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F51	1	F8	49	Existed
131	2	1-0	53	LAISIEU

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F se	ensor 1	Ground	Continuity	
Connector	Terminal	Glound	Continuity	
F51	1	Ground	Not existed	
F31	2	Giodila	Not existed	

E	CM	Ground	Continuity	
Connector	Terminal	Glound		
F8	49	Ground	Not existed	
ı-o	53	Giouna		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

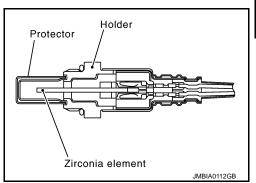
P0132 A/F SENSOR 1

Description INFOID:0000000007770491

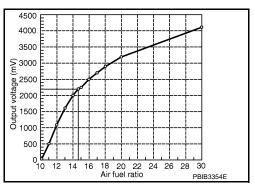
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



DTC Logic INFOID:0000000007770492

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately high.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	Air fuel ratio (A/F) sensor 1 circuit high voltage	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5 V.	Harness or connectors (The A/F sensor 1 circuit is open or shorted.) A/F sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 2.

2.CHECK A/F SENSOR FUNCTION

With CONSULT

- Start engine and warm it up to normal operating temperature.
- Select "A/F SEN1 (B1)" in "DATA MONITOR" mode with CONSULT.
- Check "A/F SEN1 (B1)" indication.

■With GST

Follow the procedure "With CONSULT" above.

Is the indication constantly approx. 5 V?

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P0132 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

YES >> Go to EC-674, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

(I) With CONSULT

- 1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
- Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.CAUTION:

Always drive vehicle at a safe speed.

3. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	Suitable position

NOTE:

- Keep the accelerator pedal as steady as possible during the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 1, return to step 1.
- 4. Check 1st trip DTC.

®With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC is detected?

YES >> Go to EC-674, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770493

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- Disconnect A/F sensor 1 harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between A/F sensor 1 harness connector and ground.

A/F se	ensor 1	Ground	Voltage	
Connector	Terminal	Ground		
F51	4	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

${f 3.}$ DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8. F1
- IPDM E/R harness connector E15
- 15 A fuse (No. 61)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

P0132 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F51	F51 1 F8		49	Existed
131	2	1-0	53	LAISIEU

Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F se	ensor 1	Ground	Continuity	
Connector	Terminal	Ground		
F51	1	Ground	Not existed	
131	2	Giodila	NOI EXISIEU	

E	CM	Ground	Continuity	
Connector	Terminal	Glound		
F8	49	Ground	Not existed	
10	53	Glound	Not existed	

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace.

O.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

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P0137 H02S2

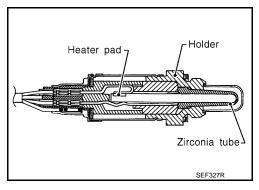
Description INFOID:000000007770494

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.

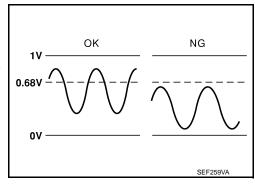


DTC Logic

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DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0137	Heated oxygen sensor 2 circuit low voltage	The maximum 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 Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2. NO >> GO TO 5.

2.PRECONDITIONING

If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

P0137 H02S2

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

1.	Turn igr	nition :	switch O	N and	select	"DATA	MONI	ITOR"	mode with	CONSULT.

- 2. 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.
- 5. Let engine idle for 1 minute.
- 6. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).

If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).

- Open engine hood.
- Select "HO2S2 (B1) P1147" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT.
- Follow the instruction of CONSULT.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

10. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT screen?

>> INSPECTION END OK

NG >> Go to EC-678, "Diagnosis Procedure".

CAN NOT BE DIAGNOSED>>GO TO 4.

f 4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

${f 5}$.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-677, "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-678, "Diagnosis Procedure".

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT

- Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector and ground under the following condition.

E	ECM Ground		Condition	Voltage	
Connector	Terminal	Glound	Condition	voltage	
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure.	

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 and ground under the following condition.

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ECM		Ground	Condition	Voltage	
Connector	Terminal	Glound	Condition	voltage	
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at 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 and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal	Glound	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-678, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to <u>EC-502</u>, "MIXTURE RATIO SELF-LEARNING VALUE <u>CLEAR</u>: Special Repair Requirement".
- Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171. Refer to EC-701, "DTC Logic".

NO >> GO TO 3.

3.check ho2s2 ground circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
- Disconnect ECM harness connector.
- Check the continuity between HO2S2 harness connector and ECM harness connector.

НО	HO2S2		ECM		
Connector	Terminal	Connector	Terminal	Continuity	
F49	1	F8	59	Existed	

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

	HO2S2 ECM				
Connector	Terminal	Connector	Terminal	Continuity	
F49	4	F8	50	Existed	
	continuity betw	een HO2S2 ha	arness connecto	or and ground, o	or ECM harness connector and
ground.					
HO2	S2				
Connector	Terminal	Ground	Continuity		
F49	4	Ground	Not existed		
ECI		Ground	Continuity		
Connector F8	Terminal 50	Ground	Not existed		
-	narness for sho		Not existed		
	result normal?	•			
'ES >> GO	TO 5.	_			
•	•	J	und or short to	power in harness	s or connectors.
CHECK HEA	TED OXYGEN	SENSOR 2			
· · · · · · · · · · · · · · · · · · ·	. "Component				
•	result normal?	-			
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		EN SENSOR 2			
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surface such	as a concrete	TIOOT: USE a n	ew one.		
Before install	ing new sens	or, clean exha	ust system th	reads using Ox	ygen Sensor Thread Cleane
Before install commercial s	ing new sens	or, clean exha	ust system th	reads using Ox	xygen Sensor Thread Cleaner
Before install commercial s	ing new sens	or, clean exha	ust system th	reads using Ox	ygen Sensor Thread Cleane
Before install commercial service tool).	ing new sens	or, clean exha -43897-18 or c	ust system th	reads using Ox	ygen Sensor Thread Cleane
Before install commercial service tool). >> INSI	ing new sens service tool (J	or, clean exha -43897-18 or c	ust system th	reads using Ox	ygen Sensor Thread Cleane
Before install commercial service tool). >> INSI	ing new sens service tool (J PECTION END	or, clean exha I-43897-18 or c O CIDENT	ust system th	reads using Ox	ygen Sensor Thread Cleaner
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Before install commercial service tool). >> INSI CHECK INTE	ing new sens service tool (J PECTION END EMITTENT IN Intermittent Incomp	or, clean exha l-43897-18 or c cident".	ust system th	reads using Ox	ygen Sensor Thread Cleaner
Before install commercial service tool). >> INSI CHECK INTE	ing new sens service tool (J PECTION END EMITTENT IN Intermittent Incomp	or, clean exha l-43897-18 or c cident".	ust system th	reads using Ox	aygen Sensor Thread Cleaner i-seize Lubricant (commercial
Before install (commercial service tool). >> INSI CHECK INTE efer to GI-41. " >> INSI Omponent I	ing new sens service tool (J PECTION END ERMITTENT IN Intermittent Inc PECTION END nspection	or, clean exha l-43897-18 or c cident".	ust system th	reads using Ox	aygen Sensor Thread Cleaner i-seize Lubricant (commercial
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- With CONSULT

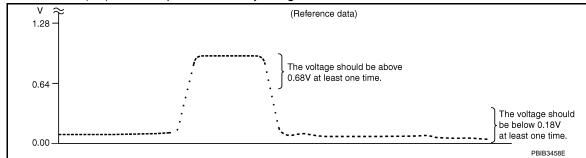
 1. Turn ignition sw Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT. Start engine and warm it up to normal operating temperature.
- 2.
- Turn ignition switch OFF and wait at least 10 seconds.

2. CHECK HEATED OXYGEN SENSOR 2

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< DTC/CIRCUIT DIAGNOSIS >

- 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)" as the monitor item with CONSULT.
- 7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to ± 25%.



"HO2S2 (B1)" should be above 0.68 V at least once when the "FUEL INJECTION" is + 25%. "HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is – 25%.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal	Glound	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

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 and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal	Glound	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

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 and ground under the following condition.

P0137 H02S2

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

EC	ECM		Condition	Voltage
Connector	Terminal	Ground	Condition	vollage
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

Revision: 2011 November EC-681 2012 CUBE

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P0138 H02S2

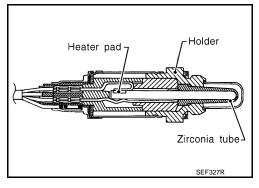
Description INFOID:0000000007770499

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.



DTC Logic

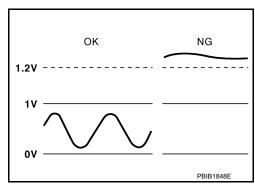
INFOID:0000000007770500

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/ F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time.

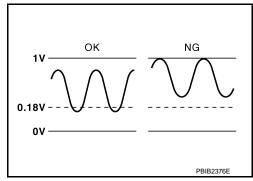
MALFUNCTION A

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



MALFUNCTION B

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
	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	Heated oxygen sensor 2 circuit high voltage	В)	The minimum voltage from the sensor is not reached to the specified voltage.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 Fuel pressure Fuel injector

< DTC/CIRCUIT DIAGNOSIS >

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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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.

- 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 2 minutes.
- 5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-684, "Diagnosis Procedure".

NO-1 >> With CONSULT: GO TO 3.

NO-2 >> Without CONSULT: GO TO 5.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

NOTE:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Make sure 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.
- 8. Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT.
- Follow the instruction of CONSULT.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

10. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT

OK >> INSPECTION END

NG >> Go to EC-684, "Diagnosis Procedure".

CAN NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B AGAIN

- Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

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5.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to EC-684, "Diagnosis Procedure".

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-684, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007770501

1. PERFORM COMPONENT FUNCTION CHECK-I

INFOID:0000000007770502

< DTC/CIRCUIT DIAGNOSIS >

⋈Without CONSULT

- 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. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Ground Condition	Voltage
Connector	Terminal	Glound	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.18 V at 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 and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal	Glound	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.18 V at 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 and ground under the following condition.

ECM		Ground Condition		Voltage
Connector	Terminal	Glound	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-684, "Diagnosis Procedure".

Diagnosis Procedure

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-682, "DTC Logic".

Which malfunction is detected?

A >> GO TO 2.

B >> GO TO 9.

2.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3.CHECK HO2S2 CONNECTOR FOR WATER

< DTC/CIRCUIT DIAGNOSIS >

- Disconnect heated oxygen sensor 2 harness connector.
- Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace harness or connectors.

f 4.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- Disconnect ECM harness connector.
- 2. Check the continuity between HO2S2 harness connector and ECM harness connector.

НО	HO2S2		ECM	
Connector	Terminal	Connector	Terminal	Continuity
F49	1	F8	59	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between HO2S2 harness connector and ECM harness connector.

НО	HO2S2		ECM	
Connector	Terminal	Connector	Terminal	Continuity
F49	4	F8	50	Existed

Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

НО	HO2S2		Continuity
Connector	Terminal	Ground	Continuity
F49	4	Ground	Not existed

E	CM	Ground	Continuity	
Connector	Terminal	Glodila	Continuity	
F8	50	Ground	Not existed	

Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

$oldsymbol{6}$.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-687, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

 Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

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< DTC/CIRCUIT DIAGNOSIS >

 Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

8.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

9. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace ground connection.

10.clear the mixture ratio self-learning value

- Clear the mixture ratio self-learning value. Refer to <u>EC-502</u>, "MIXTURE RATIO SELF-LEARNING VALUE <u>CLEAR</u>: Special Repair Requirement".
- 2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0172. Refer to <u>EC-705</u>, "DTC Logic".

NO >> GO TO 11.

11. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 harness connector.
- Disconnect ECM harness connector.
- 4. Check the continuity between HO2S2 harness connector and ECM harness connector.

НО	HO2S2		ECM	
Connector	Terminal	Connector	Terminal	Continuity
F49	1	F8	59	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

12.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

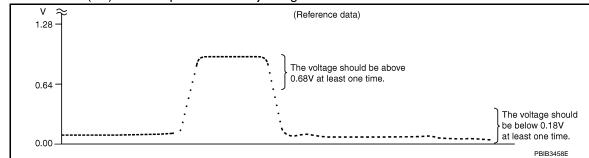
НО	HO2S2		ECM	
Connector	Terminal	Connector	Terminal	Continuity
F49	4	F8	50	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

НО	2S2	Ground	Continuity	
Connector	Terminal	Glound	Continuity	
F49	4	Ground	Not existed	

F(CM				Α
Connector	Terminal	Ground	Continuity		
F8	50	Ground	Not existed		EC
3. Also check	harness for sh	ort to power.			LU
Is the inspectio	n result normal	?			
) TO 13.	t or short to are	und or short to	power in harness or connectors.	С
13.CHECK H			und of short to	power in namess of connectors.	
Refer to EC-68					D
Is the inspectio	•				
YES >> GC) TO 15.	<u>-</u>			Е
	TO 14.				
14.REPLACE	HEATED OXY	GEN SENSOR	. 2		
Replace heated	d oxygen senso	r 2. Refer to EX	(-5, "Exploded \	<u>'iew"</u> .	F
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surface such	n as a concrete	e floor; use a n	ew one.	- ,	G
				reads using Oxygen Sensor Thread Cleaner damproved Anti-seize Lubricant (commercial	
service tool)		7 40007 10 01 1	7-10007 12/j an	a approved Anti Seize Eubriodin (commercial	
					Н
	SPECTION ENI				
15.CHECK IN					
Refer to GI-41,	"Intermittent In	<u>cident"</u> .			
~~ ING	SPECTION ENI	1			J
		,			
Component	inspection			INFOID:000000007770503	17
1.INSPECTIO	N START				K
Do you have C	ONSULT?			-	
Do you have C	ONSULT?				L
	TO 2.				
_) TO 3.	I OFNOOD O			M
2.CHECK HEA		I SENSOR 2			1 V I
With CONSUTurn ignition		nd select "DATA	MONITOR" mc	de with CONSULT.	
			erating tempera		Ν
	n switch OFF a			nd 4,000 rpm for at least 1 minute under no load.	
•	idle for 1 minut	•	G.WGGII 3,300 a	110 4,000 Ipin 101 at least 1 Illinute under 110 10au.	0
6. Select "FU	EL INJECTION		EST" mode, ar	d select "HO2S2 (B1)" as the monitor item with	
CONSULT.					
					Р

7. Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to \pm 25%.



"HO2S2 (B1)" should be above 0.68 V at least once when the "FUEL INJECTION" is + 25%. "HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is – 25%.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-I

⋈Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector and ground under the following condition.

E	CM	Ground	Condition	Voltage
Connector	Terminal	Glound	Condition	
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

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 and ground under the following condition.

E	СМ	Ground	Condition	Voltage
Connector	Terminal	Glound	Condition	
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

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 and ground under the following condition.

P0138 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

E	CM	Ground	Condition	Voltage
Connector	Terminal	Glound	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

Revision: 2011 November EC-689 2012 CUBE

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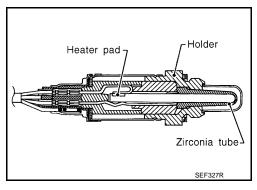
Description

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.

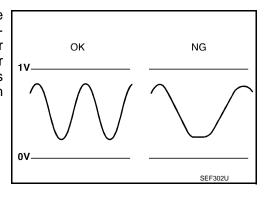
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



DTC Logic

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst 1 causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during various driving conditions such as fuel cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139	Heated oxygen sensor 2 (bank 1) circuit slow response	The switching time between rich and lean of a heated oxygen sensor 2 signal delays more than the specified time computed by ECM.	Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 Fuel system EVAP system Intake air system

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2. NO >> GO TO 7.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

>> GO TO 3.

[MR18DE (FOR CALIFORNIA)] < DTC/CIRCUIT DIAGNOSIS > 3.perform dtc confirmation procedure Α (P)With CONSULT Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT. Start engine and warm it up to the normal operating temperature. EC Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. 7. Let engine idle for 1 minute. 8. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F). 9. Drive the vehicle in a proper at 60 km/h (38MPH) and maintain the speed. D **CAUTION:** Always drive vehicle at a safe speed. 10. Release the accelerator pedal fully at least 5 seconds. Е **CAUTION:** Enable engine brake. · Always drive carefully. Never apply brake when releasing the accelerator pedal. 11. Repeat step 9 and 10 at least 8 times. 12. Check the following item of "DATA MONITOR". Data monitor item Status HO2 S2 DIAG1 (B1) **CMPLT** HO2 S2 DIAG2 (B1) Is "CMPLT" displayed on CONSULT screen? YES >> GO TO 6. NO-1: "CMPLT" is not displayed on DIAG 1>>Perform DTC confirmation procedure again. NO-2: "CMPLT" is not displayed on DIAG 2>>GO TO 4. 4.PERFORM DTC WORK SUPPORT Open engine hood. Select "HO2S2 (B1) P0139" in "DTC WORK SUPPORT" mode with CONSULT. Start engine and follow the instruction of CONSULT display. K NOTE: It will take at most 10 minutes until "COMPLETED" is displayed. Is "COMPLETED" displayed on CONSULT screen? YES >> GO TO 6. NO >> GO TO 5. ${f 5}$.PERFORM DTC CONFIRMATION PROCEDURE AGAIN Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle). Perform DTC confirmation procedure again. N >> GO TO 3. $\mathsf{6}.$ PERFORM SELF-DIAGNOSIS (P)With CONSULT Perform ECM self-diagnosis. Is DTC "P0139" detected? Р YES >> Proceed to EC-692, "Diagnosis Procedure".

NO >> INSPECTION END

7.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-692, "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.

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< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-692, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007770506

1.PERFORM COMPONENT FUNCTION CHECK-I

⋈Without CONSULT

- 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. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal	Glound	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.8 V at 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 and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal	Gloulia	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.8 V at 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 and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal	Glound	Condition	vollage
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.8 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-692, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007770507

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

< DTC/CIRCUIT DIAGNOSIS >

2.clear the mixture ratio self-learning value

Clear the mixture ratio self-learning value. Refer to EC-502, "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 or P0172 detected? Is it difficult to start engine?

>> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-701, "DTC Logic" or EC-705, "DTC Logic".

NO >> GO TO 3.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect heated oxygen sensor 2 harness connector. 2.
- 3. Disconnect ECM harness connector.
- Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F49	1	F8	59	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

f 4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F49	4	F8	50	Existed

Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

НО	2S2	Ground	Continuity	
Connector	Connector Terminal		Continuity	
F49	4	Ground	Not existed	

E	СМ	Ground	Continuity	
Connector	Terminal	Glound		
F8	50	Ground	Not existed	

Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

${f 5.}$ CHECK HEATED OXYGEN SENSOR 2

Refer to EC-694, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

O.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5. "Exploded View".

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CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770508

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

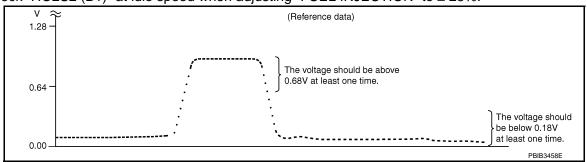
YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

(A) With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- 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)" as the monitor item with CONSULT.
- Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to ± 25%.



"HO2S2 (B1)" should be above 0.68 V at least once when the "FUEL INJECTION" is + 25%. "HO2S2 (B1)" should be below 0.18 V at least once when the "FUEL INJECTION" is – 25%.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

®Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground Condition	Voltage	
Connector	Terminal	Ground	Condition	Voltage
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

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 and ground under the following condition.

E	ECM		Condition	Voltage
Connector	Terminal	Ground	Condition	voltage
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

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 and ground under the following condition.

E	ECM		Condition	Voltage
Connector	Terminal	Ground	Condition	vollage
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

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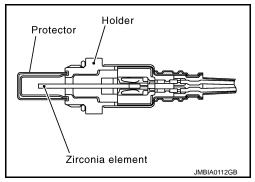
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Description INFOID:000000007770508

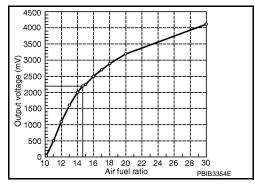
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



DTC Logic

DTC DETECTION LOGIC

To judge malfunctions, this diagnosis measures response time of the A/F signal computed by ECM from the A/F sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the A/F sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P014C	Air fuel ratio (A/F) sensor 1		
P014D	(bank 1) circuit slow re- sponse	The response time of a A/F sensor 1 signal de- lays more than the specified time computed by	 Harness or connectors (The A/F sensor 1 circuit is open or
P015A	Air fuel ratio (A/F) sensor 1	ECM.	shorted.) • A/F sensor 1
P015B	(bank 1) circuit delayed response		- 7/1 3611301 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

Do you have CONSULT?

YES >> GO TO 2. NO >> GO TO 6.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

[MR18DF (FOR CALIFORNIA)]

< DIC/CIRCUIT DIAGN	10312 >	[IIIK TODE (FOR OALII OKKIA)]	
	rm it up to normal operati OFF and wait at least 10 ON.		Α
4. Turn ignition switch 05. Start engine and kee	OFF and wait at least 10 per the engine speed betw	seconds. een 3,500 and 4,000 rpm for at least 1minute under no load.	EC
8. Fully release acceler9. Check the items statNOTE:	speed up to about 3,600 rator pedal and then let e us of "DATA MONITOR"		С
ii PRSNI Change	d to ABSNI, refer to	EC-609, "Component Function Check".	D
Data monitor item	Status	-	
A/F SEN1 DIAG3 (B1)	PRSNT	-	Е
Is "PRSNT" displayed on	CONSULT screen?	•	
YES >> GO TO 4.			F
NO >> GO TO 3.			Г
3.PERFORM DTC CON	IFIRMATION PROCEDU	RE-2	
With CONSULT			G
Perform DTC confirmation Is "PRSNT" displayed on			
YES >> GO TO 4.	CONSOLT SCIECTS		Н
	609, "Component Function	on Check".	
4.PERFORM DTC CON	IFIRMATION PROCEDU	RE-2	
With CONSULT			I
1. Wait for about 20 sec		an fallance	
2. Check the items stat NOTE:	us of "DATA MONITOR"	as follows.	J
	d to "INCMP", refer to <u>F</u>	EC-609, "Component Function Check".	
Data monitor item	Status	•	K
A/F SEN1 DIAG1 (B1)	Oldido		
A/F SEN1 DIAG2 (B1)	CMPLT		
Is "CMPLT" displayed on	CONSULT screen?	•	L
YES >> GO TO 5.	CONCOLL GOLGOII.		
_NO >> Refer to <u>EC-</u>	609, "Component Function	on Check".	M
5. PERFORM SELF-DIA	GNOSIS		
®With CONSULT Check the "SELF-DIAG F	RESULT".		Ν
Is any DTC detected?			
YES >> Proceed to E NO >> INSPECTION	<u>EC-610, "Diagnosis Proce</u> N END	<u>edure"</u> .	0
6. CHECK AIR-FUEL RA	ATIO SELF-LEARNING V	/ALUE	
With GST			Р
 Start engine and war Select Service \$01 w 	rm it up to normal operativith GST.	ng temperature.	

3. Calculate the total value of "Short term fuel trim" and "Long term fuel trim" indications.

Is the total percentage within ±15%?

YES >> GO TO 8.

>> GO TO 7. NO

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

7.DETECT MALFUNCTIONING PART

Check the following.

- · Intake air leaks
- · Exhaust gas leaks
- · Incorrect fuel pressure
- Lack of fuel
- Fuel injector
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor

>> Repair or replace malfunctioning part.

8. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds.
- 7. Fully release accelerator pedal and then let engine idle for about 1 minute.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-610, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770511

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

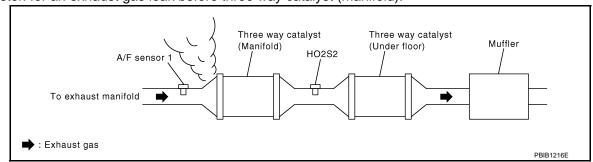
2.RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1. Refer to EM-30, "Exploded View".

>> GO TO 3.

3. CHECK EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.

NO >> GO TO 4.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 5.

5.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to EC-502, "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 or P172 detected? Is it difficult to start engine?

>> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-701, "DTC Logic" or EC-705, "DTC Logic".

NO >> GO TO 6.

6.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

Disconnect A/F sensor 1 harness connector.

2. Turn ignition switch ON.

Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1 Ground Voltage Connector Terminal F51 Ground Battery voltage

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 7.

.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- IPDM E/R harness connector E15
- 15 A fuse (No. 61)
- 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.
- Disconnect ECM harness connector. 2.
- Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F se	ensor 1	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F51	1	F8	49	Existed
F31	2	10	53	LAISIEU

Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity	
Connector	Terminal	Glound	Continuity	
F51	1	Ground	Not existed	
	2	Gloulia	Not existed	

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[MR18DE (FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS >

ECM		Ground	Continuity	
Connector	Terminal	Glound	Continuity	
F8	49	Ground	Not existed	
ГО	53	Giodila	Not existed	

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-628, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 13.

10.CHECK MASS AIR FLOW SENSOR

Refer to EC-637. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace mass air flow sensor. Refer to EM-24, "Exploded View".

11. CHECK PCV VALVE

Refer to EC-940, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace PCV valve. Refer to EM-42, "Exploded View".

12. CHECK INTERMITTENT INCIDENT

Perform GI-41. "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace.

13. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171	Fuel injection system too lean	 Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.) 	 Intake air leaks A/F sensor 1 Fuel injector Exhaust gas leaks Incorrect fuel pressure Lack of fuel Mass air flow sensor Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Clear the mixture ratio self-learning value. Refer to <u>EC-502</u>, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- 2. Start engine.

Is it difficult to start engine?

YES >> GO TO 3.

NO >> GO TO 4.

3. RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.

Crank engine while depressing accelerator pedal.

NOTE:

When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Go to EC-702, "Diagnosis Procedure".

NO >> Check exhaust and intake air leak visually.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. Start engine and let it idle for at least 5 minutes.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-702, "Diagnosis Procedure".

NO >> GO TO 5.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

5. PERFORM DTC CONFIRMATION PROCEDURE-III

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start engine.
- 3. Maintain the following conditions for at least 10 consecutive minutes. Hold the accelerator pedal as steady as possible.

VHCL SPEED SE 50 - 120 km/h (31 - 75 MPH)

CAUTION:

Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-702, "Diagnosis Procedure".

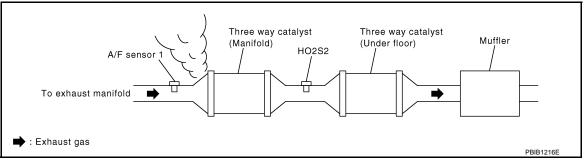
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770513

1. CHECK EXHAUST GAS LEAK

- Start engine and run it at idle.
- Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.

NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAK

- 1. Listen for an intake air leak after the mass air flow sensor.
- 2. Check PCV hose connection.

Intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 3.

${f 3.}$ CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect corresponding A/F sensor 1 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F se	ensor 1	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F51	1	F8	49	Existed
131	2	1-0	53	LAISIEU

Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

A/F se	ensor 1				Α
Connector	Terminal	Ground	Continuity		
F51	1 2	Ground	Not existed		EC
				_	
E	СМ	0	O continuit		С
Connector	Terminal	- Ground	Continuity		
F8	49 53	Ground	Not existed		D
6. Also check	harness for sh	ort to power.			
Is the inspection	<u>n result normal</u>	?			Е
	TO 4.	t or obort to are	und or obort to	cower in harnons or connectors	
4.CHECK FUE		-	ourid or Short to	power in harness or connectors.	F
-			. "		
1. Check fuel Is the inspection	•	er to <u>EC-985, "Ir</u> 2	ispection".		
•	<u>11 165011 1101111ai</u>) TO 6.	<u>f.</u>			G
	TO 5.				
5. DETECT M	ALFUNCTIONI	NG PART			-
Check fuel hos	es and fuel tube	es for clogging.			
Is the inspectio		_			
		and fuel pump	assembly". Ref	er to <u>FL-5, "Exploded View"</u> .	- 1
6.CHECK MA	pair or replace	CENCOD			
		SENSOR			J
With CONSU	JLT emoved parts.				
2. Check "MA	SS AIR FLOW		NTOR" mode w		K
•	cation, refer to <u>l</u>	<u>EC-989, "Mass</u>	Air Flow Senso		ĺ
With GSTInstall all re	emoved parts.				
2. Check mas	ss air flow sense		vice \$01 with G		L
•	_		Air Flow Senso	" -	
Is the measure YES >> GO) TO 7.	iin the specifica	<u>uon?</u>		N
NO >> Ch	eck connectors	for rusted term EC-635, "DTC		onnections in the mass air flow sensor circuit or	
7.CHECK FUI					N
(P)With CONSI	JLT				
1. Start engin	e.	OE" :- "AOT" '	- TEOT" '	: U. CONOLII T	C
			ETEST" mode v omentary engin		
	34017 011 04	_F . 2 3 4 0 0 0 4 111	inchian, ongin	p - 3 & 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5	_
⊗ Without CO					F
1. Let engine	ıdle.				

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Listen to each fuel injector operating sound.

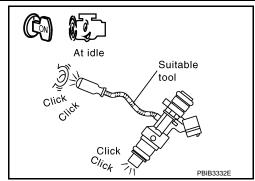
Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 8.

NO

>> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-922, "Component Function Check".



8. CHECK FUEL INJECTOR

- Turn ignition switch OFF.
- Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- Disconnect all fuel injector harness connectors.
- Remove fuel tube assembly. Refer to EM-37, "Removal and Installation". Keep fuel hose and all fuel injectors connected to fuel tube.
- Disconnect all ignition coil harness connectors.
- 6. Prepare pans or saucers under each fuel injector.
- 7. Crank engine for about 3 seconds.

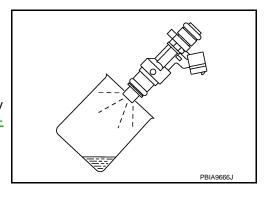
Fuel should be sprayed evenly for each fuel injector.

Is the inspection result normal?

YES >> GO TO 9.

NO

>> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones. Refer to EM-37, "Exploded View".



9. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic INFOID:0000000007770514

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor Input signal to ECM		ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172	Fuel injection system too rich	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 leaks Incorrect fuel pressure Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

- Clear the mixture ratio self-learning value. Refer to EC-502, "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.

When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Go to EC-706, "Diagnosis Procedure".

NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

- Start engine and let it idle for at least 5 minutes.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-706, "Diagnosis Procedure".

NO >> GO TO 5.

${f 5.}$ PERFORM DTC CONFIRMATION PROCEDURE-III

- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Maintain the following conditions for at least 10 consecutive minutes. Hold the accelerator pedal as steady as possible.

VHCL SPEED SE 50 - 120 km/h (31 - 75 MPH)

CAUTION:

Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-706, "Diagnosis Procedure".

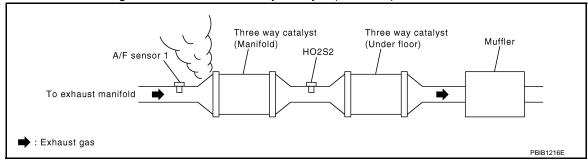
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770515

1. CHECK EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.

NO >> GO TO 2.

2. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 3.

3.check a/f sensor 1 input signal circuit

- 1. Turn ignition switch OFF.
- 2. Disconnect corresponding A/F sensor 1 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F se	ensor 1	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F51	1	F8	49	Existed
L91	2	10	53	Laisted

 Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity	
Connector	Terminal	Glound	Continuity	
F51	1	Ground	Not existed	
	2	Glound	Not existed	

DTC/CIRCUIT DIAGNOSIS >

IMR18DE (FOR CALIFORNIA)1

< DTC/CIRCU	IT DIAGNOSIS	S >		[MR18DE (FOR CALIFORNIA)]	
	CM		T		А
Connector	Terminal	Ground	Continuity		
Connector	49				
F8	53	Ground	Not existed		EC
6. Also check	harness for sh	ort to power.		'	
Is the inspectio					С
	TO 4.				
4	•	_	ound or short to p	ower in harness or connectors.	D
4.CHECK FUE					D
	pressure. Refe	·	nspection".		
Is the inspectio		?			Е
) TO 6.) TO 5.				
5. DETECT M		NG PART			F
Check fuel hos					
Is the inspectio					
		and fuel pump	assembly". Refe	r to <u>FL-5, "Exploded View"</u> .	G
_	pair or replace				
6.CHECK MA	SS AIR FLOW	SENSOR			Н
With CONSU					
	emoved parts. SS AIR FLOW	' in "DATA MOI	NITOR" mode wit	n CONSULT	
For specific			Air Flow Sensor		- 1
With GST	and a conta				
	emoved parts. ss air flow senso	or signal in "Se	rvice \$01" with G	ST.	J
			Air Flow Sensor		
Is the measure		in the specifica	<u>ition?</u>		K
) TO 7. eck connectors	for rusted term	ninals or loose or	nnections in the mass air flow sensor circuit or	1 \
	ounds Refer to			Theodorio in the mass an new sensor chedit of	

grounds. Refer to EC-635, "DTC Logic".

7.CHECK FUNCTION OF FUEL INJECTOR

(I) With CONSULT

- Start engine.
- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- Make sure that each circuit produces a momentary engine speed drop.

⊗Without CONSULT

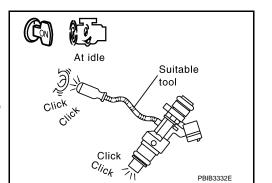
- 1. Let engine idle.
- 2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 8.

>> Perform trouble diagnosis for FUEL INJECTOR, refer to NO EC-922, "Component Function Check".



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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

8.CHECK FUEL INJECTOR

- Remove fuel injector assembly. Refer to <u>EM-37</u>. "<u>Removal and Installation</u>". Keep fuel hose and all fuel injectors connected to fuel tube.
- 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- 4. Disconnect all ignition coil harness connectors.
- 5. Prepare pans or saucers under each fuel injectors.
- Crank engine for about 3 seconds.
 Make sure fuel does not drip from fuel injector.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one. Refer to EM-37, "Exploded View".

9. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

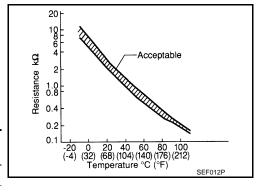
P0181 FTT SENSOR

Description

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Fluid temperature [°C (°F)]	Voltage* [V]	Resistance [kΩ]
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90



^{*:} These data are reference values and are measured between ECM terminal 43 (Fuel tank temperature sensor) and ground.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (Trouble diagnosis content)		DTC detecting condition	Possible cause
	A)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from ECT sensor and intake air temperature sensor.	Harness or connectors (The FTT sensor circuit is open or shorted) FTT sensor Combination meter	
P0181	FTT SENSOR [Fuel tank temperature (FTT) sensor circuit range/performance]	B)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, EOT sensor, and FTT sensor, CVT fluid temperature sensor) shows that the voltage signal of the FTT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	Harness or connectors (High or low resistance in the FTT sensor circuit) FTT sensor

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 7.

NO >> GO TO 2.

2.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-I

- 1. Turn ignition switch ON and wait at least 10 seconds.
- 2. Check 1st trip DTC.

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P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Is 1st trip DTC detected?

YES >> Proceed to EC-711, "Diagnosis Procedure".

NO >> GO TO 4.

4. CHECK ENGINE COOLANT TEMPERATURE

(P)With CONSULT

- 1. Select "COOLAN TEMP/S" in "DATA MONITOR" with CONSULT.
- Check "COOLAN TEMP/S" value.

@With GST

Follow the procedure "With CONSULT" above.

"COOLAN TEMP/S" less than 60°C (140°F)?

YES >> INSPECTION END

NO >> GO TO 5.

5.perform dtc confirmation procedure for malfunction a-ii

(II) With CONSULT

- 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" above.

Is 1st trip DTC detected?

YES >> Proceed to EC-711, "Diagnosis Procedure".

NO >> GO TO 6.

6.PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)

Perform component function check. Refer to EC-711, "Component Function Check".

NOTE:

Use the component function check to check the overall function of the FTT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to <u>EC-711</u>, "<u>Diagnosis Procedure</u>".

7.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- Before performing the following procedure, do not add fuel.
- Before performing the following procedure, check that fuel level is between 1/4 and 4/4.
- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 8.

8. PERFORM DTC CONFIRMATION PROCEDURE B

- 1. Start engine and let it idle for 60 minutes.
- 2. Move the vehicle to a cool place.

NOTE:

Cool the vehicle in an environment of ambient air temperature between -10°C (14°F) and 35°C (95°F).

3. Turn ignition switch OFF and soak the vehicle for 12 hours.

CAUTION:

Never turn ignition switch ON during soaking.

NOTE:

The vehicle must be cooled with the food open.

4. Start engine and let it idle for 5 minutes or more.

CAUTION:

Never turn ignition switch OFF during idling.

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-711, "Diagnosis Procedure".

NO >> INSPECTION END

Component Function Check

1.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR

- Turn ignition switch OFF.
- 2. Disconnect fuel level sensor unit and fuel pump harness connector.
- Remove fuel level sensor unit. Refer to <u>FL-5</u>, "<u>Removal and Installation</u>".
- 4. Check resistance between fuel level sensor unit and fuel pump terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (k Ω)	
4 and 5	Temperature [°C (°F)]	20 (68)	2.3 – 2.7
	remperature [*C (*F)]	50 (122)	0.79 – 0.90

Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to <u>EC-711</u>, "<u>Diagnosis Procedure</u>".

2.check intermittent incident

Check intermittent incident. Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-711, "Diagnosis Procedure".

Diagnosis Procedure

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-709, "DTC Logic".

Which malfunction is detected?

A >> GO TO 2.

B >> GO TO 7.

2. CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to MWI-30, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Proceed to EC-711, "Component Function Check".

${f 3.}$ CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- Disconnect fuel level sensor unit and fuel pump harness connector.
- Turn ignition switch ON.
- 4. Check the voltage between fuel level sensor unit and fuel pump harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage (V)	
Connector Terminal		Giodila		
B40	B40 4		Approx. 5	

Is the inspection result normal?

YES >> GO TO 5.

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< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM and fuel level sensor unit and fuel pump
- · Loose or poor connection for each connector and harness
 - >> Repair open circuit, short to ground or short to power in harness or connector.

${f 5.}$ CHECK FTT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect combination meter harness connector.
- Check the continuity between fuel level sensor unit and fuel pump harness connector and combination meter harness connector.

	sor unit and fuel imp	Combination meter Connector Terminal		Continuity	
Connector	Terminal				
B40	5	M34	24	Existed	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between fuel level sensor unit and fuel pump and combination meter
- Loose or poor connection for each connector and harness
 - >> Repair open circuit, short to ground or short to power in harness or connector.

7. CHECK FTT SENSOR

Check FTT sensor. Refer to EC-712, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace fuel level sensor unit and fuel pump. Refer to FL-5, "Exploded View".

8.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770520

1. CHECK FUEL TANK TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- Remove fuel level sensor unit.
- 4. Check resistance between "fuel level sensor unit and fuel pump" terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance
4 and 5	Tomporature [°C (°E)]	20 (68)	2.3 - 2.7 kΩ
	Temperature [°C (°F)]	50 (122)	0.79 - 0.90 kΩ

Is the inspection result normal?

P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

YES >> INSPECTION END

>> Replace "fuel level sensor unit and fuel pump". Refer to FL-5, "Exploded View". NO

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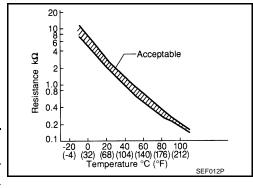
P0182, P0183 FTT SENSOR

Description INFOID:000000007770521

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Fluid temperature [°C (°F)]	Voltage* [V]	Resistance $[k\Omega]$
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90



^{*:} These data are reference values and are measured between ECM terminal 43 (Fuel tank temperature sensor) and 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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> 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-714, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770523

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Turn ignition switch ON.
- Check the voltage between "fuel level sensor unit and fuel pump" harness connector and ground.

P0182, P0183 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Fuel level sensor unit and fuel p	— Ground	Voltage		
Connector Termina	al Communication	,		
B40 4	Ground	Approx. 5 V		
s the inspection result nor YES >> GO TO 4. NO >> GO TO 3. DETECT MALFUNCTION				
Check the following. Harness connectors B4, Harness connectors M77 Harness connectors E8, Harness for open or sho	M79 7, E105 F1	nd "fuel level sen	sor unit and fue	el pump"
>> Repair open o	sircuit or short to gro			
 Turn ignition switch O Disconnect combination Check the continuity beconnector. 	on meter harness c		uel pump" harr	ess connector and ECM harness
Fuel level sensor unit and fuel p	oump Combina	ation meter	On other tr	
Connector Termina	l Connector	Terminal	Continuity	
B40 5	M34	24	Existed	•
s the inspection result nor YES >> GO TO 6. NO >> GO TO 5. DETECT MALFUNCTION Check the following. Harness connectors M79 Harness for open or sho	ONING PART 9, B4	el sensor unit ar	nd fuel pump" a	nd combination meter
	circuit or short to gro		power in harne	ss or connector.
O.CHECK FUEL TANK T		NSOR		
Refer to <u>EC-715, "Compor</u>	•			
Is the inspection result nor YES >> GO TO 7.	<u>mal?</u>			
	level sensor unit ar	nd fuel pump". R	efer to <u>FL-5, "E</u>	xploded View".
7.CHECK INTERMITTEN	IT INCIDENT			
Refer to <u>GI-41, "Intermitte</u>	nt Incident".			
>> INSPECTION	END			
>> INSPECTION				
Component Inspection				INFOID:000000007770524
	on	NSOR		INFOID:000000007770524

2. Disconnect "fuel level sensor unit and fuel pump" harness connector.

Remove fuel level sensor unit.

P0182, P0183 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

4. Check resistance between "fuel level sensor unit and fuel pump" terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance
4 and 5	Temperature [°C (°F)]	20 (68)	2.3 - 2.7 kΩ
	Temperature [O (1)]	50 (122)	0.79 - 0.90 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump". Refer to FL-5, "Exploded View".

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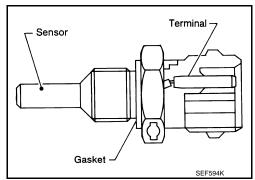
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P0196 EOT SENSOR

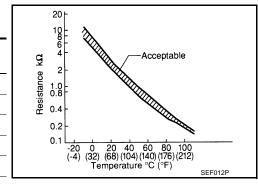
Component Description

The engine oil temperature sensor is used to detect the engine oil temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine oil temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant tempera- ture [°C (°F)]	Voltage* (V)	Resistance (k Ω)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260
110 (230)	0.6	0.143 - 0.153
150 (302)	0.3	0.050 - 0.065



^{*:} This data is reference values and is measured between ECM terminal 27 (Engine oil temperature sensor) and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0196 is displayed with DTC P0197 or P0198, first perform the trouble diagnosis for DTC P0197 or P0198. Refer to <u>EC-721</u>, "DTC Logic".

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition		Possible cause	-
		A)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from EOT sensor and intake air temperature sensor.	Harness or connectors (The EOT sensor circuit is open or shorted) EOT sensor	1
P0196	EOT SENSOR [Engine oil temperature (EOT) sensor circuit range/perfor- mance]	B)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, FTT sensor, and EOT sensor, CVT fluid temperature sensor) shows that the signal voltage of the EOT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	Harness or connectors (High or low resistance in the EOT sensor circuit) EOT sensor	- (

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

< DTC/CIRCUIT DIAGNOSIS >

Is it necessary to erase permanent DTC?

YES >> GO TO 6.

NO >> GO TO 2.

2.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition 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 11 V or more at idle.

>> GO TO 3.

${f 3.}$ PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-I

- 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 5 minutes and 10 seconds.
- 6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-720, "Diagnosis Procedure".

NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-II

(P)With CONSULT

- 1. Select "DATA MONITOR" mode with CONSULT.
- 2. Check that "COOLAN TEMP/S" indicates above 80°C (176°F).

If it is above 80°C (176°F), go to the following steps.

If it is below 80°C (176°F), warm engine up until "COOLAN TEMP/S" indicates more than 80°C (176°F). Then perform the following steps.

- 3. Turn ignition switch OFF and soak the vehicle in a cool place.
- 4. Turn ignition switch ON.

NOTE:

Do not turn ignition switch OFF until step 8.

- Select "DATA MONITOR" mode with CONSULT.
- 6. Check the following.

COOLAN TEMP/S	Below 40°C (104°F)
INT/A TEMP SE	Below 40°C (104°F)
Difference between "COOLAN TEMP/S" and "INT/A TEMP SE"	Within 6°C (11°F)

If they are within the specified range, perform the following steps.

If they are out of the specified range, soak the vehicle to meet the above conditions. Then perform the following steps.

NOTE:

- · Do not turn ignition switch OFF.
- If it is supposed to need a long period of time, do not deplete the battery.
- 7. Start engine and let it idle for 5 minutes.
- 8. Check 1st trip DTC.

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Proceed to EC-720, "Diagnosis Procedure".

NO >> GO TO 5.

5. PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)

P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Perform component function check. Refer to EC-719, "Component Function Check".

NOTE:

Use the component function check to check the overall function of the EOT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-720, "Diagnosis Procedure".

6.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON. 2.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- Before performing the following procedure, do not add fuel.
- Before performing the following procedure, check that fuel level is between 1/4 and 4/4.
- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 7.

7 . PERFORM DTC CONFIRMATION PROCEDURE B

- Start engine and let it idle for 60 minutes.
- 2. Move the vehicle to a cool place.

NOTE:

Cool the vehicle in an environment of ambient air temperature between -10°C (14°F) and 35°C (95°F).

3. Turn ignition switch OFF and soak the vehicle for 12 hours.

CAUTION:

Never turn ignition switch ON during soaking.

NOTE:

The vehicle must be cooled with the food open.

4. Start engine and let it idle for 5 minutes or more.

CAUTION:

Never turn ignition switch OFF during idling.

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-720, "Diagnosis Procedure".

NO >> INSPECTION END

Component Function Check

1. CHECK ENGINE OIL TEMPERATURE (EOT) SENSOR

- Turn ignition switch OFF.
- Disconnect EOT sensor harness connector. 2.
- Remove EOT sensor. Refer to EM-88, "Exploded View".
- Check resistance between EOT sensor terminals by heating with hot water as shown in the figure.

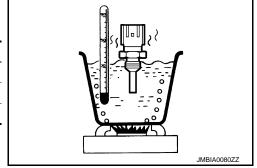
Terminals	Condition		Resistance (k Ω)
1 and 2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63
		50 (122)	0.68 – 1.00
		90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to EC-720, "Diagnosis Procedure".

2.CHECK INTERMITTENT INCIDENT



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P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Check intermittent incident. Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-720, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007770528

1. CHECK ENGINE OIL TEMPERATURE (EOT) SENSOR

Check EOT sensor. Refer to EC-720, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace EOT sensor. Refer to EM-88, "Exploded View".

2. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

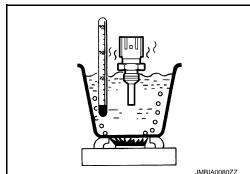
Component Inspection

INFOID:0000000007770529

1. CHECK ENGINE OIL TEMPERATURE (EOT) SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect EOT sensor harness connector.
- 3. Remove EOT sensor. Refer to EM-88, "Exploded View".
- 4. Check resistance between EOT sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (kΩ)
1 and 2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63
		50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EOT sensor. Refer to EM-88, "Exploded View".

P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P0197, P0198 EOT SENSOR

DTC Logic INFOID:0000000007770530

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC Detecting Condition	Possible Cause	
P0197	EOT SEN/CIRC (Engine oil temperature sensor circuit low input)	An excessively low voltage from the engine oil temperature sensor is sent to ECM.	Harness or connectors (FOT concer pirquit is one or shorted)	
P0198	EOT SEN/CIRC (Engine oil temperature sensor circuit high input)	An excessively high voltage from the engine oil temperature sensor is sent to ECM.	(EOT 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.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and wait at least 5 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

>> Proceed to EC-721, "Diagnosis Procedure". YES

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK ENGINE OIL TEMPERATURE SENSOR POWER SUPPLY

- Turn ignition switch OFF.
- Disconnect engine oil temperature (EOT) sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between EOT sensor harness connector and ground.

	+		Valtana
EOT	EOT sensor		Voltage (Approx.)
Connector	Terminal		, , ,
F48	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.CHECK ENGINE OIL TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between EOT sensor harness connector and ECM harness connector.

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EOT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F48	1	F7	27	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3.check eot sensor ground circuit

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between EOT sensor harness connector and ECM harness connector.

+		1		
EOT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	,
F48	2	F7	12	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4. CHECK ENGINE OIL TEMPERATURE SENSOR

Check the engine oil temperature sensor. Refer to EC-722, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

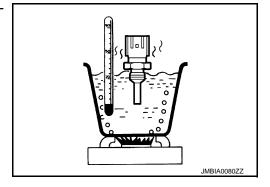
NO >> Replace engine oil temperature sensor. Refer to EM-34, "Exploded View".

Component Inspection

1. CHECK ENGINE OIL TEMPERATURE SENSOR

- Turn ignition switch OFF.
- Disconnect engine oil temperature sensor harness connector.
- Remove engine oil temperature sensor. Refer to <u>EM-88, "Exploded View"</u>.
- 4. Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.

Engine oil temperature sensor		Condition		2
+	_	Condition		Resistance (kΩ)
Terr	minal			
			20 (68)	2.37 - 2.63
1	2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
		()1	90 (194)	0.236 - 0.260



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Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor. Refer to EM-88, "Exploded View".

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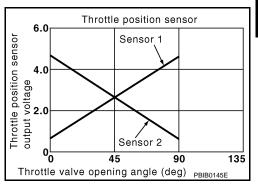
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P0222, P0223 TP SENSOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of 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 conditions via the throttle control motor.



DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0222 or P0223 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-738, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	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	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	Electric throttle control actuator (TP sensor 1)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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 let it idle for 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-723, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

- Disconnect electric throttle control actuator harness connector.
- Turn ignition switch ON.

P0222, P0223 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle	control actuator	Ground	Voltage
Connector	Terminal	Glound	voltage
F29	2	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.check throttle position sensor 1 ground circuit for open and short

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F29	4	F8	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle	control actuator	E	ECM	
Connector	Terminal	Connector	Terminal	Continuity
F29	1	F8	33	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-725, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-26, "Exploded View".

>> INSPECTION END

.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

P0222, P0223 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Component Inspection

INFOID:0000000007770536

1. CHECK THROTTLE POSITION SENSOR

- Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-500, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- Turn ignition switch ON.
- Set selector lever to D (CVT) or 1st (M/T) position.
- Check the voltage between ECM harness connector and ground.

ECM		Ground	Col	ndition	Voltage			
Connector	Terminal	Ground	001	idition	voltage			
	33 (TP sensor			Fully released	More than 0.36V			
F8	1 signal)	Ground	Ground	Ground	Ground Accelera	Accelerator	Fully de- pressed	Less than 4.75V
10	34 (TP sensor			pedal	Fully released	Less than 4.75V		
	2 signal)			Fully de- pressed	More than 0.36V			

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to EM-26, "Exploded View". EC

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crank-shaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

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 light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.

A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300	Multiple cylinder misfire detected	Multiple cylinders misfire.	Improper spark plug
P0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	Insufficient compression Incorrect fuel pressure
P0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	The fuel injector circuit is open or shorted
P0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	Fuel injector Intake air leak
P0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	The ignition signal circuit is open or shorted Lack of fuel Signal plate A/F sensor 1 Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.perform dtc confirmation procedure-i

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Restart engine and let it idle for about 15 minutes.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-727, "Diagnosis Procedure".

NO >> GO TO 3.

3.perform dtc confirmation procedure-ii

1. Turn ignition switch OFF and wait at least 10 seconds.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.

Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

Engine speed	Engine speed in the freeze frame data \pm 400 rpm		
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)		
Base fuel schedule	Base fuel schedule in freeze frame data \times (1 \pm 0.1)		
Engine coolant temperature (T)	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).		
condition	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).		

The time to driving varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

Check 1st trip DTC.

Is 1st trip DTC detected?

>> Go to EC-727, "Diagnosis Procedure". YES

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

- Start engine and run it at idle speed.
- Listen for the sound of the intake air leak.
- Check PCV hose connection.

Is intake air leak detected?

YES >> Discover air leak location and repair.

NO >> GO TO 2.

2.check for exhaust system clogging

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 3.

YES-2 >> Without CONSULT: GO TO 4.

NO >> Repair or replace it.

3.PERFORM POWER BALANCE TEST

(I) With CONSULT

- Start engine.
- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 4.

4. CHECK FUNCTION OF FUEL INJECTOR

Start engine and let engine idle.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Listen to each fuel injector operating sound.

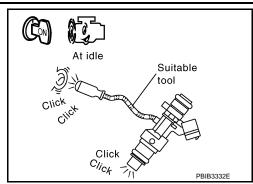
Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 5.

NO

>> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-923. "Component Inspection".



$\mathbf{5}$. CHECK FUNCTION OF IGNITION COIL-I

Do the following procedure in the place where ventilation is good without the combustible.

- Turn ignition switch OFF.
- Remove fuel pump fuse in IPDM E/R to release fuel pressure.

Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

- Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- Turn ignition switch OFF.
- 6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 7. Remove ignition coil and spark plug of the cylinder to be checked.
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- Connect spark plug and harness connector to ignition coil.
- 10. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 -0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal por-

Spark should be generated.

CAUTION:

- During the operation, always stay 0.5 m (19.7 in) away from the spark plug and the ignition coil within. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 6.

6. CHECK FUNCTION OF IGNITION COIL-II

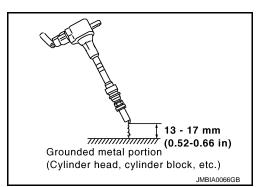
- Turn ignition switch OFF.
- Disconnect spark plug and connect a known-good spark plug.
- Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Check ignition coil, power transistor and their circuits. Refer to EC-928, "Component Function Check".



< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

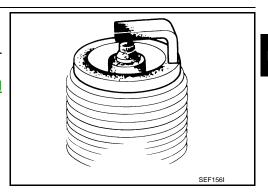
7. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-115, "Spark Plug".

NO >> Repair or clean spark plug. Refer to EM-42, "Exploded View". Then GO TO 8.



8. CHECK FUNCTION OF IGNITION COIL-III

- Reconnect the initial spark plugs.
- 2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-115, "Spark Plug".

9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-21, "Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10. CHECK FUEL PRESSURE

- Install all removed parts.
- Check fuel pressure. Refer to EC-985, "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?

>> Replace "fuel filter and fuel pump assembly". Refer to FL-5, "Exploded View". YES

NO >> Repair or replace.

12.check ignition timing

Check the following items. Refer to EC-495, "BASIC INSPECTION: Special Repair Requirement". For specification, refer to EC-989, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Follow the EC-495, "BASIC INSPECTION: Special Repair Requirement".

13.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect corresponding A/F sensor 1 harness connector.
- 3. Disconnect ECM harness connector.
- Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

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A/F se	ensor 1	ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
F51	1	F8	49	Existed
131	2	1-0	53	LXISIEU

5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity
Connector	Terminal	Giodila	Continuity
F51	1	Ground	Not existed
101	2	Giodila	Not existed

ECM		Ground	Continuity
Connector	Terminal	Glound	Continuity
F8	49	Ground	Not existed
	53	Glound	NOT EXISTED

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 14.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

14.CHECK A/F SENSOR 1 HEATER

Refer to EC-628, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace A/F sensor 1. Refer to EM-30, "Exploded View".

15. CHECK MASS AIR FLOW SENSOR

(P)With CONSULT

Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.

For specification, refer to EC-989, "Mass Air Flow Sensor".

With GST

Check mass air flow sensor signal in Service \$01 with GST.

For specification, refer to EC-989, "Mass Air Flow Sensor".

Is the measurement value within the specification?

YES >> GO TO 16.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to <u>EC-635</u>, "<u>DTC Logic</u>".

16. CHECK SYMPTOM TABLE

Check items on the rough idle symptom in EC-973, "Symptom Table".

Is the inspection result normal?

YES >> GO TO 17.

NO >> Repair or replace.

17.ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.

Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to "How to Erase DTC and 1st Trip DTC" in EC-600, "CONSULT Function".

>> GO TO 18.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

18.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

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P0327, P0328 KS

Description

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detected condition	Possible cause
P0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The sensor circuit is open or shorted.)
P0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Knock sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and run it for at least 5 seconds at idle speed.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-732, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770541

CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Disconnect knock sensor harness connector.
- Disconnect ECM harness connector.
- Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F12	2	F8	40	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

< DTC/CIRCUIT DIAGNOSIS >

${f 3.}$ CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
F12	1	F8	37	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK KNOCK SENSOR

Refer to EC-733, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace knock sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK KNOCK SENSOR

- Turn ignition switch OFF.
- Disconnect knock sensor harness connector.
- 3. 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 Ω .

Terminals	Resistance	
1 and 2	Approx. 532 - 588 kΩ [at 20°C (68°F)]	

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace knock sensor. Refer to EM-88, "Exploded View".

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P0335 CKP SENSOR (POS)

Description INFOID:0000000007770543

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet and Hall IC.

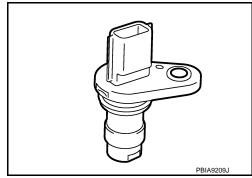
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

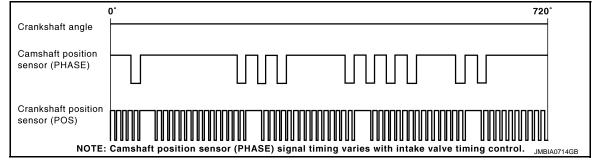
The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

ECM receives the signals as shown in the figure.





DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (POS) circuit	 The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. The crankshaft position sensor (POS) signal is not in the normal pattern during engine running. 	Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Refrigerant pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Battery current sensor circuit is shorted.) (Tumble control valve position sensor circuit is shorted.) Crankshaft position sensor (POS) Refrigerant pressure sensor Accelerator pedal position sensor EVAP control system pressure sensor Signal plate Battery current sensor Tumble control valve position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

P0335 CKP SENSOR (POS)

< DTC/CIRCUIT DIAGNOSIS >

>> GO TO 2.

[MR18DE (FOR CALIFORNIA)]

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.

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-735, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

Turn ignition switch OFF.

Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.check crankshaft position (ckp) sensor (pos) power supply circuit-i

- Disconnect crankshaft position (CKP) sensor (POS) harness connector.
- Turn ignition switch ON. 2.
- Check the voltage between CKP sensor (POS) harness connector and ground.

CKP sensor (POS)		Ground	Voltage
Connector	Terminal	Glodila	voltage
F20	1	Ground	Approx. 5 V

Is the inspection result normal?

>> GO TO 8. YES

NO >> GO TO 3.

3.CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT-II

- Turn ignition switch ON.
- Disconnect ECM harness connector. 2.
- Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sen	CKP sensor (POS)		ECM		
Connector	Terminal	Connector Terminal		Continuity	
F20	1	F8	75	Existed	

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

f 4.CHECK CKP SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

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E	СМ	Sensor		
Connector	Terminal	Name	Connector	Terminal
	69	Tumble control valve actuator	F22	1
	74	Refrigerant pressure sensor	E49	3
F8	75	CKP sensor (POS)	F20	1
. •	76	EVAP control system pressure sensor	B21	3
	71	Battery current sensor	F53	1
E16	102	APP sensor	E110	5

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.

- Buttery current sensor (Refer to EC-846, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-779, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-941, "Diagnosis Procedure".)
- Tumble control valve (Refer to EC-880, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning components.

6.CHECK APP SENSOR

Refer to EC-896, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 7.

7. REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

>> INSPECTION END

8. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sen	sor (POS)	E(CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F20	2	F8	62	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect ECM harness connector.
- 2. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

< DTC/CIRCUIT DIAGNOSIS >

CKP sen	sor (POS)	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F20	3	F8	61	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10.check crankshaft position sensor (pos)

Refer to EC-737, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace crankshaft position sensor (POS).

11. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> GO TO 12.

>> Replace the signal plate. NO

12. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

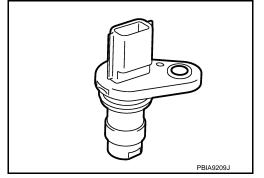
1. CHECK CRANKSHAFT POSITION SENSOR (POS)-I

- Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect crankshaft position sensor (POS) harness connector.
- 4. Remove the sensor. Refer to EM-88, "Exploded View".
- 5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

>> Replace crankshaft position sensor (POS). Refer to EM-NO 88, "Exploded View".



2.CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as per the following.

Terminals (Polarity)	Resistance [Ω at 25°C (77°F)]
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or ∞
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END

>> Replace crankshaft position sensor (POS). Refer to EM-88, "Exploded View". NO

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P0340 CMP SENSOR (PHASE)

Description INFOID:000000007770547

The camshaft position sensor (PHASE) senses the retraction of camshaft (INT) to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.

When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

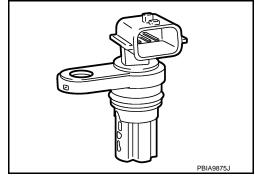
The sensor consists of a permanent magnet and Hall IC.

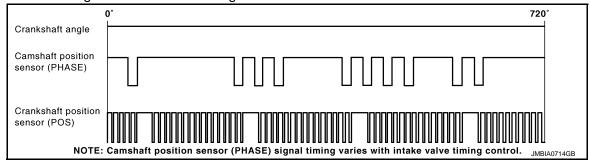
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

ECM receives the signals as shown in the figure.





DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0340 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-823, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340	Camshaft position sensor (PHASE) circuit	 The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. The cylinder No. signal is not sent to ECM during engine running. The cylinder No. signal is not in the normal pattern during engine running. 	 Harness or connectors (The sensor circuit is open or shorted) Camshaft position sensor (PHASE) Camshaft (INT) Starter motor Starting system circuit Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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.
- Check 1st trip DTC.

P0340 CMP SENSOR (PHASE)

[MR18DE (FOR CALIFORNIA)] < DTC/CIRCUIT DIAGNOSIS > Is 1st trip DTC detected? Α YES >> Go to EC-739, "Diagnosis Procedure". >> GO TO 3. NO 3. PERFORM DTC CONFIRMATION PROCEDURE-I EC Maintaining engine speed at more than 800 rpm for at least 5 seconds. 2. Check 1st trip DTC. Is 1st trip DTC detected? YES >> Go to EC-739, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure INFOID:0000000007770549 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 STR-2, "Work Flow".). 2.check ground connection Turn ignition switch OFF. Check ground connection E38. Refer to GI-44, "Circuit Inspection". Is the inspection result normal? YES >> GO TO 3. Н NO >> Repair or replace ground connection. 3.check camshaft position (cmp) sensor (phase) power supply circuit Disconnect camshaft position (CMP) sensor (PHASE) harness connector. Turn ignition switch ON. 2. Check the voltage between CMP sensor (PHASE) harness connector and ground. CMP sensor (PHASE) Ground Voltage Connector Terminal F26 Ground Approx. 5 V Is the inspection result normal? YES >> GO TO 4. >> Repair open circuit or short to ground or short to power in harness or connectors. NO $oldsymbol{4}.$ CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT Turn ignition switch OFF.

2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sens	or (PHASE)	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F26	2	F8	63	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

${f 5.}$ CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Disconnect ECM harness connector.
- Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

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< DTC/CIRCUIT DIAGNOSIS >

CMP sens	or (PHASE)	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F26	3	F8	65	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-740, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace camshaft position sensor (PHASE). Refer to EM-55, "Exploded View".

7.CHECK CAMSHAFT (INT)

Check the following.

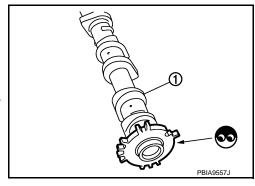
- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end

Is the inspection result normal?

YES >> GO TO 8.

NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-55,

"Exploded View".



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8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

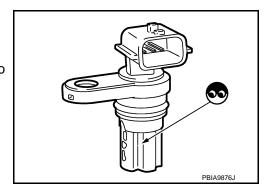
1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

- Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect camshaft position sensor (PHASE) harness connector.
- 4. Remove the sensor. Refer to EM-55, "Exploded View".
- Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace camshaft position sensor (PHASE). Refer to <u>EM-55, "Exploded View"</u>.



2. CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check resistance camshaft position sensor (PHASE) terminals as per the following.

P0340 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

YES >> INSPECTION END	1 (+) - 3 (-) 2 (+) - 3 (-) s the inspection result normal? YES >> INSPECTION END
2 (+) - 3 (-) s the inspection result normal? YES >> INSPECTION END	2 (+) - 3 (-) s the inspection result normal? YES >> INSPECTION END
s the inspection result normal? YES >> INSPECTION END	s the inspection result normal? YES >> INSPECTION END
YES >> INSPECTION END	YES >> INSPECTION END

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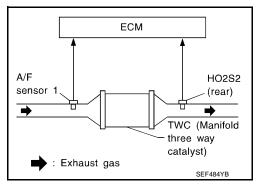
DTC Logic

DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2.

A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.

When the frequency ratio of A/F sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420	Catalyst system efficiency below threshold	 Three way catalyst (manifold) does not operate properly. Three way catalyst (manifold) does not have enough oxygen storage capacity. 	 Three way catalyst (manifold) Exhaust tube Intake air leaks Fuel injector Fuel injector leaks Spark plug Improper ignition timing

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 7.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Do not hold engine speed for more than the specified minutes below.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

(P)With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Make sure 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).
- Open engine hood.
- 8. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT.
- Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
- 10. Check the indication of "CATALYST".

Which is displayed on CONSULT screen?

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

CMPLT>> GO TO 6. INCMP >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

Wait 5 seconds at idle.

2. Rev engine up to 2,000 to 3,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take approximately 5 minutes).

Does the indication change to "CMPLT"?

YES >> GO TO 6. NO >> GO TO 5.

${f 5.}$ PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- Stop engine and cool it down to less than 70°C (158°F).
- Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3

O.PERFORM DTC CONFIRMATION PROCEDURE-III

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-743, "Diagnosis Procedure".

NO >> INSPECTION END

7 .PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-743, "Component Function Check".

NOTE:

Use component function check to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-743, "Diagnosis Procedure".

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK

WWithout CONSULT

- 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.
- Open engine hood. 5.
- Check the voltage between ECM harness connector and ground under the following condition.

E	ECM		Condition	Voltage	
Connector	Terminal	Ground	Condition	vollage	
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at 2,500 rpm constant under no load	The voltage fluctuation cycle takes more than 5 seconds. 1 cycle: 0.6 - $1.0 \rightarrow 0$ - $0.3 \rightarrow 0.6$ - 1.0	

Is the inspection result normal?

YES >> INSPECTION END

>> Go to EC-743, "Diagnosis Procedure". NO

Diagnosis Procedure

1. CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dent.

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< DTC/CIRCUIT DIAGNOSIS >

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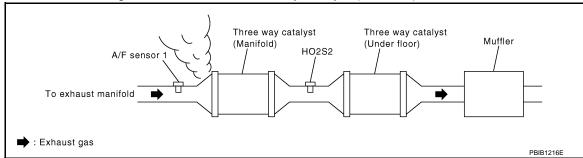
Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

2.CHECK EXHAUST GAS LEAK

- Start engine and run it at idle.
- Listen for an exhaust gas leak before the three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.

NO >> GO TO 3.

3. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 4.

4. CHECK IDLE SPEED AND IGNITION TIMING

For procedure, refer to EC-499, "IGNITION TIMING: Special Repair Requirement".

For specification, refer to EC-989, "Idle Speed" and EC-989, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Follow the instruction of EC-495, "BASIC INSPECTION: Special Repair Requirement".

5. CHECK FUEL INJECTOR

- Stop engine and then turn ignition switch ON.
- 2. Check the voltage between ECM harness connector and ground.

E	ECM		Voltage	
Connector	Terminal	Ground	voltage	
	25			
F7	29	Ground	Battery voltage	
	30	Glound		
	31	-		

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform <u>EC-922</u>, "<u>Diagnosis Procedure</u>".

6.CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

- Turn ignition switch OFF.
- 2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

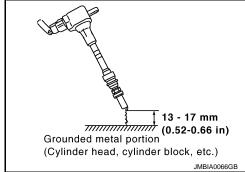
NOTE:

Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

< DTC/CIRCUIT DIAGNOSIS >

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- Start engine.
- After engine stalls, crank it two or three times to release all fuel pressure. 4.
- Turn ignition switch OFF.
- 6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 7. Remove ignition coil and spark plug of the cylinder to be checked.
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 9. Connect spark plug and harness connector to ignition coil.
- 10. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 -0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- During the operation, always stay 0.5 m (19.7 in) away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 7.

.CHECK FUNCTION OF IGNITION COIL-II

- Turn ignition switch OFF. 2. Disconnect spark plug and connect a known-good spark plug.
- 3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

YES >> GO TO 8.

>> Check ignition coil, power transistor and their circuits. Refer to EC-928, "Diagnosis Procedure". NO

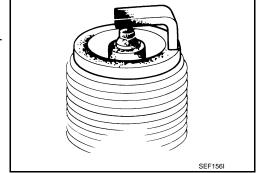
8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-115, "Spark Plug".

NO >> Repair or clean spark plug. Then GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

- Reconnect the initial spark plugs.
- Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-115, "Spark Plug".

10. CHECK FUEL INJECTOR

- 1. Turn ignition switch OFF. Refer to EM-37, "Removal and Installation".
- 2. Remove fuel injector assembly.
 - Keep fuel hose and all fuel injectors connected to fuel tube.
- 3. Disconnect all ignition coil harness connectors.
- 4. Reconnect all fuel injector harness connectors disconnected.
- 5. Turn ignition switch ON.

Does fuel drip from fuel injector?

YES >> GO TO 11.

NO >> Replace the fuel injector(s) from which fuel is dripping. Refer to EM-37, "Exploded View".

11. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace three way catalyst assembly. Refer to <u>EX-5</u>, "<u>Exploded View</u>".

NO >> Repair or replace harness or connector

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P0441 EVAP CONTROL SYSTEM

DTC Logic

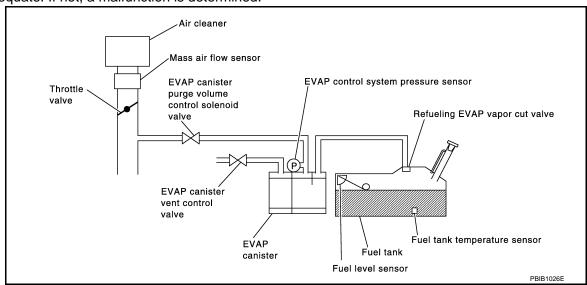
DTC DETECTION LOGIC

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 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 Drain filter

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 6.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

(P)With CONSULT

- 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 70 seconds.
- Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CON-SULT.
- 5. Touch "START".

Is COMPLETED displayed on CONSULT screen?

YES >> GO TO 5.

NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Selector lever	Suitable position
VHCL SPEED SE	32 - 120 km/h (20 - 75 mph)
ENG SPEED	500 - 3,800 rpm
B/FUEL SCHDL	1.0 - 10.0 msec
COOLAN TEMP/S	More than 0°C (32°F)

CAUTION:

Always drive vehicle at a safe speed.

If "TESTING" is not changed for a long time, retry from step 2.

Is "COMPLETED" displayed on CONSULT screen?

YES >> GO TO 5.

NO >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 3.

${f 5}$ PERFORM DTC CONFIRMATION PROCEDURE-II

Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to EC-749, "Diagnosis Procedure".

$\mathbf{6}$.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-748, "Component Function Check".

NOTE:

Use component function check to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-749, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007770555

1. PERFORM COMPONENT FUNCTION CHECK

⋈Without CONSULT

- 1. Lift up drive wheels.
- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and wait at least 70 seconds.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Set voltmeter probes to ECM harness connector and ground.

ECM		Ground
Connector	Terminal	Ground
F8	42 (EVAP control system pressure sensor signal)	Ground

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- 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	Any position other than P, N or R

8. 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-749, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK EVAP CANISTER

- Turn ignition switch OFF.
- Check EVAP canister for cracks.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 2.

YES-2 >> Without CONSULT: GO TO 3.

>> Replace EVAP canister. Refer to FL-14, "Exploded View".

2.CHECK PURGE FLOW

(P)With CONSULT

- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-563, "System Description".
- 2. Start engine and let it idle.
- 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT.
- 4. Rev engine up to 2,000 rpm.
- Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL C/V" opening and check vacuum existence.

PURG VOL C/V	Vacuum
100%	Existed
0%	Not existed

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 4.

3. CHECK PURGE FLOW

₩ Without CONSULT

- Start engine and warm it up to normal operating temperature.
- Stop engine.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-563, "System Description".
- 4. Start engine and let it idle.

Do not depress accelerator pedal even slightly.

Check vacuum gauge indication before 60 seconds passed after starting engine.

Vacuum should not exist.

6. Revving engine up to 2,000rpm after 100 seconds passed after starting engine.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 4.

4. CHECK EVAP PURGE LINE

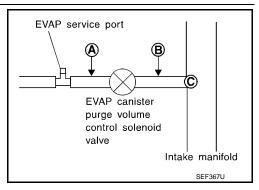
- 1. Turn ignition switch OFF.
- Check EVAP purge line for improper connection or disconnection. Refer to <u>EC-563</u>, "System Description".

Is the inspection result normal?

YES >> GO TO 5. NO >> Repair it.

${f 5.}$ CHECK EVAP PURGE HOSE AND PURGE PORT

- Disconnect purge hoses connected to EVAP service port A and EVAP canister purge volume control solenoid valve B.
- 2. Blow air into each hose and EVAP purge port C.

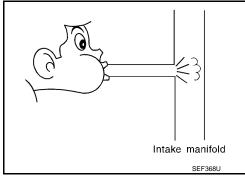


3. Check that air flows freely.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 6. YES-2 >> Without CONSULT: GO TO 7.

NO >> Repair or clean hoses and/or purge port.



6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

(P)With CONSULT

- Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 7.

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[MR18DE (FOR CALIFORNIA)]

The following is a second seco	<u> </u>
7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
Refer to EC-763, "Component Inspection".	_
Is the inspection result normal?	
YES >> GO TO 8.	
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-26, "Exploded View"	
3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	
 Disconnect EVAP control system pressure sensor harness connector. Check connectors for water. 	
Water should not exist.	
s the inspection result normal?	
YES >> GO TO 9.	
NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View".	
CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
Refer to EC-780, "DTC Logic" for DTC P0452, EC-785, "DTC Logic" for DTC P0453.	
s the inspection result normal?	
YES >> GO TO 10. NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-14</u> , " <u>Exploded View</u> ".	
10.check rubber tube for clogging	
. Disconnect rubber tube connected to EVAP canister vent control valve.	—
Check the rubber tube for clogging.	
s the inspection result normal?	
YES >> GO TO 11.	
NO >> Clean the rubber tube using an air blower.	
11.CHECK DRAIN FILTER	
Refer to EC-752, "Component Inspection (Drain filter)".	
s the inspection result normal?	
YES >> GO TO 12. NO >> Replace drain filter. <u>EC-563</u> , "System Description"	
2.CHECK EVAP CANISTER VENT CONTROL VALVE	
Refer to EC-770, "Component Inspection".	—
s the inspection result normal?	
YES >> GO TO 13.	
NO >> Replace EVAP canister vent control valve. Refer to FL-14, "Exploded View".	
3.CHECK EVAP PURGE LINE	
nspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks. Refer to <u>EC-987, "Inspection"</u> .	_
s the inspection result normal?	
YES >> GO TO 14.	
NO >> Replace it.	
4.CLEAN EVAP PURGE LINE	
Clean EVAP purge line (pipe and rubber tube) using air blower.	
>> GO TO 15.	
15.check intermittent incident	
Refer to GI-41, "Intermittent Incident".	

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

>> INSPECTION END

Component Inspection (Drain filter)

INFOID:0000000007770557

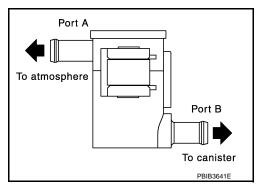
1. CHECK DRAIN FILTER

- 1. Check visually for insect nests in the drain filter air inlet.
- 2. Check visually for cracks or flaws in the appearance.
- 3. Check visually for cracks or flaws in the hose.
- 4. Blow air into port A and check that it flows freely out of port B.
- 5. Block port B.
- 6. Blow air into port A and check that there is no leakage.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace drain filter. Refer to <u>EC-563, "System Description"</u>.



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P0442 EVAP CONTROL SYSTEM

DTC Logic

DTC DETECTION LOGIC

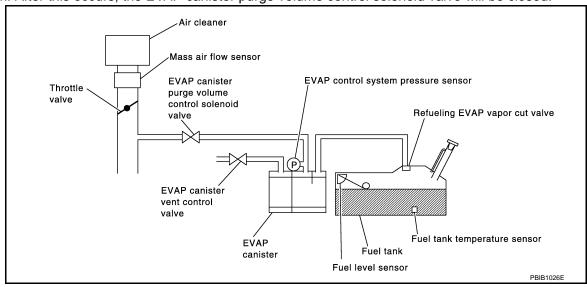
NOTE:

If DTC P0442 is displayed with DTC P0456, first perform the trouble diagnosis for DTC P0456. Refer to <u>EC-797</u>, "DTC Logic".

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.

If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following "Vacuum test" conditions.

The EVAP canister vent control valve is closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve will then be opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0442	EVAP control system small leak detected (negative pressure)	EVAP control system has a leak, EVAP control system does not operate properly.	 Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Fuel filler cap remains open or fails to close. Foreign matter caught in fuel filler cap. Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. Foreign matter caught in EVAP canister vent control valve. EVAP canister or fuel tank leaks EVAP purge line (pipe and rubber tube) leaks EVAP purge line rubber tube bent Loose or disconnected rubber tube EVAP canister vent control valve and the circuit EVAP canister purge volume control solenoid valve and the circuit Fuel tank temperature sensor O-ring of EVAP canister vent control valve is missing or damaged EVAP canister is saturated with water EVAP control system pressure sensor Fuel level sensor and the circuit Refueling EVAP vapor cut valve ORVR system leaks Drain filter

CAUTION:

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Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

- · If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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:

- Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Always perform test at a temperature of 0 to 30°C (32 to 86°F).

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

Do you have CONSULT?

YES >> GO TO 2. NO >> GO TO 3.

2. PERFORM DTC CONFIRMATION PROCEDURE

(I) With CONSULT

- 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.
- 4. Make sure that the following conditions are met.

COOLAN TEMP/S: 0 - 70°C (32 - 158°F)

INT/A TEMP SE: 0 - 30°C (32 - 86°F)

 Select "EVP V/S LEAK P0456/P1456" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.

Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT screen, go to <u>EC-495</u>, "BASIC INSPECTION: Special Repair Requirement".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to EC-754, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

With GST

NOTE:

Be sure to read the explanation of DRIVING PATTERN in <u>EC-505</u>, "SRT Set Driving Pattern" before driving vehicle.

- 1. Start engine.
- Drive vehicle according to DRIVING PATTERN.
- Stop vehicle.
- Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- 5. Select Service \$07 with GST.

Is 1st trip DTC displayed?

YES-1 >> P0441: Go to <u>EC-749</u>, "<u>Diagnosis Procedure</u>". YES-2 >> P0442: Go to <u>EC-754</u>, "<u>Diagnosis Procedure</u>". NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770559

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.

< DTC/CIRCUIT DIAGNOSIS >

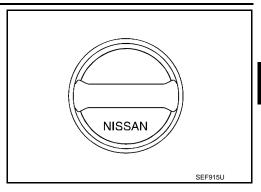
[MR18DE (FOR CALIFORNIA)]

2. Check for genuine NISSAN fuel filler cap design.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Then retighten until ratcheting sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-758, "Component Inspection (Fuel filler cap)".

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-987, "Inspection".

Is there any leak in EVAP line?

YES >> Repair or replace.

NO >> GO TO 6.

6. CHECK DRAIN FILTER

Refer to EC-758, "Component Inspection (Drain filter)".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace drain filter. Refer to <u>EC-563</u>, "System Description".

.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

EVAP canister vent control valve is installed properly.
 Refer to <u>FL-14</u>, "<u>Exploded View</u>".

EVAP canister vent control valve.

Refer to EC-770, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace EVAP canister vent control valve and O-ring. Refer to FL-14, "Exploded View".

8. 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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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

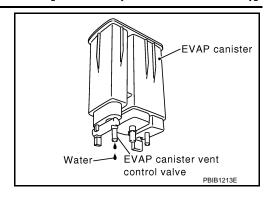
2. Does water drain from the EVAP canister?

Does water drain from the EVAP canister?

YES >> GO TO 9.

NO-1 >> With CONSULT: GO TO 11.

NO-2 >> Without CONSULT: GO TO 12.



9. 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 1.9 kg (4.2 lb).

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 11.

YES-2 >> Without CONSULT: GO TO 12.

NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-14, "Exploded View".

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

(P)With CONSULT

- 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 2. Start engine.
- 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
- 4. Touch "Qu" on CONSULT screen to increase "PURG VOL C/V" opening to 100%.
- 5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 13.

12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

♥Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Stop engine.
- 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 4. Start engine and let it idle for at least 80 seconds.
- 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 13.

13. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to <u>EC-563</u>, "System Description". Is the inspection result normal?

P0442 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >	[MR18DE (FOR CALIFORNIA)]
YES >> GO TO 14.	
NO >> Repair or reconnect the hose.	A
14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENG	DID VALVE
Refer to EC-763, "Component Inspection".	EC
Is the inspection result normal? YES >> GO TO 15.	
NO >> Replace EVAP canister purge volume control solenoid valv	e. Refer to EM-26. "Exploded View".
15. CHECK FUEL TANK TEMPERATURE SENSOR	
Refer to EC-712, "Component Inspection".	
Is the inspection result normal?	D
YES >> GO TO 16.	
NO >> Replace fuel level sensor unit. Refer to FL-5. "Exploded Vie	
16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	E
Refer to EC-776, "DTC Logic".	·
Is the inspection result normal?	F
YES >> GO TO 17.	
NO >> Replace EVAP control system pressure sensor. Refer to FL	
17.CHECK EVAP PURGE LINE	G
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to EC-563, "System Description".	H
Is the inspection result normal? YES >> GO TO 18.	
NO >> Repair or reconnect the hose.	
18.CLEAN EVAP PURGE LINE	1
Clean EVAP purge line (pipe and rubber tube) using air blower.	
clean 2 v, a parge into (pipe and rabber tabe) deing an bletten	J
>> GO TO 19.	
19. CHECK EVAP/ORVR LINE	
Check EVAP/ORVR line between EVAP canister and fuel tank for cloggi	ing, kink, looseness and improper con-
nection. For location, refer to EC-934, "Description".	
Is the inspection result normal?	L
YES >> GO TO 20.	
NO >> Repair or replace hoses and tubes.	
20. CHECK RECIRCULATION LINE	N
Check recirculation line between fuel filler tube and fuel tank for c	logging, kink, cracks, looseness and
improper connection. <u>Is the inspection result normal?</u>	N
YES >> GO TO 21.	
NO >> Repair or replace hose, tube or fuel filler tube.	
21. CHECK REFUELING EVAP VAPOR CUT VALVE	С
Refer to EC-937, "Component Inspection (Refueling EVAP vapor cut va	ilve)".
Is the inspection result normal?	
YES >> GO TO 22.	•
NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refe	er to <u>FL-9, "Exploded View"</u> .
22.CHECK FUEL LEVEL SENSOR	
Refer to MWI-42, "Component Function Check".	
Is the inspection result normal?	
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YES >> GO TO 23.

P0442 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

NO >> Replace fuel level sensor unit. Refer to FL-5, "Exploded View".

23. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

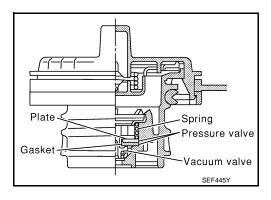
>> INSPECTION END

Component Inspection (Fuel filler cap)

INFOID:0000000007770560

1. CHECK FUEL FILLER CAP

- 1. Turn ignition switch OFF.
- 2. Remove fuel filler cap.
- 3. Wipe clean valve housing.



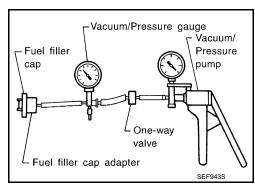
- 4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.
- 5. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22

- 2.90 psi)

Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm²,

-0.87 to -0.48 psi)



Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

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 Inspection (Drain filter)

INFOID:0000000007770561

1. CHECK DRAIN FILTER

- 1. Check visually for insect nests in the drain filter air inlet.
- 2. Check visually for cracks or flaws in the appearance.
- 3. Check visually for cracks or flaws in the hose.

P0442 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

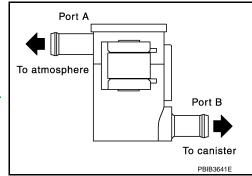
[MR18DE (FOR CALIFORNIA)]

- 4. Blow air into port A and check that it flows freely out of port B.
- 5. Block port B.
- 6. Blow air into port A and check that there is no leakage.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace drain filter. Refer to <u>EC-563, "System Description"</u>.



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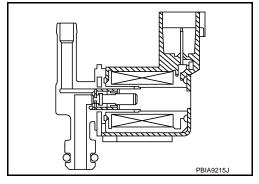
< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

The EVAP canister purge volume control solenoid valve is used to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



DTC Logic

INFOID:0000000007770563

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
P0443	EVAP canister purge volume control solenoid	Α	The canister purge flow is detected during the vehicle is stopped while the engine is running, even when EVAP canister purge volume control solenoid valve is completely closed.	 EVAP control system pressure sensor EVAP canister purge volume control solenoid valve (The valve is stuck open.) EVAP canister vent control valve
	valve	В	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 Hoses (Hoses are connected incorrectly or clogged.)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- Perform DTC CONFIRMATION PROCEDURE when the fuel is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Always perform test at a temperature of 5 to 60°C (41 to 140°F).
- Cool the vehicle so that engine coolant temperature becomes same level as ambient temperature.

Do you have CONSULT

YES >> GO TO 2. NO >> GO TO 4.

2.PERFORM DTC CONFIRMATION PROCEDURE A

(I) With CONSULT

- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT.
- 3. Check that the following condition are met. FUEL T/TMP SE: 0 35°C (32 95°F)
- 4. Start engine and wait at least 60 seconds.
- 5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-761, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE B

(I) With CONSULT

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
- Touch "START".
- Start engine and let it idle until "TESTING" on CONSULT changes to "COMPLETED". (It will take approximately 10 seconds.)

If "TESTING" is not displayed after 5 minutes, retry from step 2.

Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT?

OK >> INSPECTION END

NG >> Go to EC-761, "Diagnosis Procedure".

f 4.PERFORM DTC CONFIRMATION PROCEDURE A

■With GST

- Turn ignition switch ON.
- Check the voltage between ECM harness connector and ground.

	ECM	Ground	Voltage (V)
Connector	Terminal	Glound	voltage (v)
F8	43 (Fuel tank temperature sensor signal)	Ground	3.1 - 4.0

- Start engine and wait at least 60 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-761, "Diagnosis Procedure".

NO >> GO TO 5.

$oldsymbol{5}$.PERFORM DTC CONFIRMATION PROCEDURE

■With GST

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and let it idle for at least 20 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

>> Go to EC-761, "Diagnosis Procedure". YES

NO >> INSPECTION END

Diagnosis Procedure

${f 1}$.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect EVAP canister purge volume control solenoid valve harness connector. 2.
- Turn ignition switch ON.
- Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

•	rge volume control id valve	Ground	Voltage
Connector	Terminal		
F32	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

EC-761 Revision: 2011 November 2012 CUBE

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- IPDM E/R harness connector E14
- 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 the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

•	rge volume control id valve	ECM		Continuity
Connector	Terminal	Connector	Terminal	
F32	2	F7	9	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK 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 5.

NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View".

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-779, "Component Inspection".

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 6.

YES-2 >> Without CONSULT: GO TO 7.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-14. "Exploded View"</u>.

6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

(II) With CONSULT

- 1. Turn ignition switch OFF.
- Reconnect harness connectors disconnected.
- Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies
 according to the valve opening.

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 7.

7.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-763, "Component Inspection".

Is the inspection result normal?

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [MR18DE (FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 8.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to FL-14, "Exploded View".

8.CHECK RUBBER TUBE FOR CLOGGING

- Disconnect rubber tube connected to EVAP canister vent control valve.
- 2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Clean the rubber tube using an air blower.

9.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-770, "Component Inspection".

Is the inspection result normal?

>> GO TO 10. YES

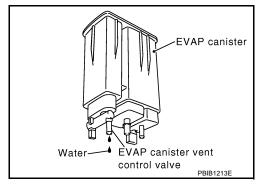
NO >> Replace EVAP canister vent control valve. Refer to FL-14, "Exploded View".

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.
- Check if water will drain from EVAP canister.

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 1.9 kg (4.2 lb).

Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-14, "Exploded View".

13. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

(P)With CONSULT

- Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.

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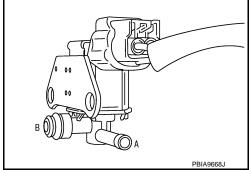
EC-763 Revision: 2011 November 2012 CUBE

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

- 4. Turn ignition switch ON.
- 5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT.
- Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

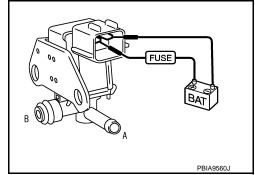
Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



♥Without CONSULT

- Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 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?

NO

YES >> INSPECTION END

>> Replace EVAP canister purge volume control solenoid valve. Refer to EM-26, "Exploded View".

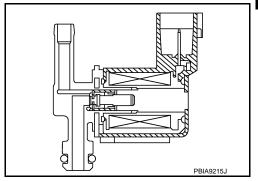
< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description INFOID:0000000007770566

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:0000000007770567

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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11 V at idle.

>> GO TO 2.

2.perform dtc confirmation procedure

- Start engine and let it idle for at least 13 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-765, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect EVAP canister purge volume control solenoid valve harness connector.
- Turn ignition switch ON.
- Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

EVAP canister purge volume control solenoid valve		Ground	Voltage
Connector	Terminal		
F32	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R harness connector E14
- Harness connectors E8. F1
- 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 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	
F32	2	F7	9	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 4.

YES-2 >> Without CONSULT: GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

(P)With CONSULT

- Reconnect all harness connectors disconnected.
- Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies
 according to the valve opening.

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

f 5.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-767, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-26, "Exploded View".

6. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Component Inspection

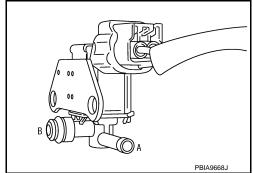
INFOID:0000000007770569

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT

- Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- Turn ignition switch ON.
- 5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT.
- Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

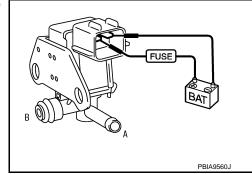
Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



⋈Without CONSULT

- Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed



Is the inspection result normal?

YES >> INSPECTION END

NO

>> Replace EVAP canister purge volume control solenoid valve. Refer to EM-26, "Exploded View".

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P0447 EVAP CANISTER VENT CONTROL VALVE

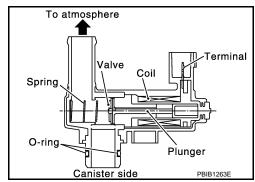
Description INFOID:000000007770570

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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and wait at least 8 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-768, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770572

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

(P)With CONSULT

- 1. Turn ignition switch OFF and then turn ON.
- Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT.
- 3. Touch "ON/OFF" on CONSULT screen.
- 4. Check for operating sound of the valve.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Clicking sound should be heard.

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 3.

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3.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- Disconnect EVAP canister vent control valve harness connector. 2.
- 3. Turn ignition switch ON.
- 4. Check the voltage between EVAP canister vent control valve harness connector and ground.

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EVAP canister v	ent control valve	Ground	Voltage
Connector	Terminal		
B20	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5. NO >> GO TO 4.

f 4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- Harness connectors E105, M77
- Harness connectors B1. M18
- Harness for open or short between EVAP canister vent control valve and IPDM E/R

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>> Repair open circuit or short to ground or short to power in harness or connectors.

5.check evap canister vent control valve output signal circuit for open and short

- 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		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
B20	2	F7	28	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.

- Junction block connector E8. F1
- Harness connectors E105, M77
- Harness connectors M79, B4
- Harness for open or short between EVAP canister vent control valve and ECM

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>> 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.
- 2. Check the rubber tube for clogging.

Is the inspection result normal?

EC-769 Revision: 2011 November 2012 CUBE

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

YES >> GO TO 8.

NO >> Clean the rubber tube using an air blower.

8.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-770, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP canister vent control valve. Refer to FL-14, "Exploded View".

9. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770573

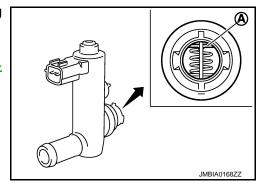
1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister.
- Check portion (A) of EVAP canister vent control valve for being rusted.

Is it rusted?

YES >> Replace EVAP canister vent control valve. Refer to <u>FL-14</u>, "Exploded View".

NO >> GO TO 2.



2.CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT

- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 4. Check air passage continuity and operation delay time.

Make sure new O-ring is installed properly.

VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT

Check air passage continuity and operation delay time under the following conditions.

Make sure new O-ring is installed properly.

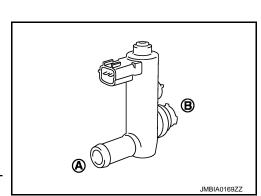
Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace EVAP canister vent control valve. Refer to <u>FL-14, "Exploded View"</u>.



< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

3.check evap canister vent control valve-iii

(II) With CONSULT

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- Check air passage continuity and operation delay time.
 Make sure new O-ring is installed properly.

VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

⋈Without CONSULT

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Check air passage continuity and operation delay time under the following conditions.

Make sure new O-ring is installed properly.

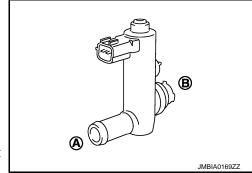
Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve. Refer to FL-14, "Exploded View".



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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P0448 EVAP CANISTER VENT CONTROL VALVE

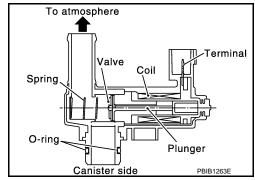
Description

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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

- 1. Turn ignition switch ON and wait at least 5 seconds.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 4. Start engine and let it idle for at least 1 minute.
- Repeat next procedures three times.
- Increase the engine speed up to 3,000 to 3,500 rpm and keep it for 2 minutes and 50 seconds to 3 minutes.

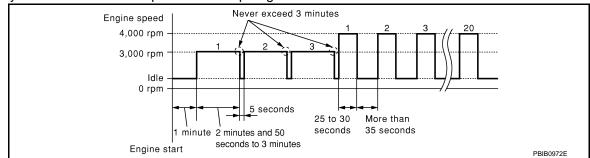
Never exceed 3 minutes.

- Fully released accelerator pedal and keep engine idle for about 5 seconds.
- 6. Repeat next procedure 20 times.
- Quickly increase the engine speed up to 4,000 to 4,500 rpm or more and keep it for 25 to 30 seconds.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Fully released accelerator pedal and keep engine idle for at least 35 seconds.



7. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-773, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK RUBBER TUBE

- Turn ignition switch OFF.
- Disconnect rubber tube connected to EVAP canister vent control valve.
- Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Clean rubber tube using an air blower.

2.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-774, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace EVAP canister vent control valve. Refer to FL-14, "Exploded View".

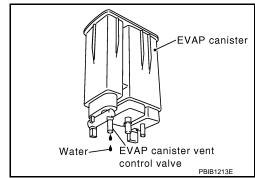
${f 3.}$ CHECK IF EVAP CANISTER IS SATURATED WITH WATER

- 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.

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 1.9 kg (4.2 lb).

Is the inspection result normal?

YES >> GO TO 6.

>> GO TO 5. NO

${f 5.}$ DETECT MALFUNCTIONING PART

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection
 - >> Repair hose or replace EVAP canister. Refer to FL-14, "Exploded View".

6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

- Disconnect EVAP control system pressure sensor harness connector.
- Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-14. "Exploded View"</u>.

7.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-779, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP control system pressure sensor. Refer to FL-14. "Exploded View".

8.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770577

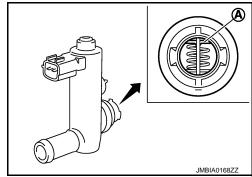
1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister.
- Check portion (A) of EVAP canister vent control valve for being rusted.

Is it rusted?

YES >> Replace EVAP canister vent control valve. Refer to <u>FL-14</u>, "Exploded View".

NO >> GO TO 2.



2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

(P)With CONSULT

- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

4. Check air passage continuity and operation delay time. Make sure new O-ring is installed properly.

VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

⋈Without CONSULT

Check air passage continuity and operation delay time under the following conditions.

Make sure new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace EVAP canister vent control valve. Refer to <u>FL-14</u>, "<u>Exploded View</u>".

3.CHECK EVAP CANISTER VENT CONTROL VALVE-III

(P)With CONSULT

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 3. Check air passage continuity and operation delay time.

Make sure new O-ring is installed properly.

VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

⋈Without CONSULT

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- Check air passage continuity and operation delay time under the following conditions.

Make sure new O-ring is installed properly.

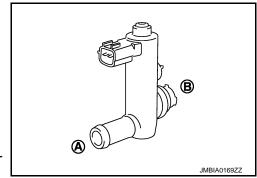
Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve. Refer to <u>FL-14. "Exploded View"</u>.



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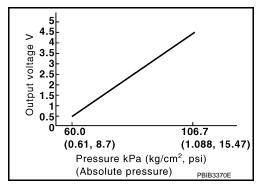
< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description INFOID:0000000007770578

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:0000000007770579

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 sensor (POS) circuit is shorted.] (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Battery current sensor circuit is shorted.) (Tumble control valve position sensor circuit is shorted.) EVAP control system pressure sensor Crankshaft position sensor (POS) Accelerator pedal position sensor Refrigerant pressure sensor Battery current sensor Tumble control valve position sensor

DTC CONFIRMATION PROCEDURE

NOTE:

Never remove fuel filler cap during DTC confirmation procedure.

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

(P)With CONSULT>>GO TO 2.

Without CONSULT>>GO TO 5.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

(II) With CONSULT

Start engine and let it idle for least 40 seconds.

Do not depress accelerator pedal even slightly.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

>> Proceed to EC-777, "Diagnosis Procedure". YES

NO >> GO TO 3.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

3.PERFORM DTC CONFIRMATION PROCEDURE-2	A
 With CONSULT Select "EVAP DIAG READY" in "DATA MONITOR" mode of "ENGINE". Let it idle until "OFF" of "EVAP DIAG READY" changes to "ON". NOTE: 	EC
It will take at most 2 hours until "OFF" of "EVAP DIAG READY" changes to "ON". 3. Turn ignition switch OFF and wait at least 90 minutes. NOTE:	С
Never turn ignition switch ON during 90 minutes. 4. Turn ignition switch ON. 5. Select "EVAP LEAK DIAG" in "DATA MONITOR" mode of "ENGINE". 6. Check that "EVAP LEAK DIAG" indication.	D
Which is displayed on CONSULT? CMPLT>> GO TO 4. YET >> 1. Perform DTC CONFIRMATION PROCEDURE again. 2. GO TO 1.	Е
4.PERFORM DTC CONFIRMATION PROCEDURE-3	F
©With CONSULT Check 1st trip DTC. Is 1st trip DTC detected? YES >> Proceed to EC-777, "Diagnosis Procedure".	G
NO >> INSPECTION END	
5.PERFORM DTC CONFIRMATION PROCEDURE-4	H
 With GST Start engine and let it idle for least 40 seconds. NOTE: Do not depress accelerator pedal even slightly. 	1
2. Check 1st trip DTC.	J
Is 1st trip DTC detected? YES >> Proceed to EC-777, "Diagnosis Procedure". NO >> GO TO 6.	
6.PERFORM DTC CONFIRMATION PROCEDURE-5	K
 With GST 1. Let it idle for at least 2 hours. 2. Turn ignition switch OFF and wait at least 90 minutes. NOTE: 	L
Never turn ignition switch ON during 90 minutes. 3. Turn ignition switch ON. 4. Check 1st trip DTC.	M
Is 1st trip DTC detected? YES >> Proceed to EC-777, "Diagnosis Procedure". NO >> INSPECTION END	N
Diagnosis Procedure	0007770580
1.check ground connection	
 Turn ignition switch OFF. Check ground connection E38. Refer to GI-44, "Circuit Inspection". 	P
Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace ground connection.	
2. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER	
Disconnect EVAP control system pressure sensor harness connector.	

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness connector.

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch ON.
- 2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

•	tem pressure sen- or	Ground	Voltage	
Connector	Terminal			
B21	3	Ground	Approx. 5 V	

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 4.

4. CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
	69	Tumble control valve actuator	F22	1
F8	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
. •	76	EVAP control system pressure sensor	B21	3
	71	Battery current sensor	F53	1
E16	102	APP sensor	E110	5

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.

- Battery current sensor (Refer to EC-846, "Component Inspection".)
- Crankshaft position sensor (POS) (Refer to <u>EC-737, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to EC-941, "Diagnosis Procedure".)
- Tumble control valve (Refer to EC-880, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to EC-896, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 7.

7. REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

>> INSPECTION END

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-779, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View".

9. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770581

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

- Turn ignition switch OFF.
- 2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
- 3. Install a vacuum pump to EVAP control system pressure sensor.
- 4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

	ECM	Condition	Voltage	
Connector Terminal		[Applied vacuum kPa (kg/cm ² , psi)	voltage	
	42	Not applied	1.8 - 4.8 V	
F8	(EVAP control system pressure sensor signal)	-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 below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-14</u>, "<u>Exploded View</u>".

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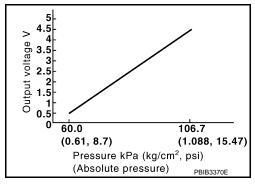
< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



INFOID:0000000007770583

DTC Logic

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 sensor (POS) circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Battery current sensor circuit is shorted.) (Tumble control valve position sensor circuit is shorted.) EVAP control system pressure sensor Crankshaft position sensor (POS) Accelerator pedal position sensor Refrigerant pressure sensor Battery current sensor Tumble control valve position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Select "DATA MONITOR" mode with CONSULT.
- 5. Make sure that "FUEL T/TMP SE" indication is more than 0°C (32°F).
- Start engine and wait at least 20 seconds.
- 7. Check 1st trip DTC.

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< DTC/CIRCUIT DIAGNOSIS >

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1. Start engine and warm it up to normal operating temperature.

2. S	et voltmeter	probes to ECM	harness conne	ctor and g	ا round as	per the f	ollowing	ı
------	--------------	---------------	---------------	------------	------------	-----------	----------	---

	Ground	
Connector	Ground	
F8	43 (Fuel tank temperature sensor signal)	Ground

Make sure that the voltage is less than 4.2 V.

- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and wait at least 20 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-781, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44. "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK CONNECTOR

- Disconnect EVAP control system pressure sensor harness connector.
- Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness connector.

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-I

- Turn ignition switch ON.
- Check the voltage between EVAP control system pressure sensor harness connector and ground.

•	tem pressure sen- or	Ground	Voltage	
Connector	Terminal			
B21	3	Ground	Approx. 5 V	

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.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

[MR18DE (FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS >

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector		
B21	3	F8	76	Existed

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B4. M79
- Harness connectors M77, E105
- · Harness connectors E8, F1
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
69		Tumble control valve actuator	F22	1
71 74 75 76	71	Battery current sensor	F53	1
	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
	76	EVAP control system pressure sensor	B21	3
E16	102	APP sensor	E110	5

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.

- Battery current sensor (Refer to <u>EC-846, "Component Inspection"</u>.)
- Crankshaft position sensor (POS) (Refer to EC-737, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-941, "Diagnosis Procedure".)
- Tumble control valve (Refer to EC-880, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace malfunctioning component.

8. CHECK APP SENSOR

Refer to EC-896, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

$10. \mathsf{check}$ evap control system pressure sensor ground circuit for open and SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

•	tem pressure sen-	ECM		Continuity
Connector	Terminal	Connector	Terminal	
B21	1	F8	51	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B4, M79
- Harness connectors M77, E105
- Harness connectors E8, F1
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

,	tem pressure sen- or	ECM		Continuity
Connector	Terminal	Connector	Terminal	
B21	2	F8	42	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 B4, M79
- Harness connectors M77, E105
- Harness connectors E8. F1
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-779, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View".

15. CHECK INTERMITTENT INCIDENT

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770585

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 and ground under the following conditions.

	ECM	Condition	Voltage	
Connector	Terminal	[Applied vacuum kPa (kg/cm², psi)	voltage	
	42	Not applied	1.8 - 4.8 V	
F8	(EVAP control system pressure sensor signal)	-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 below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View".

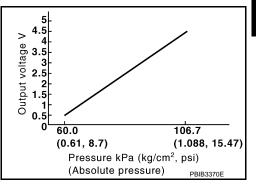
< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description INFOID:0000000007770586

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:0000000007770587

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 sensor (POS) circuit is shorted.] (Accelerator pedal circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Battery current sensor circuit is shorted.) (Tumble control valve position sensor circuit is shorted.) EVAP control system pressure sensor Crankshaft position sensor (POS) Accelerator pedal position sensor Refrigerant pressure sensor EVAP canister vent control valve EVAP canister Rubber hose from EVAP canister vent control valve to vehicle frame Battery current sensor Tumble control valve position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT

- Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT.
- 5. Make sure that "FUEL T/TMP SE" indication is more than 0°C (32°F).
- Start engine and wait at least 20 seconds.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

7. 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 and ground as per the following.

	ECM		
Connector	Terminal	Ground	
F8	43 (Fuel tank temperature sensor signal)	Ground	

- 3. Make sure that the voltage is less than 4.2 V.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and wait at least 20 seconds.
- 6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-786, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770588

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK CONNECTOR

- Disconnect EVAP control system pressure sensor harness connector.
- 2. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness connector.

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

- Turn ignition switch ON.
- Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control system pressure sensor		Ground	Voltage
Connector	Terminal		
B21	3	Ground	Approx. 5 V

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.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

•	tem pressure sen- or	ECM		Continuity
Connector	Terminal	Connector	Terminal	
B21	3	F8	76	Existed

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Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

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5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B4. M79
- Harness connectors M77, E105
- Harness connectors E8, F1
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
	69	Tumble control valve actuator	F22	1
	71	Battery current sensor	F53	1
F8	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
	76	EVAP control system pressure sensor	B21	3
E16	102	APP sensor	E110	5

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.

- Battery current sensor (Refer to <u>EC-846, "Component Inspection"</u>.)
- Crankshaft position sensor (POS) (Refer to <u>EC-737, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to EC-941, "Diagnosis Procedure".)
- Tumble control valve (Refer to <u>EC-880, "Component Inspection"</u>.)

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace malfunctioning component.

8. CHECK APP SENSOR

Refer to EC-896, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

10.check evap control system pressure sensor ground circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

•	tem pressure sen- or	ECM		Continuity
Connector	Terminal	Connector	Terminal	
B21	1	F8	51	Existed

^{4.} Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B4, M79
- Harness connectors M77, E105
- · Harness connectors E8, F1
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

12.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

•	tem pressure sen- or	ECM		Continuity
Connector	Terminal	Connector	Terminal	
B21	2	F8	42	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 B4, M79
- Harness connectors M77, E105
- Harness connectors E8. F1
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK RUBBER TUBE

- 1. Disconnect rubber tube connected to EVAP canister vent control valve.
- 2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 15.

NO >> Clean the rubber tube using an air blower, repair or replace rubber tube.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

15. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-770, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace EVAP canister vent control valve. Refer to FL-14, "Exploded View".

16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-779. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 17.

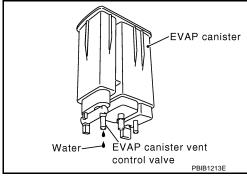
>> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View". NO

$17.\mathtt{CHECK}$ IF EVAP CANISTER IS SATURATED WITH WATER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- 2. Check if water will drain from the EVAP canister.

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 1.9 kg (4.2 lb).

Is the inspection result normal?

YES >> GO TO 20.

NO >> GO TO 19.

19. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-14, "Exploded View".

20.check intermittent incident

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Turn ignition switch OFF.

Component Inspection

- 2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. Always replace O-ring with a new one.
- 3. Install a vacuum pump to EVAP control system pressure sensor.
- Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

	ECM	Condition	Voltage
Connector	Terminal	[Applied vacuum kPa (kg/cm ² , psi)	voltage
F0	42	Not applied	1.8 - 4.8 V
F8	(EVAP control system pressure sensor signal)	-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 below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).

Is the inspection result normal?

YES >> INSPECTION END

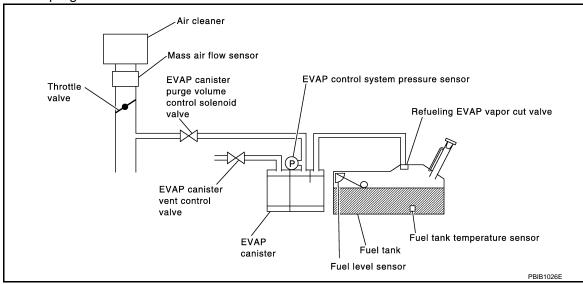
NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View".

P0455 EVAP CONTROL SYSTEM

DTC Logic INFOID:0000000007770590

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 dia	osis name DTC detecting condition	Possible cause
P0455 EVAP contr gross leak o	as the filler can left off EVAP control system	 Fuel filler cap remains open or fails to close. Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Foreign matter caught in fuel filler cap. Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. Foreign matter caught in EVAP canister vent control valve. EVAP canister or fuel tank leaks EVAP purge line (pipe and rubber tube) leaks EVAP purge line rubber tube bent. Loose or disconnected rubber tube EVAP canister vent control valve and the circuit EVAP canister purge volume control solenoid valve and the circuit Fuel tank temperature sensor O-ring of EVAP canister vent control valve is missing or damaged. EVAP control system pressure sensor Refueling EVAP vapor cut valve ORVR system leaks Drain filter

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 come on.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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CAUTION:

Never remove fuel filler cap during the DTC CONFIRMATION PROCEDURE.

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

TESTING CONDITION:

- Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedures.

Do you have CONSULT?

YES >> GO TO 2. NO >> GO TO 4.

2. PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT

- 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.
- 5. Make sure that the following conditions are met.

COOLAN TEMP/S: 0 - 70°C (32 - 158°F) INT/A TEMP SE: 0 - 30°C (32 - 86°F)

 Select "EVP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.

Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT screen, go to <u>EC-495</u>, "BASIC INSPECTION: Special Repair Requirement".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> GO TO 3.

3.check dtc

Check DTC.

Which DTC is detected?

P0455 >> Go to EC-792, "Diagnosis Procedure". P0442 >> Go to EC-754, "Diagnosis Procedure".

4. PERFORM DTC CONFIRMATION PROCEDURE

With GST

NOTE:

Be sure to read the explanation of DRIVING PATTERN in <u>EC-505</u>, "SRT Set Driving Pattern" before driving vehicle.

- Start engine.
- 2. Drive vehicle according to DRIVING PATTERN.
- 3. Stop vehicle.
- Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES-1 >> P0455: Go to <u>EC-792</u>, "<u>Diagnosis Procedure</u>". YES-2 >> P0442: Go to <u>EC-754</u>, "<u>Diagnosis Procedure</u>".

YES-3 >> P0441: Go to EC-749, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

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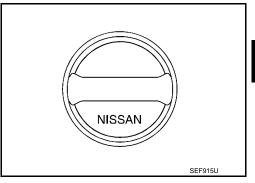
[MR18DE (FOR CALIFORNIA)]

- Turn ignition switch OFF.
- 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.

>> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Then retighten NO 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-795, "Component Inspection (Fuel filler cap)".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel filler cap with a genuine one.

5.CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection.

Refer to EC-563, "System Description".

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 DRAIN FILTER

Refer to EC-796, "Component Inspection (Drain filter)".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace drain filter. Refer to EC-563, "System Description".

8.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly.
- Refer to FL-14, "Exploded View".
- EVAP canister vent control valve. Refer to EC-770, "Component Inspection".

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace EVAP canister vent control valve and O-ring. Refer to FL-14, "Exploded View".

9.CHECK FOR EVAP LEAK

Refer to EC-987, "Inspection".

Is there any leak in EVAP line?

YES >> Repair or replace.

NO-1 >> With CONSULT: GO TO 10.

NO-2 >> Without CONSULT: GO TO 11.

10.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

(P)With CONSULT

- 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 2. Start engine.
- 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
- 4. Touch "Qu" on CONSULT screen to increase "PURG VOL C/V" opening to 100%.
- Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

⋈Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Stop engine.
- 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 4. Start engine and let it idle for at least 80 seconds.
- 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 12.

12. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-563, "System Description".

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 13.

YES-2 >> Without CONSULT: GO TO 14.

NO >> Repair or reconnect the hose.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

(P)With CONSULT

- Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 15.

NO >> GO TO 14.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-763, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-26, "Exploded View".

15. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-712, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace fuel level sensor unit. Refer to FL-5, "Exploded View".

16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-779, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 17.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-14. "Exploded View"</u>.

17. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-934, "Description".

Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair or replace hoses and tubes.

18. CHECK RECIRCULATION LINE

Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 19.

NO >> Repair or replace hose, tube or fuel filler tube.

19. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-937, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> GO TO 20.

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-9, "Exploded View".

20. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Fuel filler cap)

1. CHECK FUEL FILLER CAP

- 1. Turn ignition switch OFF.
- 2. Remove fuel filler cap.
- 3. Wipe clean valve housing.

Plate Spring
Pressure valve
Gasket Vacuum valve
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[MR18DE (FOR CALIFORNIA)]

-Vacuum/Pressure gauge

One-way

valve

-Fuel filler

Fuel filler cap adapter

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Install fuel filler cap adapter (commercial service tool) to fuel filler cap.

5. Check valve opening pressure and vacuum.

> Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22

> > - 2.90 psi)

Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm²,

-0.87 to -0.48 psi)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE FUEL FILLER CAP

Replace fuel filler cap.

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 Inspection (Drain filter)

INFOID:0000000007770593

Vacuum/

Pressure

pump

SEF9435

1. CHECK DRAIN FILTER

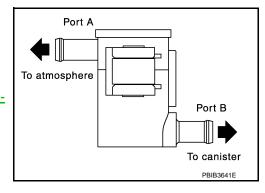
- Check visually for insect nests in the drain filter air inlet.
- Check visually for cracks or flaws in the appearance.
- Check visually for cracks or flaws in the hose.
- Blow air into port A and check that it flows freely out of port B.
- 5. Block port B.
- Blow air into port A and check that there is no leakage.

Is the inspection result normal?

YES >> INSPECTION END

>> Replace drain filter. Refer to EC-563, "System Descrip-NO

tion".



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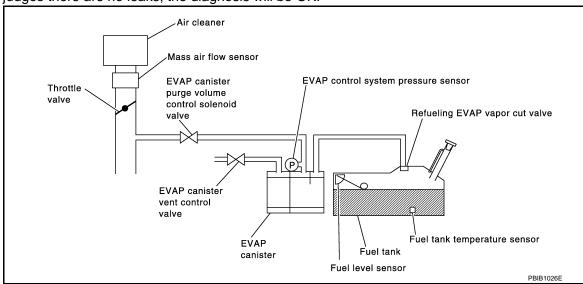
P0456 EVAP CONTROL SYSTEM

DTC Logic

DTC DETECTION LOGIC

This diagnosis detects leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the negative pressure caused by decrease of fuel temperature in the fuel tank after turning ignition switch OFF.

If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0456	Evaporative emission control system leak	EVAP system has a leak. EVAP system does not operate properly.	Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Fuel filler cap remains open or fails to close. Foreign matter caught in fuel filler cap. Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. Foreign matter caught in EVAP canister vent control valve. Foreign matter or fuel tank leaks EVAP canister or fuel tank leaks EVAP purge line (pipe and rubber tube) leaks EVAP purge line rubber tube bent Loose or disconnected rubber tube EVAP canister vent control valve and the circuit EVAP canister purge volume control solenoid valve and the circuit Fuel tank temperature sensor O-ring of EVAP canister vent control valve is missing or damaged EVAP canister is saturated with water EVAP control system pressure sensor Refueling EVAP vapor cut valve ORVR system leaks Fuel level sensor and the circuit Foreign matter caught in EVAP canister purge volume control solenoid valve

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC CONFIRMATION PROCEDURE

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

INFOID:0000000007770595

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

Do you have CONSULT?

YES >> GO TO 2. NO >> GO TO 4.

2.perform dtc confirmation procedure-i

(P)With CONSULT

- Turn ignition switch ON and select "EVAP DIAG READY" in "DATA MONITOR" mode with CONSULT.
- 2. Start engine and wait at idle until "OFF" of "EVAP DIAG READY" changes to "ON".

NOTE:

It will take at most 2 hours until "OFF" of "EVAP DIAG READY" changes to "ON".

3. Turn ignition switch OFF and wait at least 90 minutes.

NOTE:

Never turn ignition switch ON during 90 minutes.

- 4. Turn ignition switch ON and select "EVAP LEAK DIAG" in "DATA MONITOR" mode with CONSULT.
- 5. Check that "EVAP LEAK DIAG" indication.

Which is displayed on CONSULT?

CMPLT>> GO TO 3.

YET >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 1.

3.perform dtc confirmation procedure-ii

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-798, "Diagnosis Procedure".

NO >> INSPECTION END.

4. PERFORM DTC CONFIRMATION PROCEDURE

With GST

- 1. Start engine and wait engine idle for at least 2 hours.
- 2. Turn ignition switch OFF and wait at least 90 minutes.

NOTE:

Never turn ignition switch ON during 90 minutes.

- 3. Turn ignition switch ON.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-798, "Diagnosis Procedure".

NO >> INSPECTION END.

Diagnosis Procedure

1. CHECK FUEL FILLER CAP DESIGN

Turn ignition switch OFF.

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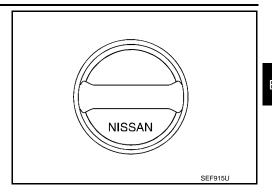
[MR18DE (FOR CALIFORNIA)]

2. Check for genuine NISSAN fuel filler cap design.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace with genuine NISSAN fuel filler cap.



2.CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Then retighten until ratcheting sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-802, "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-987, "Inspection".

Is there any leak in EVAP line?

YES >> Repair or replace.

NO >> GO TO 6.

6. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

EVAP canister vent control valve is installed properly.

Refer to FL-14, "Exploded View".

EVAP canister vent control valve.

Refer to EC-774, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace EVAP canister vent control valve and O-ring. Refer to FL-14. "Exploded View".

7.CHECK IF EVAP CANISTER SATURATED WITH WATER

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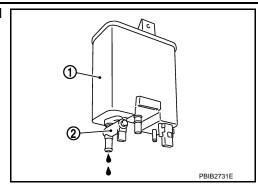
[MR18DE (FOR CALIFORNIA)]

- 1. Remove EVAP canister (1) with EVAP canister vent control valve (2) and EVAP control system pressure sensor attached.
- 2. Check if water will drain from the EVAP canister.

Does water drain from EVAP canister?

YES >> GO TO 8.

NO-1 >> With CONSULT: GO TO 10. NO-2 >> Without CONSULT: GO TO 11.



8. CHECK EVAP CANISTER

Weigh the EVAP canister assembly with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.2 kg (4.9 lb).

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 10.

YES-2 >> Without CONSULT: GO TO 11.

NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-14, "Exploded View".

10.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

(P)With CONSULT

- 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 2. Start engine and let it idle.
- 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode.
- 4. Touch "Qu" on CONSULT screen to increase "PURG VOL CONT/V" opening to 100%.
- 5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

♥Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Stop engine.
- 3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
- 4. Start engine and let it idle for at least 80 seconds.
- 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

12. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to <u>EC-563</u>, "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-763. "Component Inspection". Is the inspection result normal? YES >> GO TO 14. NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-26. "Exploded View". 14. CHECK FUEL TANK TEMPERATURE SENSOR Refer to EC-712. "Component Inspection". Is the inspection result normal? YES >> GO TO 15. NO >> Replace fuel level sensor unit. Refer to FL-5. "Exploded View". 15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR Refer to EC-779. "Component Inspection". Is the inspection result normal? YES >> GO TO 16. NO >> Replace EVAP control system pressure sensor. Refer to FL-14. "Exploded View". 16. CHECK EVAP PURGE LINE Check EVAP purge line (pipe, nubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-563. "System Description". Is the inspection result normal? YES >> GO TO 17. NO >> Repair or reconnect the hose. 17. CLEAN EVAP PURGE LINE Clean EVAP purge line (pipe and rubber tube) using air blower. >> GO TO 18. 18. CHECK EVAP/ORVR LINE Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-934. "Description". Is the inspection result normal? YES >> GO TO 19. NO >> Repair or replace hoses and tubes. 19. CHECK RECIRCULATION LINE Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection. Ste inspection result normal? YES >> GO TO 20. NO >> Repair or replace hose tube or fuel filler tube.	< DTC/CIRCUIT DIAGNOSIS >	[MR18DE (FOR CALIFORNIA)]
Refer to EC-763. "Component Inspection". Is the inspection result normal? YES > GO TO 14. NO > Replace EVAP canister purge volume control solenoid valve. Refer to EM-26. "Exploded View". 14. CHECK FUEL TANK TEMPERATURE SENSOR Refer to EC-712. "Component Inspection". Is the inspection result normal? YES >> GO TO 15. NO > Replace fuel level sensor unit. Refer to FL-5. "Exploded View". 15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR Refer to EC-779. "Component Inspection". Is the inspection result normal? YES >> GO TO 16. NO >> Replace EVAP control system pressure sensor. Refer to FL-14. "Exploded View". 16. CHECK EVAP PURGE LINE Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-53. "System Description". Is the inspection result normal? YES >> GO TO 17. NO >> Repair or reconnect the hose. 17. CLEAN EVAP PURGE LINE Clean EVAP purge line (pipe and rubber tube) using air blower. >> GO TO 18. 18. CHECK EVAP/ORVR LINE Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-934. "Description". Is the inspection result normal? YES >> GO TO 19. NO >> Repair or replace hoses and tubes. 19. CHECK EVCRULATION LINE Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection. In line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection. In line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection. Is the inspection result normal? YES >> GO TO 20.		
Refer to EC-763, "Component Inspection". Is the inspection result normal? YES >> GO TO 14. NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-26, "Exploded View". 14. CHECK FUEL TANK TEMPERATURE SENSOR Refer to EC-712, "Component Inspection". Is the inspection result normal? YES >> GO TO 15. NO >> Replace fuel level sensor unit. Refer to FL-5, "Exploded View". 15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR Refer to EC-779, "Component Inspection". Is the inspection result normal? YES >> GO TO 16. NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View". 16. CHECK EVAP PURGE LINE Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-563, "System Description". Is the inspection result normal? YES >> GO TO 18. 17. CLEAN EVAP PURGE LINE Clean EVAP purge line (pipe and rubber tube) using air blower. >> GO TO 18. 18. CHECK EVAP/ORVR LINE Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-934, "Description". Is the inspection result normal? YES >> GO TO 19. NO >> Repair or replace hoses and tubes. 19. CHECK RECIRCULATION LINE Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection. Is the inspection result normal? YES >> GO TO 20.	·	
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Is the inspection result normal? YES >> GO TO 20.	Check recirculation line between fuel filler tube and fuel tank for close	gging, kink, cracks, looseness and
YES >> GO TO 20.	···	1
N() >> Renair or replace hose tube or fuel filler tube	YES >> GO TO 20.	
	NO >> Repair or replace hose, tube or fuel filler tube.	(
20. CHECK REFUELING EVAP VAPOR CUT VALVE		
Refer to EC-937, "Component Inspection (Refueling EVAP vapor cut valve)".		
Is the inspection result normal? YES >> GO TO 21.	·	I
NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to <u>FL-9, "Exploded View"</u> .		to FL-9, "Exploded View".
21.check fuel level sensor	21.check fuel level sensor	
Refer to MWI-43, "Component Inspection".	Refer to MWI-43, "Component Inspection".	
Is the inspection result normal?		

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YES >> GO TO 22.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

NO >> Replace fuel level sensor unit. Refer to FL-5, "Exploded View".

22. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

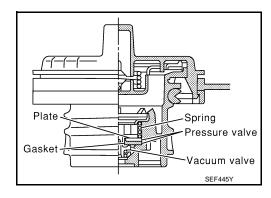
>> INSPECTION END

Component Inspection

INFOID:0000000007770596

1. CHECK FUEL TANK VACUUM RELIEF VALVE

- 1. Turn ignition switch OFF.
- 2. Remove fuel filler cap.
- 3. Wipe clean valve housing.



4. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 -

2.90 psi)

Vacuum: −6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm²,

-0.87 to -0.48 psi)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

Fuel filler cap adapter Vacuum/Pressure gauge Vacuum/ Pressure pump One-way valve SEF943S

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 come on.

>> INSPECTION END

P0460 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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P0460 FUEL LEVEL SENSOR

Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P0460 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0460 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-822, "DTC Logic"</u>.

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
P0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (The sensor circuit is open or shorted) Combination meter Fuel level sensor	Н

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and wait maximum of 2 consecutive minutes.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-803, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK COMBINATION METER FUNCTION

Refer to MWI-30, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Refer to MWI-42, "Component Function Check"

2. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Revision: 2011 November EC-803 2012 CUBE

P0461 FUEL LEVEL SENSOR

Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

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-822, "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) Combination meter Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-804, "Component Function Check".

Use component function check to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-805, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007770602

1.PRECONDITIONING

WARNING:

When performing following procedure, be sure to observe the handling of the fuel. Refer to <u>FL-2</u>, <u>"General Precautions"</u>.

TESTING CONDITION:

Before starting component function check, preparation of draining fuel and refilling fuel is required.

Do you have CONSULT?

YES >> GO TO 2. NO >> GO TO 3.

2. PERFORM COMPONENT FUNCTION CHECK

(P)With CONSULT

NOTE:

Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 $\,\ell$ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

Prepare a fuel container and a spare hose.

P0461 FUEL LEVEL SENSOR	
< DTC/CIRCUIT DIAGNOSIS > [MR18DE (FOR CALIFORNIA)]	
 Release fuel pressure from fuel line, refer to <u>EC-985</u>. "Inspection". Remove the fuel feed hose on the fuel level sensor unit. Connect a spare fuel hose where the fuel feed hose was removed. Turn ignition switch OFF and wait at least 10 seconds then turn ON. 	А
 Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT. Check "FUEL LEVEL SE" output voltage and note it. Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT. 	EC
9. Touch "ON" and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it. 10. Check "FUEL LEVEL SE" output voltage and note it. 11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal). 12. Check "FUEL LEVEL SE" output voltage and note it.	С
13. Confirm whether the voltage changes more than 0.03 V during step 7 to 10 and 10 to 12. <u>Is the inspection result normal?</u> YES >> INSPECTION END	D
NO >> Go to EC-805, "Diagnosis Procedure".	Е
3.PERFORM COMPONENT FUNCTION CHECK	_
NOTE: Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8	F
 Imp gal) in advance. Prepare a fuel container and a spare hose. Release fuel pressure from fuel line. Refer to <u>EC-985</u>, "Inspection". Remove the fuel feed hose on the fuel level sensor unit. 	G
 Connect a spare fuel hose where the fuel feed hose was removed. Turn ignition switch ON. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment. 	Н
 7. Confirm that the fuel gauge indication varies. 8. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal). 9. Confirm that the fuel gauge indication varies. 	I
Is the inspection result normal? YES >> INSPECTION END NO >> Go to EC-805, "Diagnosis Procedure".	J
Diagnosis Procedure	K
1. CHECK COMBINATION METER FUNCTION	
Refer to MWI-30, "CONSULT Function (METER/M&A)".	L
Is the inspection result normal?	
YES >> GO TO 2. NO >> Refer to MWI-42, "Component Function Check"	M
2.CHECK INTERMITTENT INCIDENT	IVI
Refer to GI-41, "Intermittent Incident".	
	Ν
>> INSPECTION END	
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P0462, P0463 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P0462, P0463 FUEL LEVEL SENSOR

Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line.

It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P0462 or P0463 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0462 or P0463 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-822, "DTC Logic"</u>.

This diagnosis indicates the former, to detect open or short circuit malfunction.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0462	Fuel level sensor circuit 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) Combination meter Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 11 V and 16 V at ignition switch ON.

>> 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-806, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770606

1.CHECK COMBINATION METER FUNCTION

Refer to MWI-30, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Refer to MWI-42, "Component Function Check"

2.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

P0462, P0463 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

>> INSPECTION END

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P0500 VSS M/T MODELS

M/T MODELS: Description

INFOID:0000000007770607

The vehicle speed signal is sent to the combination meter from the "ABS actuator and electric unit (control unit)" via the CAN communication line. The combination meter then sends a signal to the ECM via the CAN communication line.

M/T MODELS: DTC Logic

INFOID:0000000007770608

DTC DETECTION LOGIC

NOTE:

- If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-822, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500	Vehicle speed sensor	The vehicle speed signal sent to ECM is almost 0 km/h (0 MPH) even when vehicle is being driven.	Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (The vehicle speed signal circuit is open or shorted) Wheel sensor Combination meter ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> 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

- 1. Start engine.
- Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT. The vehicle speed on CONSULT should exceed 10 km/h (6 mph) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Go to EC-809, "M/T MODELS : Diagnosis Procedure".

4. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Select "DATA MONITOR" mode with CONSULT.
- Warm engine up to normal operating temperature.
- Maintain the following conditions for at least 50 consecutive seconds.
 CAUTION:

Always drive vehicle at a safe speed.

NOTE:

ENG SPEED	2,200 - 6,000 rpm	
COOLAN TEMP/S	More than 70°C (158°F)	
B/FUEL SCHDL	4.0 - 31.8 msec	E
Selector lever	Except Neutral position	
PW/ST SIGNAL	OFF	
4. Check 1st trip DTC.		
Is 1st trip DTC detected?	-	
YES >> Go to <u>EC-80</u> NO >> INSPECTIO	9, "M/T MODELS : Diagnosis Procedure".	
_	NENT FUNCTION CHECK	
		Composert Function Chaptel
	tion check. Refer to <u>EC-809, "M/T MODELS : C</u> check to check the overall function of the vel	
check, a 1st trip DTC mig		mene of each eigenen enemm i annig inne
Is the inspection result ne	ormal?	
YES >> INSPECTIO		
	99, "M/T MODELS : Diagnosis Procedure".	
M/I MODELS : Cor	mponent Function Check	INFOID:0000000007770609
1.PERFORM COMPON	NENT FUNCTION CHECK	
⊚With GST		
1. Lift up drive wheels.		
2. Start engine.		
	signal in Service \$01 with GST. ignal on GST should be able to exceed 10 km/	h (6 MPH) when rotating wheels with
suitable gear position		in (6 im 11) when retaining whoole with
Is the inspection result ne	ormal?	
YES >> INSPECTIO		
	9, "M/T MODELS : Diagnosis Procedure".	
M/T MODELS : Dia	gnosis Procedure	INFOID:000000007770610
1. CHECK DTC WITH "A	ABS ACTUATOR AND ELECTRIC UNIT (CONT	ROL UNIT)"
Refer to BRC-23, "CONS	<u> </u>	
Is the inspection result no		
YES >> GO TO 2.		
NO >> Repair or rep		
2. CHECK COMBINATION	ON METER	
Refer to MWI-30, "CONS	SULT Function (METER/M&A)".	
>> INSPECTIO		
EXCEPT FOR M/T	MODELS	
EXCEPT FOR M/T	MODELS : Description	INFOID:000000007770611
ECM receives vehicle sr	peed signals from two different paths via CAN	communication line: One is from the
	c unit (control unit) via the combination unit and	
EXCEPT FOR M/T	MODELS : DTC Logic	INFOID:000000007770612
	-	
DTC DETECTION LOC	3IC	

< DTC/CIRCUIT DIAGNOSIS >

- If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-822</u>, "DTC Logic".

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0500	VEH SPEED SEN/CIRC (Vehicle speed sensor)	At 20 km/h (13 MPH), ECM detects the following status continuously for 5 seconds or more: The difference between a vehicle speed calculated by a output speed sensor transmitted from TCM to ECM via CAN communication and the vehicle speed indicated on the combination meter exceeds 15km/h (10 MPH).	 Harness or connector (The CAN communication line is open or shorted.) Combination meter ABS actuator and electric unit (control unit) Wheel sensor TCM Output speed sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 10 V or more at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine.
- 2. Shift the selector lever to D range and wait at least for 2 seconds.
- Drive the vehicle at least 5 seconds at 20 km/h (13 MPH) or more.

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-810, "EXCEPT FOR M/T MODELS : Diagnosis Procedure"

NO >> INSPECTION END

EXCEPT FOR M/T MODELS : Diagnosis Procedure

INFOID:0000000007770613

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-98, "CONSULT Function (TRANSMISSION)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.

$\overline{2}$.check dtc with abs actuator and electric unit (control unit)

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-23. "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform trouble shooting relevant to DTC indicated.

3. CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to MWI-30, "CONSULT Function (METER/M&A)".

P0500 VSS

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[MR18DE (FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS >	[MR18DE (FOR CALIFORNIA)]
Is the inspection result normal?	
YES >> GO TO 4.	А
NO >> Perform trouble shooting relevant to DTC indicated.	
4.CHECK OUTPUT SPEED SENSOR	F.C.
Check output speed sensor. Refer to TM-118, "Diagnosis Procedure".	EC
Is the inspection result normal?	
YES >> GO TO 5.	С
NO >> Replace or replace error-detected parts.	
5.check wheel sensor	
Check wheel sensor. Refer to BRC-41, "Diagnosis Procedure".	D
Is the inspection result normal?	
YES >> Check intermittent incident. Refer to GI-41, "Intermittent Inc	<u>sident"</u> .
NO >> Replace or replace error-detected parts.	E
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P0506 ISC SYSTEM

Description INFOID:000000007770614

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0506	Idle speed control system RPM lower than expected	The idle speed is less than the target idle speed by 100 rpm or more.	Electric throttle control actuator Intake air leak

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

If the target idle speed is out of the specified value, perform <u>EC-501, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"</u>, before conducting DTC Confirmation Procedure.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.
- Always perform the test at a temperature above –10°C(14°F).

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. 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-812, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770616

1. CHECK INTAKE AIR LEAK

- Start engine and let it idle.
- Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Discover air leak location and repair.

NO >> GO TO 2.

2.REPLACE ECM

- 1. Stop engine.
- 2. Replace ECM.

P0506 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

3. Perform <u>EC-498</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

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P0507 ISC SYSTEM

Description INFOID:000000007770617

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0507	Idle speed control system RPM higher than expected	The idle speed is more than the target idle speed by 200 rpm or more.	Electric throttle control actuator Intake air leak PCV system

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

If the target idle speed is out of the specified value, perform <u>EC-501, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"</u>, before conducting DTC Confirmation Procedure.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.
- Always perform the test at a temperature above –10°C(14°F).

>> GO TO 2.

2.perform dtc confirmation procedure

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. 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-814, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770619

1.CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

2. CHECK INTAKE AIR LEAK

- 1. Start engine and let it idle.
- Listen for an intake air leak after the mass air flow sensor.

P0507 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS > [MR18DE (FOR CALIFORNIA)	
Is intake air leak detected?	
YES >> Discover air leak location and repair. NO >> GO TO 3.	A
3.REPLACE ECM	EC
 Stop engine. Replace ECM. Perform <u>EC-498</u>, "<u>ADDITIONAL SERVICE WHEN REPLACING Requirement"</u>. 	_
>> INSPECTION END	D
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EC-815 2012 CUBE Revision: 2011 November

P050A, P050B, P050E COLD START CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P050A, P050B, P050E COLD START CONTROL

Description INFOID:000000007770620

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 P050A, P050B or P050E is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P050A	Cold start idle air control system performance	ECM does not control engine idle speed properly when engine is started with pre-warming up condition.	
P050B	Cold start ignition timing performance	ECM does not control ignition timing properly when engine is started with pre-warming up condition.	Lack of intake air volumeFuel injection systemECM
P050E	Cold start engine exhaust temperature too low	The temperature of the catalyst inlet does not rise to the proper temperature when the engine is started with pre-warming up condition.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

(P)With CONSULT

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Select "DATA MONITOR" mode with CONSULT.
- Check the indication of "COOLAN TEMP/S".

Follow the procedure "With CONSULT" above.

Is the value of "COOLAN TEMP/S" between 15°C (59°F) and 36°C (97°F)?

YES >> GO TO 3.

NO-1 [If it is below 15°C (59°F)]>>Warm up the engine until the value of "COOLAN TEMP/S" reaches 15°C (59°F) or more. Retry from step 1.

NO-2 [If it is above 36°C (97°F)]>>Cool engine down to less than 36°C (97°F). Retry from step 1.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

(P)With CONSULT

- Set the select lever in N range.
- Start the engine and warm up in idle with the value of "COOLAN TEMP/S" between 15°C (59°F) and 40°C (104°F) for more than 15 seconds.
- 3. Check 1st trip DTC.

P050A, P050B, P050E COLD START CONTROL

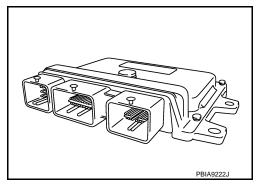
P050A, P050B, P050E COLD START (
< DTC/CIRCUIT DIAGNOSIS >	[MR18DE (FOR CALIFORNIA)]
With GST Follow the procedure "With CONSULT" above.	А
Is 1st trip DTC detected?	
YES >> Go to <u>EC-817</u> , " <u>Diagnosis Procedure</u> ". NO >> INSPECTION END	EC
Diagnosis Procedure	INFOID:0000000007770622
1.PERFORM IDLE AIR VOLUME LEARNING	C
Perform EC-501, "IDLE AIR VOLUME LEARNING: Special Repair Requi	rement".
Is Idle Air Volume Learning carried out successfully? YES >> GO TO 2.	D
NO >> Follow the instruction of Idle Air Volume Learning.	
2.CHECK INTAKE SYSTEM	E
Check for the cause of intake air volume lacking. Refer to the following.	
Crushed intake air passageIntake air passage clogging	F
Clogging of throttle body	
Is the inspection result normal?	G
YES >> GO TO 3. NO >> Repair or replace malfunctioning part	G
3. CHECK FUEL INJECTION SYSTEM FUNCTION	
Perform DTC Confirmation Procedure for DTC P0171. Refer to EC-701, "	DTC Logic".
Is the inspection result normal?	
YES >> GO TO 4. NO >> Go to <u>EC-702</u> , " <u>Diagnosis Procedure</u> " for DTC P0171.	I
4.PERFORM DTC CONFIRMATION PROCEDURE	
Turn ignition switch ON.	J
 Erase DTC. Perform DTC Confirmation Procedure. 	
See EC-816, "DTC Logic".	K
Is the 1st trip DTC P050A, P050B or P050E displayed again?	
YES >> GO TO 5. NO >> INSPECTION END	L
5.REPLACE ECM	
1. Replace ECM.	N.A.
2. Perform EC-498, "ADDITIONAL SERVICE WHEN REPLACING	CONTROL UNIT : Special Repair
Requirement".	
>> INSPECTION END	N
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P0603 ECM POWER SUPPLY

Description INFOID:000000007770623

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.



INFOID:0000000007770625

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 before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.perform dtc confirmation procedure

- 1. Turn ignition switch ON and wait at least 10 seconds.
- 2. Turn ignition switch OFF and wait at least 5 minutes
- 3. Turn ignition switch ON and wait at least 10 seconds.
- Repeat steps 2 and 3 for five times.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-818, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK ECM POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the voltage between ECM harness connector and ground.

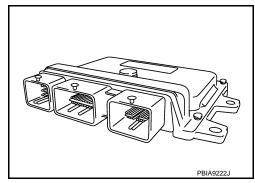
EC	M	Ground	Voltage	
Connector	Terminal			
F8 66		Ground	Battery voltage	

P0603 ECM POWER SUPPLY			
< DTC/CIRCUIT DIAGNOSIS > [MR18DE (FOR CALIFORNIA)]			
Is the inspection result normal?	Α		
YES >> GO TO 3. NO >> GO TO 2.	A		
2. DETECT MALFUNCTIONING PART			
Check the following.	EC		
 20 A fuse (No. 43) IPDM E/R harness connector E14 			
Harness for open or short between ECM and IPDM E/R	С		
>> Repair or replace harness or connectors.	D		
3. CHECK INTERMITTENT INCIDENT			
Refer to GI-41, "Intermittent Incident". Is the inspection result normal?	Е		
YES >> GO TO 4.	_		
NO >> Repair or replace harness or connectors.	_		
4.PERFORM DTC CONFIRMATION PROCEDURE	F		
With CONSULT Turn ignition quitab ON			
 Turn ignition switch ON. Select "SELF-DIAG RESULTS" mode with CONSULT. 	G		
 Touch "ERASE". Perform DTC CONFIRMATION PROCEDURE. 			
See EC-818, "DTC Logic".	Н		
With GST Turn ignition quitab CNI			
 Turn ignition switch ON. Select Service \$04 with GST. 	1		
3. Perform DTC CONFIRMATION PROCEDURE. See EC-818, "DTC Logic".			
Is the 1st trip DTC P0603 displayed again?			
YES >> GO TO 5.	J		
NO >> INSPECTION END			
5.REPLACE ECM	K		
 Replace ECM. Perform EC-498, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Special Repair 			
Requirement".	L		
INCRECTION END			
>> INSPECTION END	M		
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P0605 ECM

Description INFOID:000000007770626

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
P0605	Engine control module	A)	ECM calculation function is malfunctioning.	
		B)	ECM EEP-ROM system is malfunctioning.	• ECM
		C)	ECM self shut-off function is malfunctioning.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Turn ignition switch ON.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-821, "Diagnosis Procedure".

NO >> GO TO 3.

${f 3.}$ PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-821, "Diagnosis Procedure".

NO >> GO TO 4.

f 4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- Repeat step 2 for 32 times.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-821, "Diagnosis Procedure".

NO >> INSPECTION END

P0605 ECM

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Diagnosis Procedure

INFOID:0000000007770628

1.INSPECTION START

- 1. Turn ignition switch ON.
- 2. Erase 1st trip DTC. Refer to "How to Erase DTC and 1st Trip DTC" in EC-600, "CONSULT Function".
- 3. Perform DTC CONFIRMATION PROCEDURE. Refer to EC-820, "DTC Logic".

Is the 1st trip DTC P0605 displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

2.REPLACE ECM

- Replace ECM.
- 2. Perform <u>EC-498</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

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P0607 ECM

Description INFOID:000000007770629

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.
- 2. Check DTC.

Is DTC detected?

YES >> Go to EC-822, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770631

1. INSPECTION START

- Turn ignition switch ON.
- 2. Erase DTC. Refer to "How to Erase DTC and 1st Trip DTC" in EC-600, "CONSULT Function".
- Perform DTC CONFIRMATION PROCEDURE. Refer to <u>EC-822, "DTC Logic"</u>.
- 4. Check DTC.

Is the DTC P0607 displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

2.REPLACE ECM

- 1. Replace ECM.
- 2. Perform <u>EC-498</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT: Special Repair Requirement".

>> INSPECTION END

P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P0643 SENSOR POWER SUPPLY

DTC Logic INFOID:0000000007770632

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0643	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	Harness or connectors (APP sensor 1 circuit is shorted.) (TP sensor circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] Accelerator pedal position sensor Throttle position sensor Camshaft position sensor (PHASE)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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 let it idle for 1 second. 1.
- Check DTC.

Is DTC detected?

YES >> Go to EC-823, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

- Disconnect accelerator pedal position (APP) sensor harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between APP sensor harness connector and ground.

APP :	sensor	Ground	Voltage	
Connector	Terminal	Ground	voltage	
E110	4	Ground	Approx. 5 V	

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 3.

3.check sensor power supply circuits

Check harness for short to power and short to ground, between the following terminals.

EC-823 Revision: 2011 November 2012 CUBE

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P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

ECM		Sensor		
Connector Terminal		Name	Connector	Terminal
F8	72	Electric throttle control actuator	F29	2
10	78	CMP sensor (PHASE)	F26	1
E16	106	APP sensor	E110	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.

Camshaft position sensor (PHASE) (Refer to <u>EC-740, "Component Inspection"</u>.)

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace camshaft position sensor (PHASE). Refer to EM-55, "Exploded View".

5. CHECK TP SENSOR

Refer to EC-657, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-26, "Exploded View".

>> INSPECTION END

7. CHECK APP SENSOR

Refer to EC-896, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

>> GO TO 8. NO

8. REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

>> INSPECTION END

9. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

P0850 PNP SWITCH

Description INFOID:0000000007770634

For CVT models, transmission range switch is turn ON when the selector lever is P or N. For M/T models, park/neutral position (PNP) range switch is ON when the selector lever is Neutral position. ECM detects the position because the continuity of the line (the ON) exists.

DTC Logic INFOID:0000000007770635

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0850	Park/neutral position switch	For CVT models, the signal of transmission range switch is not changed in the process of engine starting and driving. For M/T models, the signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	Harness or connectors [The transmission range switch circuit is open or shorted.(CVT models)] [The park/neutral position (PNP) switch circuit is open or shorted.(M/T models)] Transmission range switch (CVT models) Park/neutral position (PNP) switch (M/T models)

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.CHECK PNP SWITCH FUNCTION

(P)With CONSULT

- Turn ignition switch ON.
- 2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT. Then check the "P/N POSI SW" signal under the following conditions.

Selector lever position	Known-good signal
N or P position (CVT) Neutral position (M/T)	ON
Except above position	OFF

Is the inspection result normal?

YES >> GO TO 4.

NO >> Go to EC-826, "Diagnosis Procedure".

4. PERFORM DTC CONFIRMATION PROCEDURE

- Select "DATA MONITOR" mode with CONSULT.
- Start engine and warm it up to normal operating temperature.
- Maintain the following conditions for at least 60 consecutive seconds. **CAUTION:**

Always drive vehicle at a safe speed.

EC-825 Revision: 2011 November 2012 CUBE

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< DTC/CIRCUIT DIAGNOSIS >

ENG SPEED	1,200 - 6,375 rpm
	, , ,
COOLAN TEMP/S	More than 70°C (158°F)
	, , , , , , , , , , , , , , , , , , , ,
B/FUEL SCHDL	2.5 - 31.8 msec
27: 022 00::22	2.0 01.0000
VHCL SPEED SE	More than 64 km/h (40 mph)
71102 01 22B 02	more than or langin (10 mpin)
Selector lever	Suitable position
Ociocioi icvoi	Outlable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-826, "Diagnosis Procedure".

NO >> INSPECTION END

${f 5.}$ PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-826, "Component Function Check".

NOTE:

Use component function check the overall function of the transmission range switch circuit (CVT models) or the park/neutral position (PNP) switch circuit (M/T models). During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-826, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007770636

1. PERFORM COMPONENT FUNCTION CHECK

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector and ground under the following conditions.

ECM		Ground	Condition		Voltage
Connector	Terminal	Giodila	Condition		voltage
F7	14 (PNP signal)	Ground	Selector lever	P or N (CVT) Neutral (M/T)	Approx. 0 V
				Except above	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-826, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007770637

1. check transmission range switch (cvt) or pnp switch (m/t) power supply circuit

- 1. Turn ignition switch OFF.
- Disconnect transmission range switch (CVT) or park/neutral position (PNP) switch (M/T) harness connector.
- Turn ignition switch ON.
- Check the voltage between transmission range switch (CVT) or PNP switch (M/T) harness connector and ground.

CVT models

Transmission	range switch	Ground	Voltage	
Connector	Terminal	Glound		
F21	1	Ground	Battery voltage	

P0850 PNP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

M/T models				
PNP swit	ch (M/T)	Ground	Voltage	
Connector	Terminal	Ground	vollage	
F23	2	Ground	Battery voltage	
the inspection	n result normal	?		
YES >> GO				
NO >> GO				
DETECT MA	LFUNCTIONIN	NG PART		
heck the follow				
Harness conn Harness conn	ectors Eo, Fi ectors E105, M	177 (M/T)		
IPDM E/R har	ness connecto			
10 A fuse (No 10 A fuse (No				
		tween PNP sw	itch and fuse (M	/T)
•	n result normal		`	•
>> Rer	pair open circui	t or short to gro	ound or short to p	power in harness or connectors.
.CHECK PNF	SWITCH INP	UT SIGNAL CI	RCUIT FOR OP	EN AND SHORT
	n switch OFF.			
Disconnect	ECM harness			
			on range switch	(CVT) or PNP switch (M/T) harness connector
	arness connec	ior.		
CVT models				
- · ·		_	014	
Transmission	_		CM	Continuity
Connector	Terminal	Connector	Terminal	
Connector F21	_			Continuity
Connector F21 M/T models	Terminal 2	Connector F7	Terminal 14	
Connector F21 M/T models PNP s	Terminal 2 witch	Connector F7	Terminal 14	
Connector F21 M/T models PNP s Connector	Terminal 2 switch Terminal	Connector F7 E Connector	Terminal 14 CM Terminal	Existed Continuity
Connector F21 M/T models PNP s Connector F23	Terminal 2 witch Terminal 3	Connector F7 E Connector F7	Terminal 14 CM Terminal 14	Existed Continuity Existed
Connector F21 M/T models PNP s Connector F23 Also check	Terminal 2 witch Terminal 3 harness for she	Connector F7 Connector F7 ort to ground as	Terminal 14 CM Terminal	Existed Continuity Existed
Connector F21 M/T models PNP s Connector F23 Also check the inspection	Terminal 2 witch Terminal 3 harness for shown result normal	Connector F7 Connector F7 ort to ground as	Terminal 14 CM Terminal 14	Existed Continuity Existed
Connector F21 M/T models PNP s Connector F23 Also check the inspection YES >> GO	Terminal 2 witch Terminal 3 harness for shown result normal? TO 4.	Connector F7 Connector F7 ort to ground an	Terminal 14 CM Terminal 14 nd short to power	Existed Continuity Existed r.
Connector F21 M/T models PNP s Connector F23 Also check the inspection YES >> GO NO >> Rep	Terminal 2 switch Terminal 3 harness for short result normal? TO 4. pair open circuit	Connector F7 Connector F7 ort to ground and and and and and and and and and a	Terminal 14 CM Terminal 14 nd short to powe	Continuity Existed r. Dower in harness or connectors.
Connector F21 M/T models PNP s Connector F23 Also check the inspection YES >> GO NO >> Rep	Terminal 2 switch Terminal 3 harness for short result normal TO 4. pair open circuit	Connector F7 Connector F7 ort to ground and and and and and and and and and a	Terminal 14 CM Terminal 14 nd short to power bund or short to power H (CVT) OR PN	Continuity Existed r. Dower in harness or connectors. P SWITCH (M/T)
Connector F21 M/T models PNP s Connector F23 Also check the inspection YES >> GO NO >> Rep CHECK TRA efer to TM-11	Terminal 2 switch Terminal 3 harness for short result normal TO 4. pair open circuit NSMISSION F	Connector F7 Connector F7 ort to ground and and and and and and and and and a	Terminal 14 CM Terminal 14 nd short to power bund or short to power H (CVT) OR PN ransmission Rai	Continuity Existed r. Dower in harness or connectors.
Connector F21 M/T models PNP s Connector F23 Also check the inspection YES >> GO NO >> Rep CHECK TRA efer to TM-11 OSITION (PNI	Terminal 2 switch Terminal 3 harness for short result normal TO 4. pair open circuit NSMISSION F	Connector F7 Connector F7 ort to ground and and and and and and and and and a	Terminal 14 CM Terminal 14 nd short to power bund or short to power H (CVT) OR PN ransmission Rai	Continuity Existed r. Dower in harness or connectors. P SWITCH (M/T)
Connector F21 M/T models PNP s Connector F23 Also check the inspection YES >> GO NO >> Rep -CHECK TRA Lefer to TM-11 OSITION (PNI	Terminal 2 switch Terminal 3 harness for shor result normal TO 4. pair open circuit NSMISSION F 0. "Componen P) SWITCH : Con result normal	Connector F7 Connector F7 ort to ground and and and and and and and and and a	Terminal 14 CM Terminal 14 nd short to power bund or short to power H (CVT) OR PN ransmission Rai	Continuity Existed r. Dower in harness or connectors. P SWITCH (M/T)
Connector F21 M/T models PNP s Connector F23 Also check the inspection YES >> GO NO >> Rep CHECK TRA efer to TM-11 OSITION (PNI the inspection YES >> GO NO >> Rep	Terminal 2 witch Terminal 3 harness for short result normal TO 4. pair open circuit NSMISSION For the component of the compo	Connector F7 Connector F7 Ort to ground and the content of the c	Terminal 14 CM Terminal 14 nd short to power the (CVT) OR PN ransmission Rail pection" (M/T).	Continuity Existed r. Dower in harness or connectors. P SWITCH (M/T)
Connector F21 M/T models PNP s Connector F23 Also check the inspection YES >> GO NO >> Rep CHECK TRA efer to TM-11 OSITION (PNI the inspection YES >> GO NO >> Rep TYPES >> GO NO >> Rep	Terminal 2 witch Terminal 3 harness for short result normal TO 4. Dair open circuit NSMISSION FOR TERMINATION FOR TERMINATION FOR TERMINATION FOR TERMINATION FOR TERMINATION FOR TERMINATION SUBJECT TO 5. Dair cesult normal	Connector F7 Connector F7 Connector F7 Ort to ground and P ANGE SWITC Linspection (Tomponent Inspection (Terminal 14 CM Terminal 14 nd short to power the (CVT) OR PN ransmission Rail pection" (M/T).	Continuity Existed r. Dower in harness or connectors. P SWITCH (M/T) Inge Switch)" (CVT) or TM-8, "PARK/NEUTRAL
Connector F21 M/T models PNP s Connector F23 Also check the inspection YES >> GO NO >> Rep CHECK TRA efer to TM-11 OSITION (PNI the inspection YES >> GO NO >> Rep TYPES >> GO	Terminal 2 witch Terminal 3 harness for short result normal TO 4. pair open circuit NSMISSION For the component of the compo	Connector F7 Connector F7 Connector F7 Ort to ground and P ANGE SWITC Linspection (Tomponent Inspection (Terminal 14 CM Terminal 14 nd short to power the (CVT) OR PN ransmission Rail pection" (M/T).	Continuity Existed r. Dower in harness or connectors. P SWITCH (M/T) Inge Switch)" (CVT) or TM-8, "PARK/NEUTRAL

>> INSPECTION END

P1148 CLOSED LOOP CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P1148 CLOSED LOOP CONTROL

DTC Logic

DTC DETECTION LOGIC

NOTE:

DTC P1148 is displayed with another DTC for A/F sensor 1. Perform the trouble diagnosis for the corresponding DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1148 Closed loop control function	The closed loop control function for bank 1 does not operate even when vehicle is driving in the specified condition.	Harness or connectors (The A/F sensor 1 circuit is open or shorted.)	
	The closed loop control function for bank 2 does not operate even when vehicle is driving in the specified condition.	A/F sensor 1	

Diagnosis Procedure

INFOID:0000000007770639

DTC P1148 is displayed with DTC for A/F sensor1.

When the DTC is detected, perform the trouble diagnosis of DTC corresponding to A/F sensor1. Refer to <u>EC-963</u>, "DTC Index".

P117A AIR FUEL RATIO

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P117A AIR FUEL RATIO

DTC Logic INFOID:0000000007922065

DTC DETECTION LOGIC

NOTE:

If DTC P117A is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P117A	AIR FUEL RATIO B1 (Air fuel ratio imbalance among cylinders)	ECM detects a lean/rich air fuel ratio state in any cylinder for a specified length of time.	Fuel injector Exhaust gas leaks Incorrect fuel pressure Mass air flow sensor Intake air leaks Lack of fuel Incorrect PCV hose connection Improper spark plug Insufficient compression The fuel injector circuit is open or shorted ignition coil The ignition signal circuit is open or shorted

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING-1

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

NOTE:

Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 2.

2 . PRECONDITIONING-2

- Turn ignition switch ON.
- Clear the mixture ratio self-learning value. Refer to EC-502, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".

Will CONSULT be used?

YES >> GO TO 3.

NO >> GO TO 6.

3.PERFORM DTC CONFIRMATION PROCEDURE-1

- Turn ignition switch ON.
- Select "COOLAN TEMP/S" in "DATA MONITOR" mode of "ENGINE" using CONSULT. 2.
- 3. Start engine.
- Make sure that "COOLAN TEMP/S" indicates more than 80°C (176°F).

>> GO TO 4.

f 4.PERFORM DTC CONFIRMATION PROCEDURE-2.

(P)With CONSULT

- Select "SYSTEM 1 DIAGNOSIS B B1" and "SYSTEM 1 DIAGNOSIS A B1" in "DATA MONITOR" mode of "ENGINE" using CONSULT.
- Drive vehicle under the following conditions for at least 5 consecutive seconds.

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CAUTION:

· Always drive vehicle at a safe speed.

ENG SPEED	1,600 – 1,775rpm
COOLAN TEMP/S	More than 80°C (176°F)
B/FUEL SCHDL	3 – 12 msec
Selector lever	D position
SYSTEM 1 DIAGNOSIS B B1	PRSENT

NOTE:

- Drive the vehicle at approximately 88 km/h (55MPH) allows easy diagnosis.
- Keep the accelerator pedal as possible during cruising.
- 3. Check "SYSTEM 1 DIAGNOSIS A B1" indication.

Is "CMPLT" displayed?

YES >> GO TO 5.

NO >> GO TO 2.

5.PERFORM DTC CONFIRMATION PROCEDURE- 3

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-830, "Diagnosis Procedure".

NO >> INSPECTION END

6.PERFORM DTC CONFIRMATION PROCEDURE-4

⊗Without CONSULT

- 1. Start the engine and warm it up to normal operating temperature.
- 2. Drive vehicle under the following conditions for at least 5 consecutive seconds.

CAUTION:

Always drive vehicle at a safe speed.

Engine speed	1,600 – 1,775 rpm
Calculated load value	21 –58 %
Selector lever	D position

NOTE:

- Drive the vehicle at approximately 88 km/h (55MPH) allows easy diagnosis.
- Keep the accelerator pedal as possible during cruising.
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-830, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007922066

1.CHECK FOR INTAKE AIR LEAK

- 1. Stop engine and check the following for connection.
- Air duct
- Vacuum hoses
- PCV hose
- Intake air passage between air duct to intake manifold
- Start engine and let it idle.
- 3. Listen for an intake air leak after the mass air flow sensor.

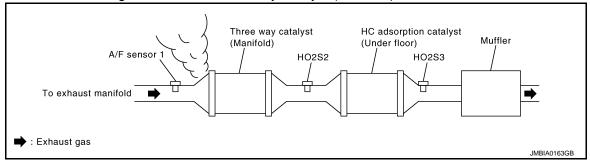
Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2.CHECK EXHAUST GAS LEAK

- 1. Stop engine and visually check exhaust tube, three way catalyst and muffler for dents connection.
- 2. Start engine and let it idle.
- Listen for an exhaust gas leak before three way catalyst (manifold).



Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3.CHECK FUEL PRESSURE

- Release fuel pressure to zero. Refer to <u>EC-985, "Inspection"</u>.
- Check fuel pressure. Refer to <u>EC-985</u>, "Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 9.

4. CHECK MASS AIR FLOW SENSOR

(P)With CONSULT

Check "MASS AIR FLOW" in "DATA MONITOR" mode of "ENGINE" using CONSULT.

For specification, refer to EC-989, "Mass Air Flow Sensor".

Without CONSULT

Check mass air flow sensor signal in Service \$01 using GST.

For specification, refer to EC-989, "Mass Air Flow Sensor".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to <u>EC-641</u>, "<u>Diagnosis Procedure</u>".

CHECK FUNCTION OF FUEL INJECTOR-1

With CONSULT

- 1. Start engine.
- Perform "POWER BALANCE" in "ACTIVE TEST" mode of "ENGINE" using CONSULT.
- 3. Check that each circuit produces a momentary engine speed drop.

Without CONSULT

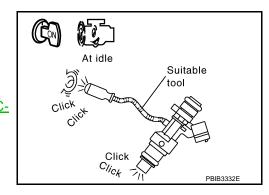
- Let engine idle.
- Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform trouble diagnosis for fuel injector, refer to <u>EC-922, "Component Function Check"</u>.



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6. CHECK FUNCTION OF FUEL INJECTOR-2

CAUTION

Perform the following procedure in a place with no combustible objects and good ventilation.

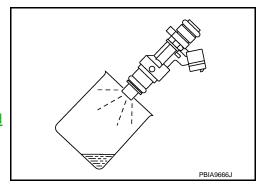
- 1. Turn ignition switch OFF.
- 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- 4. Remove fuel tube assembly. Refer to <u>EM-37</u>, "<u>Removal and Installation</u>". Keep fuel hose and all fuel injectors connected to fuel tube.
- 5. Disconnect all ignition coil harness connectors.
- 6. Prepare pans or saucers under each fuel injector.
- 7. Crank engine for approximately 3 seconds.
 - Fuel should be sprayed evenly for each fuel injector.
 - Fuel must not drip from the tip of fuel injector.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace

>> Replace fuel injector. Refer to <u>EM-37</u>, "Removal and Installation".



7.CHECK FUNCTION OF IGNITION COIL-1

CAUTION:

Perform the following steps in a well-ventilated area with no combustibles.

- 1. Turn ignition switch OFF.
- 2. Remove fuel pump fuse from IPDM E/R to release fuel pressure.

NOTE:

CONSULT must not be used to release fuel pressure. It develops again during the following steps, if released by using CONSULT.

- 3. Start the engine.
- 4. After an engine stall, crank the engine two or three times to release all the fuel pressure.
- 5. Turn ignition switch OFF.
- 6. Disconnect all the harness connectors of ignition coil to prevent electric discharge from occurring in ignition coil.
- 7. Remove ignition coil assembly and spark plug of cylinder. Refer to EM-42, "Removal and Installation".
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 9. Connect spark plug and harness connector to ignition coil.
- 10. Allow a 13-17mm (0.52-0.66 in) spacing between spark plug and grounded metal portion as shown in the figure to fix the ignition coil with a rope or an equivalent.
- 11. Crank the engine for approximately 3 seconds to see if sparking occurs between spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

- The discharge voltage becomes 20 kV or higher. Therefore, always stay away from the spark plug and ignition coil at least 50 cm (19.7 in) during the inspection.
- Leaving a space of more than 17mm (0.66 in) may damage the ignition coil.

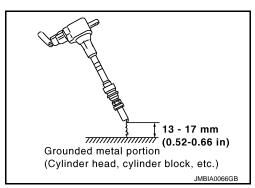
NOTE:

When the gap is less than 13 mm (0.52 in), a the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 10.

8.CHECK COMPRESSION PRESSURE



P117A AIR FUEL RATIO

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[MR18DE (FOR CALIFORNIA)]

Check compression pressure. Refer to EM-21, "Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-41, "Intermittent Incident".

NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

9. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace fuel filter and fuel pump assembly. Refer to FL-5, "Removal and Installation".

NO >> Repair or replace error-detected parts.

10. CHECK FUNCTION OF IGNITION COIL-2

- Turn ignition switch OFF.
- 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.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Check ignition coil, power transistor and their circuits. Refer to EC-928, "Component Function Check".

11. CHECK SPARK PLUG

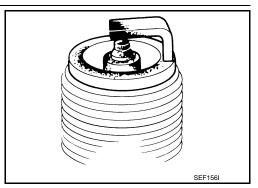
Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES Repair or clean spark plug. Refer to EM-17, >> 1. "Inspection".

GO TO 12.

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-42, "Removal and Installation".



12. CHECK FUNCTION OF IGNITION COIL-3

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 >> Check intermittent incident. Refer to GI-41, "Intermittent Incident". NO

>> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-42, "Removal and Installation".

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P1212 TCS COMMUNICATION LINE

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P1212 TCS COMMUNICATION LINE

Description INFOID:000000007770640

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 U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-621, "DTC Logic".
- If DTC P1212 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-822</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 can not 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 10.5V 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-834, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

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Perform the trouble diagnosis for TCS. Refer to GI-37, "Work Flow".

NOTE:

If DTC P1212 is displayed with DTC UXXXX and/or P0607, perform the following trouble diagnosis.

- Trouble diagnosis for DTC UXXXX, Refer to <u>EC-963</u>, "DTC Index".
- Trouble diagnosis for DTC P0607, Refer to <u>EC-822, "DTC Logic"</u>.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P1217 ENGINE OVER TEMPERATURE

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1217 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1217 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-822, "DTC Logic"</u>.

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217	Engine over temperature (Overheat)	 Cooling fan does not operate properly (Overheat). Cooling fan system does not operate properly (Overheat). Engine coolant was not added to the system using the proper filling method. Engine coolant is not within the specified range. 	Harness or connectors (The cooling fan circuit is open or shorted.) IPDM E/R (Cooling fan relay-1) Cooling fan relays-2 and -3 Cooling fan motor Radiator hose Radiator Radiator cap Reservoir tank Water pump Thermostat Water control valve

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to <u>CO-9</u>, "<u>Draining</u>". Also, replace the engine oil. Refer to <u>LU-8</u>, "<u>Refilling</u>".

- 1. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to 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-835, "Component Function Check".

NOIE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-836, "Diagnosis Procedure".

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK-I

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

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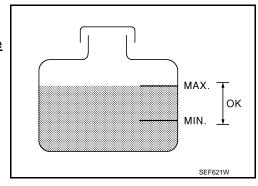
Check the coolant level in the reservoir tank and radiator.

Allow engine to cool before checking coolant level.

<u>Is the coolant level in the reservoir tank and/or radiator below the proper range?</u>

YES >> Go to EC-836, "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-836, "Diagnosis Procedure".

NO >> GO TO 3.

3.perform component function check-iii

(I) With CONSULT

- 1. Turn ignition switch ON.
- 2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.
- Make sure that cooling fan motor operates at each speed (LOW/HI).

♥Without CONSULT

Perform IPDM E/R auto active test and check cooling fan motor operation. Refer to <u>PCS-11, "Diagnosis Description"</u>.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-836, "Diagnosis Procedure".

Diagnosis Procedure

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1. CHECK COOLING FAN OPERATION

(II) With CONSULT

- 1. Turn ignition switch ON.
- 2. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.
- 3. Make sure that cooling fan motor operates at each speed (LOW/HI).

Without CONSULT

- Perform IPDM E/R auto active test and check cooling fan motor operation. Refer to <u>PCS-11, "Diagnosis Description"</u>.
- Make sure that cooling fan motor operates at each speed (Low/High).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-918, "Diagnosis Procedure".

2.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-9, "Inspection".

Is leakage detected?

YES >> GO TO 3.

NO >> GO TO 4.

3.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak.

- Hose (Refer to <u>CO-25</u>, "Inspection".)
- Radiator (Refer to CO-17, "Inspection".)
- Water pump (Refer to <u>CO-20, "Inspection"</u>.)

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>> Repair or replace malfunctioning part.

4. CHECK RADIATOR CAP

Check radiator cap. Refer to CO-13, "RADIATOR CAP: Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace radiator cap. Refer to CO-15, "Exploded View".

5. CHECK THERMOSTAT

Check thermostat. Refer to CO-23, "Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace thermostat. Refer to CO-22, "Removal and Installation".

6. CHECK WATER CONTROL VALVE

Check water control valve. Refer to CO-26, "Water Control Valve".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace water control valve. Refer to CO-24, "Exploded View".

7.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-651, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace engine coolant temperature sensor. Refer to CO-24, "Exploded View".

8. 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 Coo	plant Mixture Ratio"
	3	Coolant level	Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-9, "Inspection"
	4	Radiator cap	Pressure tester	CO-13, "RADIATOR CAP	: Inspection"
ON* ²	5	Coolant leaks	Visual	No leaks	CO-9, "Inspection"
ON* ²	6	Thermostat	Touch the upper and lower radiator hoses	Both hoses should be hot	CO-23, "Inspection"
ON* ¹	7	Cooling fan motor	• CONSULT	Operating	EC-918, "Component Function Check"
OFF	8	Combustion gas leak	Color checker chemi- cal tester 4 Gas ana- lyzer	Negative	_
ON* ³	9	Coolant temperature gauge	Visual	Gauge less than 3/4 when driving	_
		Coolant overflow to reservoir tank	Visual	No overflow during driving and idling	CO-9, "Inspection"
OFF* ⁴	10	Coolant return from reservoir tank to radi- ator	Visual	Should be initial level in reservoir tank	CO-9, "Inspection"

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Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	11	Cylinder head	Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-69, "Disassembly and Assembly"
	12	Cylinder block and pistons	Visual	No scuffing on cylinder walls or piston	EM-98, "Inspection"

^{*1:} Turn the ignition switch ON.

For more information, refer to CO-4, "Troubleshooting Chart".

>> INSPECTION END

^{*2:} Engine running at 3,000 rpm for 10 minutes.

^{*3:} Drive at 90 km/h (56 MPH) for 30 minutes and then let idle for 10 minutes.

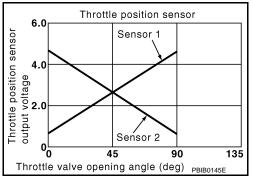
^{*4:} After 60 minutes of cool down time.

P1225 TP SENSOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle 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
P1225	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

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-839, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.check electric throttle control actuator visually

- Turn ignition switch OFF.
- Remove the intake air duct.

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P1225 TP SENSOR

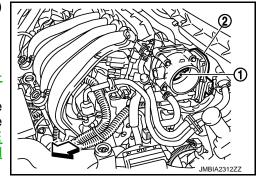
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[MR18DE (FOR CALIFORNIA)]

- 3. Check if foreign matter is caught between the throttle valve (1) and the housing.
- Electric throttle control actuator (2)

Is the inspection result normal?

- YES >> Replace electric throttle control actuator. Refer to EM-26, "Exploded View". NO >> Remove the foreign matter and clean the electric throttle
 - >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to EC-500, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

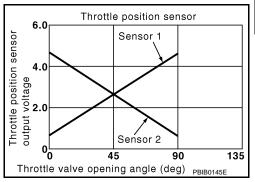


P1226 TP SENSOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of 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 conditions via the throttle control motor.



DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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, wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Repeat steps 2 and 3 for 32 times.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-841, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Turn ignition switch OFF.
- 2. Remove the intake air duct.

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P1226 TP SENSOR

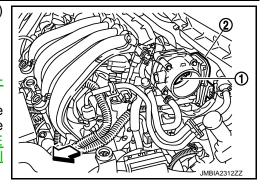
< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

- 3. Check if foreign matter is caught between the throttle valve (1) and the housing.
- Electric throttle control actuator (2)

Is the inspection result normal?

- YES >> Replace electric throttle control actuator. Refer to EM-26, "Exploded View". NO >> Remove the foreign matter and clean the electric throttle
 - >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to EC-500, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".



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[MR18DE (FOR CALIFORNIA)]

P1550 BATTERY CURRENT SENSOR

Description INFOID:0000000007770652

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 PCS-66. "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 the battery discharge may occur.

DTC Logic INFOID:0000000007770653

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 sensor (POS) circuit is shorted.] (EVAP control system pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Tumble control valve position sensor circuit is shorted.) Battery current sensor Crankshaft position sensor (POS) EVAP control system pressure sensor Accelerator pedal position sensor Refrigerant pressure sensor Tumble control valve position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and wait at least 10 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-844, "Diagnosis Procedure".

NO >> INSPECTION END

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[MR18DE (FOR CALIFORNIA)]

Diagnosis Procedure

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1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

- Disconnect battery current sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between battery current sensor harness connector and ground.

Battery cur	rent sensor	Ground	Voltage
Connector	Connector Terminal		voltage
F53	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 8.

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 cui	rrent sensor	E	Continuity	
Connector	Terminal	Connector Terminal		
F53	1	F8	71	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

4. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
	69	Tumble control valve actuator	F22	1
	71	Battery current sensor	F53	1
F8	F8 74	Refrigerant pressure sensor	E49	3
. 0	75	CKP sensor (POS)	F20	1
	76	EVAP control system pressure sensor	B21	3
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair short to ground or short to power in harness or connectors.

5. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to EC-737, "Component Inspection".)
- EVAP control system pressure sensor (Refer to <u>EC-779, "Component Inspection"</u>.)

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- Refrigerant pressure sensor (Refer to <u>EC-941, "Diagnosis Procedure"</u>.)
- Tumble control valve (Refer to EC-880, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning components.

6.CHECK APP SENSOR

Refer to EC-896, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 7.

7. REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

>> INSPECTION END

8.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery cur	Battery current sensor		ECM		
Connector	Terminal	Connector Terminal		Continuity	
F53	2	F8	64	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 BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F53	3	F8	57	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 BATTERY CURRENT SENSOR

Refer to EC-846, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

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NO >> Replace battery negative cable assembly.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-41. "Intermittent Incident".

>> INSPECTION END

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Component Inspection

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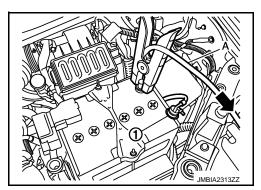
1. CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.
- 4. Install jumper cable (Ă) between battery negative terminal and body ground.

1 : Battery negative terminal

= : To body ground

- 5. Turn ignition switch ON.
- 6. Check the voltage between ECM harness connector and ground.



	ECM		
Connector	+	-	Voltage
Connector	Terminal	Terminal	
F8	57 (Battery current sensor signal)	64	Approx. 2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3. "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P1551, P1552 BATTERY CURRENT SENSOR

Description INFOID:0000000007770656

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 PCS-66. "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 the battery discharge may occur.

DTC Logic INFOID:00000000007770657

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 sensor (POS) circuit is shorted.] (Power steering pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Tumble control valve position sensor circuit is shorted.) • Battery current sensor • Crankshaft position sensor (POS) • Power steering pressure sensor • Accelerator pedal position sensor • Refrigerant pressure sensor • Tumble control valve position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V with ignition switch ON

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 10 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

>> Go to EC-848, "Diagnosis Procedure".

EC-847 Revision: 2011 November 2012 CUBE

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[MR18DE (FOR CALIFORNIA)]

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770658

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

- 1. Disconnect battery current sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between battery current sensor harness connector and ground.

Battery cur	rent sensor	Ground	Voltage	
Connector Terminal		Glound	vollage	
F53	1	Ground	Approx. 5 V	

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

3.check battery current sensor power supply circuit-ii

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery cui	rent sensor	ECM Connector Terminal		Continuity
Connector	Terminal			Continuity
F53	1	F8	71	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

4. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
	69	Tumble control valve actuator	F22	1
	71	Battery current sensor	F53	1
F8	74	Refrigerant pressure sensor	E49	3
. •	75	CKP sensor (POS)	F20	1
	76	EVAP control system pressure sensor	B21	3
E16	102	APP sensor	E110	5

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.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

- Crankshaft position sensor (POS) (Refer to <u>EC-737, "Component Inspection"</u>.)
- EVAP control system pressure sensor (Refer to <u>EC-789, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to EC-941, "Diagnosis Procedure".)
- Tumble control valve (Refer to EC-880, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning components.

6.CHECK APP SENSOR

Refer to EC-908, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 7.

/ .REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

>> INSPECTION END

8.check battery current sensor ground circuit for open and short

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery cur	Battery current sensor		ECM	
Connector	Terminal	Connector Terminal		Continuity
F53	2	F8	64	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

9.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 cur	Battery current sensor		ECM		
Connector	Terminal	Connector Terminal		Continuity	
F53	3	F8	57	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 BATTERY CURRENT SENSOR

Refer to EC-858, "Component Inspection".

Is the inspection result normal?

>> GO TO 11. YES

NO >> Replace battery negative cable assembly.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

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[MR18DE (FOR CALIFORNIA)]

Component Inspection

INFOID:0000000007770659

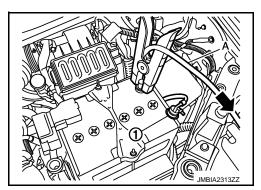
1. CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.
- 4. Install jumper cable (Ă) between battery negative terminal and body ground.

1 : Battery negative terminal

: To body ground

- 5. Turn ignition switch ON.
- 6. Check the voltage between ECM harness connector and ground.



	ECM		
Connector	+	-	Voltage
Connector	Terminal	Terminal	
F8	57 (Battery current sensor signal)	64	Approx. 2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3. "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

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[MR18DE (FOR CALIFORNIA)]

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 PCS-66. "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 the battery discharge may occur.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	C
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 sensor (POS) circuit is shorted.] (Power steering pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Tumble control valve position sensor circuit is shorted.) Battery current sensor Crankshaft position sensor (POS) Power steering pressure sensor Accelerator pedal position sensor Refrigerant pressure sensor Tumble control valve position sensor	H J K

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 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.

Is 1st trip DTC detected?

YES >> Go to EC-852, "Diagnosis Procedure".

NO >> INSPECTION END

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Diagnosis Procedure

INFOID:0000000007770662

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

- Disconnect battery current sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between battery current sensor harness connector and ground.

Battery current sensor		Ground	Voltage
Connector	Connector Terminal		vollage
F53	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

${f 3.}$ 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 cui	rrent sensor	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F53	1	F8	71	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

4. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
	69	Tumble control valve actuator	F22	1
	71	Battery current sensor	F53	1
F8	74	Refrigerant pressure sensor	E49	3
. 0	75	CKP sensor (POS)	F20	1
	76	EVAP control system pressure sensor	B21	3
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair short to ground or short to power in harness or connectors.

5. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to EC-737, "Component Inspection".)
- EVAP control system pressure sensor (Refer to <u>EC-789, "Component Inspection"</u>.)

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- Refrigerant pressure sensor (Refer to EC-941, "Diagnosis Procedure".)
- Tumble control valve (Refer to EC-880, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning components.

6.CHECK APP SENSOR

Refer to EC-908, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 7.

7. REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

>> INSPECTION END

8. CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F53	2	F8	64	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 BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F53	3	F8	57	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 BATTERY CURRENT SENSOR

Refer to EC-858, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace battery negative cable assembly.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-41. "Intermittent Incident".

>> INSPECTION END

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Component Inspection

INFOID:0000000007770663

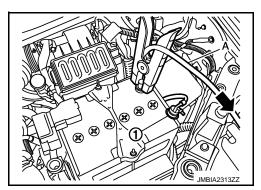
1. CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.
- 4. Install jumper cable (Ă) between battery negative terminal and body ground.

1 : Battery negative terminal

: To body ground

- 5. Turn ignition switch ON.
- 6. Check the voltage between ECM harness connector and ground.



Connector	+	-	Voltage
Connector	Terminal	Terminal	
F8	57 (Battery current sensor signal)	64	Approx. 2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

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INFOID:0000000007770666

P1554 BATTERY CURRENT SENSOR

Description

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to PCS-66. "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 the battery discharge may occur.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1554	Battery current sensor performance	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.	Harness or connectors (Battery current sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Power steering pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Tumble control valve position sensor circuit is shorted.) Battery current sensor Crankshaft position sensor (POS) Power steering pressure sensor Accelerator pedal position sensor Refrigerant pressure sensor Tumble control valve position sensor Tumble control valve position sensor

DTC CONFIRMATION PROCEDURE

1. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-855, "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-856, "Diagnosis Procedure".

Component Function Check

1.PRECONDITIONING

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 12.8 V at idle.
- Before performing the following procedure, confirm that all load switches and A/C switch are turned OFF.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

>> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK

(I) With CONSULT

Start engine and let it idle.

- Select "BAT CUR SEN" in "DATA MONITOR" mode with CONSULT.
- 3. Check "BAT CUR SEN" indication for 10 seconds.

"BAT CUR SEN" should be above 2,300 mV at least once.

♥Without CONSULT

- 1. Start engine and let it idle.
- 2. Check the voltage between ECM harness connector and ground.

Connector	+	-	Voltage
Connector	Terminal Terminal		
F8	58 (Battery current sensor signal)	68	Above 2.3 V at least once

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-856, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007770667

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

- 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	
Connector	Terminal	Glound	vollage	
F53	1	Ground	Approx. 5 V	

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

3. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-II

- 1. 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
F53	1	F8	71	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

4. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

E	СМ	Sen	Sensor	
Connector	Terminal	Name	Connector	Terminal
	69	Tumble control valve actuator	F22	1
	71	Battery current sensor	F53	1
F8	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
	76	EVAP control system pressure sensor	B21	3
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair short to ground or short to power in harness or connectors.

5. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to <u>EC-737, "Component Inspection"</u>.)
- EVAP control system pressure sensor (Refer to <u>EC-789, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to EC-941, "Diagnosis Procedure".)
- Tumble control valve (Refer to EC-880, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning components.

6.CHECK APP SENSOR

Refer to EC-908, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

>> GO TO 7. NO

/ REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

>> INSPECTION END

8.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 cur	Battery current sensor		ECM	
Connector	Terminal	Connector Terminal		Continuity
F53	2	F8	64	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

9.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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[MR18DE (FOR CALIFORNIA)]

Battery cur	rent sensor	ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
F53	3	F8	57	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 BATTERY CURRENT SENSOR

Refer to EC-858, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace battery negative cable assembly.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770668

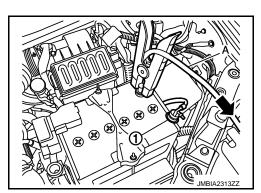
1. CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable.
- 4. Install jumper cable (Å) between battery negative terminal and body ground.

1 : Battery negative terminal

: To body ground

- 5. Turn ignition switch ON.
- 6. Check the voltage between ECM harness connector and ground.



Connector	+	-	Voltage
Connector	Terminal	Terminal	
F8	57 (Battery current sensor signal)	64	Approx. 2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P1564 ASCD STEERING SWITCH

Description INFOID:0000000007770669

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-546, "System Description" for the ASCD function.

DTC Logic INFOID:0000000007770670

DTC DETECTION LOGIC

NOTE:

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-820, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1564	ASCD steering switch	 An excessively high voltage signal from the ASCD steering switch is sent to ECM. ECM detects that input signal from the ASCD steering switch is out of the specified range. ECM detects that the ASCD steering switch is stuck ON. 	Harness or connectors (The switch circuit is open or shorted.) ASCD steering switch ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2 Perform DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- Wait at least 10 seconds. 2.
- 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.
- Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Check DTC.

Is DTC detected?

YES >> Go to EC-859, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ASCD STEERING SWITCH CIRCUIT

(P) With CONSULT

Turn ignition switch ON.

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P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

- 2. Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW" and "SET SW" in "DATA MONITOR" mode with CONSULT.
- 3. Check each item indication under the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
WAINSW	WAIN SWILCH	Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
	CANCEL SWITCH	Released	OFF
RESUME/ACC RESUME/ACCELERATE switch	DESIME/ACCELEDATE switch	Pressed	ON
	Released	OFF	
SET SW	SET/COAST switch	Pressed	ON
	SET/OUAST SWITCH	Released	OFF

N Without CONSULT

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals.

ECM				
Connector	+ -		Condition	Voltage
Connector	Terminal	Terminal		
	94 (ASCD steering switch signal)	95	MAIN switch: Pressed	Approx. 0V
			CANCEL switch: Pressed	Approx. 1V
			SET/COAST switch: Pressed	Approx. 2V
E16			RESUME/ACCELERATE switch: Pressed	Approx. 3V
			All ASCD steering switches: Released	Approx. 4V

Is the inspection result normal?

YES >> GO TO 8. NO >> 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 M352.
- 4. Check the continuity between combination switch and ECM harness connector.

Combination switch	ECM		Continuity
Terminal	Connector Terminal		
16	E16	95	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 M77, E105
- Combination switch (spiral cable)
- · Harness for open and short between ECM and combination switch

P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

>> 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 the continuity between ECM harness connector and combination switch.

combination switch	ECM Connector Terminal		Continuity
Terminal			
13	E16	94	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7. >> GO TO 6. NO

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M77, E105
- 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.

.CHECK ASCD STEERING SWITCH

Refer to EC-861, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace ASCD steering switch. Refer to ST-8, "Exploded View".

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK ASCD STEERING SWITCH

- Disconnect combination switch (spiral cable) harness connector.
- 2. Check the continuity between combination switch harness connector terminals under following conditions.

Combination switch		Condition	Resistance	
Connector	Terminals	Condition	Nesistance	
		MAIN switch: Pressed	Approx. 0 Ω	
	SET	CANCEL switch: Pressed	Approx. 250 Ω	
		SET/COAST switch: Pressed	Approx. 660 Ω	
M302	13 and 16	RESUME/ACCELERATE switch: Pressed	Approx. 1,480 Ω	
		All ASCD steering switches: Released	Approx. 4,000 Ω	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch. Refer to ST-8, "Exploded View".

EC-861 Revision: 2011 November 2012 CUBE

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P1572 ASCD BRAKE SWITCH

Description INFOID.000000007770673

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to EC-546, "System Description" for the ASCD function.

DTC Logic (INFOID:000000007770674

DTC DETECTION LOGIC

NOTE:

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-820, "DTC Logic".
- This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed.
 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
		A)	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to the ECM at the same time.	Harness or connectors (The stop lamp switch circuit is shorted.) Harness or connectors (The ASCD brake switch circuit is shorted.)
P1572	ASCD brake switch	В)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	 Harness or connectors (The ASCD clutch switch circuit is shorted.) Stop lamp switch ASCD brake switch ASCD clutch switch Incorrect stop lamp switch installation Incorrect ASCD brake switch installation Incorrect ASCD clutch switch installation ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

NOTE:

Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

>> GO TO 2.

$2.\mathsf{PERFORM}$ DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- Start engine.
- Press MAIN switch and make sure that CRUISE indicator is displayed in combination meter.
- 3. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position

Check DTC.

P1572 ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Is DTC detected?

YES >> Go to EC-863, "Diagnosis Procedure".

NO >> GO TO 3.

${f 3.}$ PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

Drive the vehicle for at least 5 consecutive seconds under the following conditions. **CAUTION:**

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

Check DTC.

Is DTC detected?

YES >> Go to EC-863, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK OVERALL FUNCTION-I

(P) With CONSULT

- Turn ignition switch ON.
- Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
- Check "BRAKE SW1" indication under the following conditions.

Monitor item	Cond	Indication	
BRAKE SW1	Brake pedal (CVT)	Slightly depressed	OFF
	Brake pedal and clutch pedal (M/T)	Fully released	ON

₩ Without CONSULT

- Turn ignition switch ON.
- Check the voltage between ECM harness connector terminals.

ECM						
Connector	+	-	Condition		Voltage	
Connector	Terminal	Terminal				
E16	100 (ASCD brake 108 switch signal)	Brake pedal (CVT)	Slightly de- pressed	Approx. 0V		
			Brake pedal and clutch pedal (M/T)	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

Select "BRAKE SW2" and check indication in "DATA MONITOR" mode with CONSULT.

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< DTC/CIRCUIT DIAGNOSIS >

Monitor item	Con	Indication	
BRAKE SW2	Brake pedal	Slightly de- pressed	ON
		Fully released	OFF

Without CONSULT

Check the voltage between ECM harness connector terminals.

ECM					
Connector	+	-	Condition		Voltage
Connector	Terminal	Terminal			
E16	99 (Stop lamp	108	Brake pedal	Slightly de- pressed	Battery voltage
	switch signal)		Fully released	Approx. 0V	

Is the inspection result normal?

YES >> GO TO 16. NO >> GO TO 11.

3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD bra	ake switch	Ground	Voltage	
Connector	Connector Terminal		voltage	
E112	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 9.

NO-1 >> CVT models: GO TO 4.

NO-2 >> M/T models: GO TO 5.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M77
- 10 A fuse (No. 2)
- · 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 CLUTCH SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- Disconnect ASCD clutch switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ASCD clutch switch harness connector and ground.

ASCD clu	itch switch	Ground	Voltage	
Connector Terminal		Glound	voltage	
E111	3	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M77
- 10 A fuse (No. 2)
- Harness for open or short between ASCD clutch switch and fuse

EC

>> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT-II

- Turn ignition switch OFF.
- Disconnect ASCD brake switch harness connector.

3. Check the continuity between ASCD clutch switch harness connector and ASCD brake switch harness connector.

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ASCD clu	ASCD clutch switch ASCD brake switch		Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E111	4	E112	1	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

$oldsymbol{8}.$ CHECK ASCD CLUTCH SWITCH

Refer to EC-867, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace ASCD clutch switch. Refer to CL-10, "Exploded View".

$oldsymbol{9}.$ CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD bra	ake switch	E	СМ	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E112	2	E16	100	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK ASCD BRAKE SWITCH

Refer to EC-866, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace ASCD brake switch. Refer to BR-17, "Exploded View".

11. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- Check the voltage between stop lamp switch harness connector and ground.

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EC-865 Revision: 2011 November 2012 CUBE

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

INFOID:0000000007770676

Stop lamp switch		Ground	Voltage
Connector	Terminal	Glound	voltage
E114 (M/T) E115 (CVT)	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105. M77
- 10A fuse (No.9)
- · 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.

13.check stop lamp switch input signal circuit for open and short

- 1. Disconnect ECM harness connector.
- 2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

E	CM	Stop lan	np switch	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E16	99	E114 (M/T) E115 (CVT)	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 15. NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- · 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.

15. CHECK STOP LAMP SWITCH

Refer to EC-867, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace stop lamp switch. Refer to BR-17, "Exploded View".

16.check intermittent incident

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

1. CHECK ASCD BRAKE SWITCH-I

- Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch harness connector.
- 3. Check the continuity between ASCD brake switch terminals under the following conditions.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Terminals	Condition		Continuity
		Fully released	Existed
1 and 2	Brake pedal	Slightly de- pressed	Not existed

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Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

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2.CHECK ASCD BRAKE SWITCH-II

- 1. Adjust ASCD brake switch installation. Refer to BR-18, "Inspection and Adjustment".
- 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 de- pressed	Not existed

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Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD brake switch. Refer to <u>BR-17</u>, "Exploded View".

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INFOID:0000000007770677

Component Inspection (ASCD Clutch Switch)

1. CHECK ASCD CLUTCH SWITCH-I

- Turn ignition switch OFF.
- 2. Disconnect ASCD clutch switch harness connector.
- Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
		Fully released	Existed
1 and 2	Clutch pedal	Slightly de- pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

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2.CHECK ASCD CLUTCH SWITCH-II

- Adjust ASCD clutch switch installation. Refer to <u>CL-11, "Inspection and Adjustment"</u>.
- 2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
		Fully released	Existed
1 and 2	Clutch pedal	Slightly de- pressed	Not existed

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Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD clutch switch. Refer to CL-10, "Exploded View".

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INFOID:0000000007770678

Component Inspection (Stop Lamp Switch)

1. CHECK STOP LAMP SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- 3. Check the continuity between stop lamp switch terminals under the following conditions.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Terminals	Condition		Continuity
		Fully released	Not existed
1 and 2	Brake pedal	Slightly de- pressed	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-18, "Inspection and Adjustment".
- 2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
		Fully released	Not existed
1 and 2	Brake pedal	Slightly de- pressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to <u>BR-17</u>, "Exploded View".

P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P1574 ASCD VEHICLE SPEED SENSOR

Description INFOID:0000000007770679

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-546, "System Description" for ASCD functions.

INFOID:0000000007770680

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1574 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-621, "DTC Logic".
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-808, "M/T MODELS: DTC Logic"
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-820, "DTC Logic".
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-822. "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	Harness or connectors (The CAN communication line is open or shorted.) ABS actuator and electric unit (control unit) TCM ECM	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine.
- Drive the vehicle at more than 40 km/h (25 MPH).

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

3. Check DTC.

Is DTC detected?

YES >> Go to EC-869, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-97, "Diagnosis Description".

Is DTC detected?

NO >> GO TO 2.

YES >> Perform trouble shooting relevant to DTC indicated. D

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2012 CUBE

P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

 $2. \mathsf{CHECK} \ \mathsf{DTC} \ \mathsf{WITH} \ \mathsf{``ABS} \ \mathsf{ACTUATOR} \ \mathsf{AND} \ \mathsf{ELECTRIC} \ \mathsf{UNIT} \ \mathsf{(CONTROL} \ \mathsf{UNIT)''}$

Refer to BRC-23, "CONSULT Function".

Is DTC detected?

NO >> INSPECTION END

YES >> Perform trouble shooting relevant to DTC indicated.

P1715 INPUT SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P1715 INPUT SPEED SENSOR

Description INFOID:0000000007770682

ECM receives input shaft revolution signal from TCM via the CAN communication line. ECM uses this signal for engine control.

INFOID:0000000007770683

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1715 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-734, "DTC Logic".
- If DTC P1715 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to EC-738, "DTC Logic".
- If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-820, "DTC Logic".
- If DTC P1715 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-822. "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715	Input speed sensor (TCM output)	Input shaft revolution 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 (Primary speed sensor circuit is open or shorted) TCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Start engine and drive the vehicle at more than 50 km/h (31 MPH) for at least 5 seconds. CAUTION:

Always drive vehicle at a safe speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-871, "Diagnosis Procedure".

>> INSPECTION END NO

INFOID:0000000007770684

Diagnosis Procedure 1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-98, "CONSULT Function (TRANSMISSION)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM. Refer to TM-216, "Exploded View".

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P1715 INPUT SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

>> INSPECTION END

P1805 BRAKE SWITCH

Description

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

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DTC Logic

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DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	rouble diagnosis name DTC detecting condition Possible cause	
P1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	Harness or connectors (Stop lamp switch circuit is open or shorted.) Stop lamp switch

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DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

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- 1. Turn ignition switch ON.
- 2. Fully depress the brake pedal for at least 5 seconds.
- Erase the DTC.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-873, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770687

1. CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.

Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly de- pressed	Illuminated

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Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 2.

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2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- 3. Check the voltage between stop lamp switch harness connector and ground.

Stop lan	np switch	Ground	Voltage	
Connector Terminal		Glodila	voitage	
E114 (M/T) E115 (CVT)	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

Revision: 2011 November

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

- Harness connectors E105, M77
- 10 A fuse (No. 9)
- 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.

f 4.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Disconnect ECM harness connector.
- Check the continuity between ECM harness connector and stop lamp switch harness connector.

E	CM	Stop lamp switch		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E16	99	E114 (M/T) E115 (CVT)	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

CHECK STOP LAMP SWITCH

Refer to EC-874, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace stop lamp switch. Refer to BR-17, "Exploded View".

6.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Stop Lamp Switch)

INFOID:0000000007770688

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	Con	Continuity	
	Brake pedal	Fully released	Not existed
1 and 2		Slightly de- pressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK STOP LAMP SWITCH-II

- Adjust stop lamp switch installation. Refer to <u>BR-18</u>, "Inspection and Adjustment".
- 2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Con	Continuity	
		Fully released	Not existed
1 and 2	Brake pedal	Slightly de- pressed	Existed

Is the inspection result normal?

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to BR-17, "Exploded View".

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Description INFOID.000000007770689

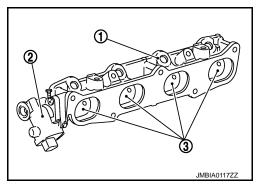
Tumble control valve (3) is installed in the intake manifold adapter (1).

Tumble control valve actuator (2) is connected to the front end of the valve shaft.

Tumble control valve actuator consists of motor and position sensor, etc.

The motor opens or closes the valve by the output signal of the ECM.

The sensor consists of a permanent magnet and Hall IC. It senses the valve shaft movement and feeds the voltage signals to the ECM.



DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2004	Tumble control valve stuck	The target angle of tumble control valve controlled by ECM and the input signal from tumble control valve position sensor is not in the normal range.	Harness or connectors (Tumble control valve motor circuit is open or shorted.) (Tumble control valve position sensor circuit is open or shorted.) (EVAP control system pressure sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Battery current sensor circuit is shorted.) *Tumble control valve actuator (Tumble control valve motor) (Tumble control valve position sensor) *EVAP control system pressure sensor *Crankshaft position sensor (POS) *Accelerator pedal position sensor *Refrigerant pressure sensor *Battery current sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 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.
- Always perform the test at a temperature above 0°C (32°F)

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

(II) With CONSULT

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT.
- Check that "COOLAN TEMP/S" indicates between 5°C (41°F) to 45°C (113°F). If not, cool engine down or warm engine up until "COOLAN TEMP/S" indicates between 5°C (41°F) to 56°C (133°F). Then go to the following steps.
- 4. Fully release accelerator pedal and wait at least 5 seconds.
- 5. Depress accelerator pedal and wait at least 5 seconds.
- Check 1st trip DTC.

With GST

Following the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-877, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection". 2.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK TUMBLE CONTROL VALVE MOTOR POWER SUPPLY CIRCUIT-I

Check the voltage between ECM harness connector and ground.

ECM		Ground Condition		Voltage	
Connector	Terminal	Ground	Condition	vollage	
F7	-7 3 Ground	Ignition switch OFF	Approx. 0 V		
	F7 3 Ground		Ignition switch ON	Battery voltage	

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

${f 3.}$ CHECK TUMBLE CONTROL VALVE MOTOR POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Disconnect IPDM E/R harness connector.
- Check the continuity between IPDM E/R harness connector and ECM harness connector.

IPDM E/R		E	Continuity	
Connector Terminal Co		Connector	Terminal	Continuity
E14	44	F7	3	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> GO TO 4.

f 4 . DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E8, F1

Revision: 2011 November

Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

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< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

5. CHECK TUMBLE CONTROL VALVE MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect tumble control valve actuator harness connector.
- Disconnect ECM harness connector.
- Check the continuity between tumble control valve actuator harness connector and ECM harness connector.

Tumble control	valve actuator	ECM		Continuity
Connector	Connector Terminal		Terminal	Continuity
	4 5	F7	6	Not existed
F22			7	Existed
1 22			6	Existed
			7	Not existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK TUMBLE CONTROL VALVE POSITION SENSOR POWER SUPPLY CIRCUIT-I

- 1. Reconnect ECM harness connector disconnected.
- 2. Turn ignition switch ON.
- 3. Check the voltage between tumble control valve actuator harness connector and ground.

Tumble control	Ground	Voltage	
Connector	Terminal	Ground	voltage
F22	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 7.

7.check tumble control valve position sensor power supply circuit-ii

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between tumble control valve actuator harness connector and ECM harness connector.

Tumble control	valve actuator	E	СМ	Continuity
Connector	Terminal	Connector Terminal		Continuity
F22	1	F8	69	Existed

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit.

8. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

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ECM		Sensor			
Connector	Terminal	Name	Connector	Terminal	
	69	Tumble control valve actuator	F22	1	
	71	Battery current sensor	F53	1	
F8	74	Refrigerant pressure sensor	E49	3	
. 0	75	CKP sensor (POS)	F20	1	
	76	EVAP control system pressure sensor	B21	3	
E16	102	APP sensor	E110	5	

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair short to ground or short to power in harness or connectors.

9. CHECK COMPONENT

Check the following.

- Battery current sensor (Refer to EC-846, "Component Inspection".)
- Crankshaft position sensor (POS) (Refer to <u>EC-737, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to EC-941, "Diagnosis Procedure".)
- Tumble control valve (Refer to EC-880, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace malfunctioning components.

10. CHECK APP SENSOR

Refer to EC-908, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 11.

11. REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

>> INSPECTION END

12. CHECK TUMBLE CONTROL VALVE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between tumble control valve actuator harness connector and ECM harness connector.

Tumble control valve actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F22	2	F8	47	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK TUMBLE CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between tumble control valve actuator harness connector and ECM harness connector.

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< DTC/CIRCUIT DIAGNOSIS >

Tumble control	valve actuator	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F22	3	F8	35	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 14.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

14.CHECK TUMBLE CONTROL VALVE

Refer to EC-880, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace intake manifold adapter. Refer to EM-26, "Exploded View".

15. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake manifold adapter. Refer to EM-26, "Exploded View".

NO >> Repair or replace harness or connectors.

Component Inspection

INFOID:0000000007770692

1. CHECK TUMBLE CONTROL VALVE

(II) With CONSULT

- Turn ignition switch OFF.
- Remove intake manifold adapter. Refer to <u>EM-27</u>, "Removal and Installation".
- Visually check the valve for damage and check if foreign matter is caught between the valve and the housing.
- 4. Connect tumble control valve actuator harness connector.
- Turn ignition switch ON.
- 6. Perform "TUMBLE CONTROL VALVE" in "ACTIVE TEST" mode with CONSULT.
- 7. Touch "ON/OFF" and check that the valve opens and closes.

Without CONSULT

- Turn ignition switch OFF.
- Remove intake manifold adapter. Refer to <u>EM-27</u>, "Removal and Installation".
- Visually check the valve for damage and check if foreign matter is caught between the valve and the housing.
- 4. Supply tumble control valve actuator terminals with battery voltage within 2 seconds and check operation.

Tumble control		
Term	Operation	
(+)	(-)	
4	5	Open
5	Close	

CAUTION:

Never apply 12 V DC continuously for 30 seconds or more. Doing so may result in damage to the coil in tumble control valve motor.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake manifold adaptor. Refer to EM-26, "Exploded View".

P2014 TUMBLE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

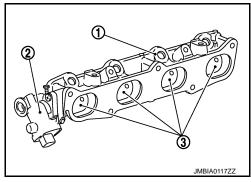
P2014 TUMBLE CONTROL VALVE POSITION SENSOR

Description INFOID:0000000007770693

Tumble control valve position sensor is built into the tumble control valve actuator (2).

- Intake manifold adapter (1)
- Tumble control valve (2)

The sensor consists of a permanent magnet and Hall IC. It senses the valve shaft movement and feeds the voltage signals to the ECM.



DTC Logic INFOID:0000000007770694

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2014	Tumble control valve position sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	Harness or connectors (Tumble control valve position sensor circuit is shorted.) (EVAP control system pressure sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Battery current sensor circuit is shorted.) Tumble control valve position sensor EVAP control system pressure sensor Crankshaft position sensor (POS) Accelerator pedal position sensor Refrigerant pressure sensor Battery current sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> 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-882, "Diagnosis Procedure".

>> INSPECTION END NO

EC-881 Revision: 2011 November 2012 CUBE

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P2014 TUMBLE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Diagnosis Procedure

INFOID:0000000007770695

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK TUMBLE CONTROL VALVE POSITION SENSOR POWER SUPPLY CIRCUIT-I

- 1. Reconnect ECM harness connector disconnected.
- 2. Turn ignition switch ON.
- 3. Check the voltage between tumble control valve actuator harness connector and ground.

Tumble control v	Tumble control valve actuator		
Connector	Terminal	Ground	Voltage
F22	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

3.check tumble control valve position sensor power supply circuit-ii

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between tumble control valve actuator harness connector and ECM harness connector.

Tumble control	Tumble control valve actuator		CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F22	1	F8	69	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

4. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor			
Connector	Terminal	Name	Connector	Terminal	
	69	Tumble control valve actuator	F22	1	
	71	Battery current sensor	F53	1	
F8	74	Refrigerant pressure sensor	E49	3	
. 0	75	CKP sensor (POS)	F20	1	
	76	EVAP control system pressure sensor	B21	3	
E16	102	APP sensor	E110	5	

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair short to ground or short to power in harness or connectors.

5. CHECK COMPONENT

Check the following.

• Battery current sensor (Refer to EC-846, "Component Inspection".)

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P2014 TUMBLE CONTROL VALVE POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

- Crankshaft position sensor (POS) (Refer to EC-737, "Component Inspection".)
- Refrigerant pressure sensor (Refer to <u>EC-941, "Diagnosis Procedure"</u>.)
- Tumble control valve (Refer to EC-880, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning components.

6. CHECK APP SENSOR

Refer to EC-908, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 7.

7. REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

>> INSPECTION END

8.check tumble control valve position sensor ground circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between tumble control valve actuator harness connector and ECM harness connector.

Tumble control	valve actuator	EC	Continuity	
Connector Terminal		Connector	Terminal	Continuity
F22	2	F8	47	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9.check tumble control valve position sensor input signal circuit for open and short

Check the continuity between tumble control valve actuator harness connector and ECM harness connector.

Tumble control	valve actuator	EC	M	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F22	3	F8	35	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake manifold adapter. Refer to EM-26, "Exploded View".

NO >> Repair or replace harness or connectors.

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P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

INFOID:0000000007770698

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
P2100	Throttle control motor relay circuit open	ECM detects a 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	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 turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V.

Witch DTC is detected?

P2100 >> GO TO 2.

P2103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100

- 1. Turn ignition switch ON and wait at least 2 seconds.
- 2. Start engine and let it idle for 5 seconds.
- Check DTC.

Is DTC detected?

YES >> Go to EC-884, "Diagnosis Procedure".

NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

- Turn ignition switch ON and wait at least 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-884, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF.
- Check the voltage between ECM harness connector and ground.

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

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E(СМ	- Ground	Voltage		
Connector	Terminal	Glound	voltage		
F7	15	Ground	Battery voltage		
K or NG			_		
	O TO 5.				
	O TO 2.				
CHECK THI	ROTTLE CONT	ROL MOTOR	RELAY POWER	SUPPLY CIRCL	JIT-II
	t ECM harness				
	t IPDM E/R har			d IDDM E/D bar	noss connector
Check the	continuity betw	een Low nam	ess connector an	u if Divi L/K flaf	less connector.
E	CM	IPD	M E/R		
Connector	Terminal	Connector	Terminal	Continuity	
F7	15	E15	57	Existed	
			nd short to powe		
	n result normal	_	na short to powe	ı .	
•) TO 4.	<u>:</u>			
	O TO 3.				
.DETECT M/	ALFUNCTIONI	NG PART			
heck the follo					
	nectors E8, F1				
Harness for c	pen or short be	etween ECM ar	nd IPDM E/R		
_					
	-	it or short to gro	ound or short to p	ower in harness	or connectors.
.CHECK FU	SE				
	t 15 A fuse (No.		I E/R.		
	A fuse for blowr				
	<u>n result normal</u>	<u>?</u>			
) TO 8. place 15 A fuse	7			
	•		RELAY INPUT S	ICNAL CIDCUIT	- 1
neck the volta	age between EC	JM harness coi	nnector and grou	nd under the foll	owing conditions.
-	ON4			T	
	CM T	Ground	Cond	lition	Voltage
Connector	Terminal				
F7	2	Ground	Ignition switch: OF		Approximately 0 V
			Ignition switch: Of	J	Rattery voltage

ECM		Ground	Condition	Voltage	
Connector	Terminal	Glound	Condition	voltage	
F7	F7 2	F7 2 Ground	Ignition switch: OFF	Approximately 0 V	
		Ground	Ignition switch: ON	Battery voltage	

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.
- 3. Disconnect IPDM E/R harness connector.
- 4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

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P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

ECM		IPDI	Continuity	
Connector Terminal		Connector	Terminal	Continuity
F7	2	E15	54	Existed

5. 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 E8, F1
- 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 GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to <u>PCS-33, "Removal and Installation"</u> (With I-KEY), <u>PCS-62, "Removal and Installation"</u> (Without I-KEY).

NO >> Repair or replace harness or connectors.

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description INFOID:0000000007770699

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.

The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM. ECM controls the throttle valve opening angle in response to driving condition via the throttle control motor.

DTC Logic INFOID:0000000007770700

DTC DETECTION LOGIC

NOTE:

 If DTC P2101 is displayed with DTC P2100, first perform the trouble diagnosis for DTC P2100. Refer to EC-884, "DTC Logic".

 If DTC P2101 is displayed with DTC P2119, first perform the trouble diagnosis for DTC P2119. Refer to EC-893, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P2101	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	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 2 seconds.
- Start engine and let it idle for 5 seconds.
- Check DTC.

Is DTC detected?

YES >> Go to EC-887, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

Check the voltage between ECM harness connector and ground under the following conditions.

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[MR18DE (FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS >

ECM		Ground	Condition	Voltage
Connector Terminal		Glound	Condition	
F7	F7 2 Ground		Ignition switch: OFF	Approx. 0 V
17	2	Giodila	Ignition switch: ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 3.

3.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Disconnect IPDM E/R harness connector.
- 4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		E	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E15	57	F7	15	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 E8, F8
- Harness for open or short between ECM and IPDM E/R
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDI	И E/R	E(Continuity	
Connector	Terminal	Connector Terminal		
E15	54	F7	2	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- 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.

7. CHECK FUSE

- 1. Disconnect 15 A fuse (No. 64) from IPDM E/R.
- Check 15 A fuse for blown.

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

YES >> GO TO 8.

NO >> Replace 15 A fuse.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-33, "Removal and Installation" (With I-KEY), PCS-62, "Removal and Installation" (Without I-KEY).

NO >> Repair or replace harness or connectors.

9.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

- Turn ignition switch OFF.
- Disconnect electric throttle control actuator harness connector. 2.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle	control actuator	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F29	5	F7	1	Not existed
	3		4	Existed
	6		1	Existed
			4	Not existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace.

10.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.
- Electric throttle control actuator (2)

Is the inspection result normal?

YES >> GO TO 11.

NO

>> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to EC-500, "THROTTLE VALVE CLOSED POSITION LEARNING: Special

Repair Requirement"...

11. CHECK THROTTLE CONTROL MOTOR

Refer to EC-890, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 13.

12. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace harness or connectors.

13. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-26, "Exploded View".

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[MR18DE (FOR CALIFORNIA)]

>> INSPECTION END

Component Inspection

INFOID:0000000007770702

1.CHECK THROTTLE CONTROL MOTOR

- 1. Turn ignition switch OFF.
- 2. Disconnect electric throttle control actuator harness connector.
- 3. Check the resistance between electric throttle control actuator terminals as per the following.

Terminals	Resistance
5 and 6	Approx. 1 - 15 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-26, "Exploded View".

>> INSPECTION END

P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P2118 THROTTLE CONTROL MOTOR

Description INFOID:0000000007770703

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.

The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM. ECM controls the throttle valve opening angle in response to driving conditions via the throttle control motor.

DTC Logic INFOID:0000000007770704

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name DTC detecting condition		Possible cause
P2118	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)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> 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.
- Check DTC.

Is DTC detected?

YES >> Go to EC-891, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Disconnect electric throttle control actuator harness connector.
- Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F29	5	F7	1	Not existed
			4	Existed
			1	Existed
	0		4	Not existed

EC-891 Revision: 2011 November 2012 CUBE

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P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3. CHECK THROTTLE CONTROL MOTOR

Refer to EC-892, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 5.

4. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace harness or connectors.

5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-26, "Exploded View".

>> INSPECTION END

Component Inspection

INFOID:0000000007770706

1. CHECK THROTTLE CONTROL MOTOR

- 1. Turn ignition switch OFF.
- 2. Disconnect electric throttle control actuator harness connector.
- Check the resistance between electric throttle control actuator terminals as per the following.

Terminals	Resistance
5 and 6	Approx. 1 - 15 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.replace electric throttle control actuator

Replace electric throttle control actuator. Refer to EM-26, "Exploded View".

>> INSPECTION END

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

Description INFOID:0000000007770707

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.

The throttle position sensor detects the throttle valve position, and feeds the voltage signal to the ECM. The ECM judges the current opening angle of the throttle valve and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.

DTC Logic INFOID:0000000007770708

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
		Α	Electric throttle control actuator does not function properly due to the return spring malfunction.	
P2119	Electric throttle control actuator	В	Throttle valve opening angle in fail-safe mode is not in specified range.	Electric throttle control actuator
		С	ECM detect the throttle valve is stuck open.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND B

- Turn ignition switch ON and wait at least 1 second.
- Set selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
- Set selector lever to P (CVT) or Neutral (M/T) position.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON and wait at least 1 second.
- Set selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
- Set selector lever to P (CVT) or Neutral (M/T) position. 7.
- Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- 9. Check DTC.

Is DTC detected?

YES >> Go to EC-893, "Diagnosis Procedure".

NO >> GO TO 3.

${f 3.}$ PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

- Turn ignition switch ON and wait at least 1 second.
- Set selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
- Set selector lever to P (CVT) or Neutral (M/T) position.
- Start engine and let it idle for 3 seconds.
- Check DTC.

Is DTC detected?

YES >> Go to EC-893, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- Turn ignition switch OFF.
- Remove the intake air duct.

EC-893 Revision: 2011 November 2012 CUBE

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P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

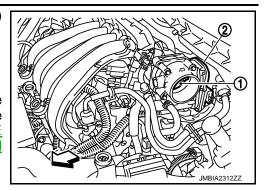
- Check if foreign matter is caught between the throttle valve (1) and the housing.
- Electric throttle control actuator (2)

Is the inspection result normal?

YES NO >> GO TO 2.

>> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to EC-500, "THROTTLE VALVE CLOSED POSITION LEARNING: Special

Repair Requirement".



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-26, "Exploded View".

>> INSPECTION END

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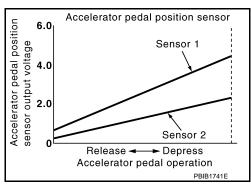
P2122. P2123 APP SENSOR

Description INFOID:0000000007770710

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



DTC Logic INFOID:0000000007770711

DTC DETECTION LOGIC

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-823, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	Harness or connectors (APP sensor 1 circuit is open or shorted.)
P2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	Accelerator pedal position sensor (APP sensor 1)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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 let it idle for 1 second.
- Check DTC.

Is DTC detected?

YFS >> Go to EC-895, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

Revision: 2011 November

NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

Disconnect accelerator pedal position (APP) sensor harness connector.

EC-895 2012 CUBE

- 2. Turn ignition switch ON.
- 3. Check the voltage between APP sensor harness connector and ground.

APP :	sensor	Ground	Voltage	
Connector Terminal		Glound	voltage	
E110	4	Ground	Approx. 5 V	

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
E110	2	E16	111	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK 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 Terminal		Continuity
E110	3	E16	110	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-896, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770713

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

- 1. Reconnect all harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal	Giodila		uition	voltage
	110			Fully released	0.6 - 0.9 V
E16	(APP sensor 1 signal)		Ground Accelerator ped- al	Fully depressed	3.9 - 4.7 V
E10				Fully released	0.3 - 0.6 V
	,			Fully depressed	1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

>> INSPECTION END

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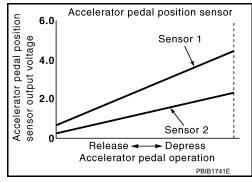
P2127, P2128 APP SENSOR

Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	Harness or connectors (APP sensor 2 circuit is open or shorted.)
P2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	[Crankshaft position sensor (POS) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Battery current sensor circuit is shorted.) (Tumble control valve position sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor • EVAP control system pressure sensor • Battery current sensor • Tumble control valve position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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 let it idle for 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-899, "Diagnosis Procedure".

NO >> INSPECTION END

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Diagnosis Procedure

INFOID:0000000007770716

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

- 1. Disconnect accelerator pedal position (APP) sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between APP sensor harness connector and ground.

APP	sensor	Ground	Voltage	
Connector Terminal		Glound	voltage	
E110	5	Ground	Approx. 5 V	

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 3.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
E110	5	E16	102	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK 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
	69	Tumble control valve actuator	F22	1
	71	Battery current sensor	F53	1
F8	74	Refrigerant pressure sensor	E49	3
. 0	75	CKP sensor (POS)	F20	1
	76	EVAP control system pressure sensor	B21	3
E16	102	APP sensor	E110	5

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.

- Battery current sensor (Refer to <u>EC-846, "Component Inspection"</u>.)
- Crankshaft position sensor (POS) (Refer to <u>EC-737, "Component Inspection"</u>.)

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P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

- Refrigerant pressure sensor (Refer to EC-941, "Diagnosis Procedure".)
- Tumble control valve (Refer to EC-880, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace malfunctioning component.

6.CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

- 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
E110	1	E16	104	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
E110	6	E16	103	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK APP SENSOR

Refer to EC-908, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 9.

$\mathbf{9}.$ replace accelerator pedal assembly

Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

>> INSPECTION END

10. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770717

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

- Reconnect all harness connectors disconnected.
- Turn ignition switch ON.
- Check the voltage between ECM harness connector and ground.

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

>> GO TO 2.

YES

NO

[MR18DE (FOR CALIFORNIA)]

ECM		Ground	Condition		Voltage
Connector	Terminal	- Glound Condi		uition	voltage
	110			Fully released	0.6 - 0.9 V
E16 -	(APP sensor 1 signal)	Ground	Accelerator ped-	Fully depressed	3.9 - 4.7 V
	103		al	Fully released	0.3 - 0.6 V
	(APP sensor 2 signal)			Fully depressed	1.95 - 2.4 V

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2.REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

>> INSPECTION END

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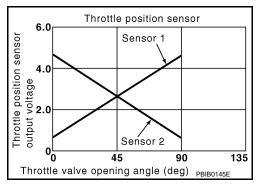
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P2135 TP SENSOR

Description INFOID:000000007770718

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-823, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135	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.	Harness or connector (TP sensor 1 or 2 circuit is open or shorted.) Electric throttle control actuator (TP sensor 1 or 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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 let it idle for 1 second.
- 2. Check DTC.

Is DTC detected?

YES >> Go to EC-902, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770720

INFOID:0000000007770719

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect electric throttle control actuator harness connector.
- 2. Turn ignition switch ON.

P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle	control actuator	Ground	Voltage	
Connector	Connector Terminal		voltage	
F29	2	Ground	Approx. 5 V	

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Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.check throttle position sensor ground circuit for open and short

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle	Electric throttle control actuator		ECM	
Connector	Terminal	Connector	Terminal	Continuity
F29	4	F8	36	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

f 4.CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
F29	1	F8	33	Existed
F29	3	го	34	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-903, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-26, "Exploded View".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

CHECK THROTTLE POSITION SENSOR

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INFOID:0000000007770721

P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

- Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-500, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D (CVT) or 1st (M/T) position.
- 6. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal	Ground	Condition		voltage
	33 (TP sensor			Fully released	More than 0.36V
1 signal) F8 34 (TP sensor 2 signal)	Ground	Accelerator pedal	Fully de- pressed	Less than 4.75V	
			Fully released	Less than 4.75V	
			Fully de- pressed	More than 0.36V	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace electric throttle control actuator. Refer to EM-26, "Exploded View".

>> INSPECTION END

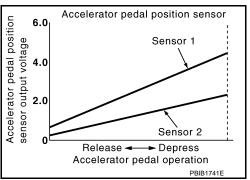
P2138 APP SENSOR

Description INFOID:0000000007770722

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



DTC Logic INFOID:00000000007770723

DTC DETECTION LOGIC

NOTE:

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-823, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	Harness or connector (APP sensor 1 or 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system sensor circuit is shorted.) (Battery current sensor circuit is shorted.) (Tumble control valve position sensor circuit is shorted.) Accelerator pedal position sensor (APP sensor 1 or 2) Crankshaft position sensor (POS) Refrigerant pressure sensor EVAP control system pressure sensor Battery current sensor Tumble control valve position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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 let it idle for 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-906, "Diagnosis Procedure".

>> INSPECTION END NO

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P2138 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Diagnosis Procedure

INFOID:0000000007770724

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect accelerator pedal position (APP) sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between APP sensor harness connector and ground.

APP s	sensor	Ground	Voltage
Connector	Connector Terminal		vollage
E110	4	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Check the voltage between APP sensor harness connector and ground.

APP s	sensor	Ground	Voltage
Connector	Connector Terminal		Voltage
E110	5	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 4.

4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
E110	4	E16	106	Existed	

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

${f 5}.$ CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

E	СМ	Sensor		
Connector	Terminal	Name	Connector	Terminal
	69	Tumble control valve actuator	F22	1
	71	Battery current sensor	F53	1
F8	74	Refrigerant pressure sensor	E49	3
	75	CKP sensor (POS)	F20	1
	76	EVAP control system pressure sensor	B21	3
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair short to ground or short to power in harness or connectors.

O.CHECK COMPONENTS

Check the following.

- Battery current sensor (Refer to <u>EC-846, "Component Inspection"</u>.)
- Crankshaft position sensor (POS) (Refer to <u>EC-737, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to EC-941, "Diagnosis Procedure".)
- Tumble control valve (Refer to EC-880, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace malfunctioning component.

7.CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- 3. Check the continuity between APP sensor harness connector and ECM harness connector as per the following.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E110 2		E16	111	Existed
	1	LIO	104	LAISIEU

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

8.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between APP sensor harness connector and ECM harness connector as per the following.

APP	sensor	ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
E110	3	E16	110	Existed
LIIU	6	LIO	103	LXISIEU

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

9.check app sensor

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P2138 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Refer to EC-908, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11. NO >> GO TO 10.

10. REPLACE ACCELERATOR PEDAL ASSEMBLY

Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

>> INSPECTION END

11. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007770725

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

- 1. Reconnect all harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage	
Connector	Terminal	Glound	Condition		voltage	
	110			Fully released	0.6 - 0.9 V	
E16	signal)	(APP sensor 1 signal) Ground (APP sensor 2 signal)	Accelerator pedal	Fully depressed	3.9 - 4.7 V	
210				Fully released	0.3 - 0.6 V	
	,			Fully depressed	1.95 - 2.4 V	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.replace accelerator pedal assembly

Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".

>> INSPECTION END

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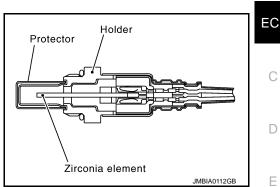
P2A00 A/F SENSOR 1

Description INFOID:0000000007770726

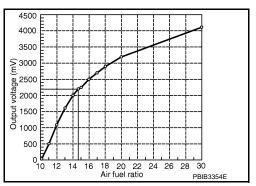
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



DTC Logic INFOID:0000000007770727

DTC DETECTION LOGIC

To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored not to be shifted to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause	K
P2A00	Air fuel ratio (A/F) sensor 1 circuit range/performance	 The output voltage computed by ECM from the A/F sensor 1 signal is shifted to the lean side for a specified period. The A/F signal computed by ECM from the A/F sensor 1 signal is shifted to the rich side for a specified period. 	 A/F sensor 1 A/F sensor 1 heater Heated oxygen sensor 2 Fuel pressure Fuel injector Intake air leaks Exhaust gas leaks 	L M

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Clear the mixture ratio self-learning value. Refer to EC-502, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- 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 1 minute under no load.
- Let engine idle for 1 minute.

>> GO TO 2.

P2A00 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

- 5. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-910, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770728

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK HARNESS CONNECTOR

- Disconnect A/F sensor 1 harness connector.
- Check harness connector for water.

Water should not exit.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness connector.

3.RETIGHTEN A/F SENSOR 1 AND HEATED OXYGEN SENSOR 2

1. Loosen and retighten the A/F sensor 1 and heated oxygen sensor 2. Refer to EM-30, "Exploded View" or EX-5, "Exploded View".

>> GO TO 4.

4. CHECK FOR EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- Listen for an exhaust gas leak before the three way catalyst 2.

Is exhaust gas leak detected?

YES >> Repair or replace malfunctioning parts.

NO >> GO TO 5.

5. CHECK FOR INTAKE AIR LEAK

- Reconnect A/F sensor 1 harness connector.
- Start engine and run it at idle.
- 3. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 6.

6.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to <u>EC-502</u>, "MIXTURE RATIO SELF-LEARNING VALUE <u>CLEAR</u>: Special Repair Requirement".
- Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171or P0172. Refer to <u>EC-701, "DTC Logic"</u> or <u>EC-705, "DTC Logic"</u>.

NO >> GO TO 7.

7. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect A/F sensor 1 harness connector.
- Turn ignition switch ON.

P2A00 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F se	ensor 1	Ground	Voltage
Connector	Terminal	Glound	voltage
F51	4	Ground	Battery voltage

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Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 8.

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8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- IPDM E/R harness connector E15
- 10 A fuse (No. 61)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

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$9.\mathsf{check}$ A/F sensor 1 input signal circuit for open and short

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F ser	nsor 1	ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
F51	F51 F8		49	Existed
131	2	10	53	LAISIGU

Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F ser	nsor 1	Ground	Continuity	
Connector Terminal		Ground	Continuity	
F51	1	Ground	Not existed	
	2	Giodila	Not existed	

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ECM		Ground	Continuity
Connector	Terminal	Ground	Continuity
F8	49	Ground	Not existed
10	53	Giodila	NOI EXISIEU

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5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK A/F SENSOR 1 HEATER

Refer to EC-628, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11. NO >> GO TO 13.

11. CHECK HEATED OXYGEN SENSOR 2

Check heated oxygen sensor 2. Refer to EC-679, "Component Inspection".

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P2A00 A/F SENSOR 1

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[MR18DE (FOR CALIFORNIA)]

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace heated oxygen sensor 2. Refer to <a>EX-5, "Exploded View".

12. CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace.

13. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. Refer to EM-30, "Exploded View".

CAUTION:

- Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

Do you have CONSULT?

YES >> GO TO 14. NO >> GO TO 15.

14.CONFIRM A/F ADJUSTMENT DATA

(P)With CONSULT

- 1. Turn ignition switch ON.
- Select "A/F ADJ-B1" in "DATA MONITOR" mode with CONSULT.
- 3. Make sure that "0.000" is displayed on CONSULT screen.

Is "0.000" displayed?

YES >> INSPECTION END

NO >> GO TO 15.

15. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to EC-502, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".

Do you have CONSULT?

YES >> GO TO 16.

NO >> INSPECTION END

16.confirm a/f adjustment data

(P)With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "A/F ADJ-B1" in "DATA MONITOR" mode with CONSULT.
- 3. Make sure that "0.000" is displayed on CONSULT screen.

>> INSPECTION END

ASCD BRAKE SWITCH

Description INFOID:0000000007770729

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).

Refer to EC-546, "System Description" for the ASCD function.

Component Function Check

CHECK FOR ASCD BRAKE SWITCH FUNCTION

(II) With CONSULT

- 1. Turn ignition switch ON.
- Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
- Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly de- pressed	OFF
	Brake pedar and clutch pedar (W/1)	Fully released	ON

- Turn ignition switch ON.
- Check the voltage between ECM harness connector terminals.

	ECM				
Connector	+	-	Condition		Voltage
Connector	Terminal	Terminal			
E16	100 (ASCD brake	108	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly de- pressed	Approx. 0 V
	switch signal)		Brake pedar and clutch pedar (IVI/1)	Fully released	Battery voltage

Is the inspection result normal?

>> INSPECTION END YES

NO >> Go to EC-913, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT-I

- 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	Glound	voltage
E112	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.

NO-1 >> CVT models: GO TO 2. NO-2 >> M/T models: GO TO 3.

2.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E105, M77

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< DTC/CIRCUIT DIAGNOSIS >

- 10 A fuse (No. 2)
- · 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.

3.check ascd clutch switch power supply circuit

- 1. Turn ignition switch OFF.
- Disconnect ASCD clutch switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ASCD clutch switch harness connector and ground.

ASCD clutch switch		Ground	Voltage	
Connector	Terminal	Glound	voltage	
E111	3	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 E105, M77
- 10 A fuse (No. 2)
- · Harness for open or short between ASCD clutch switch and fuse
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT-II

- Turn ignition switch OFF.
- Disconnect ASCD brake switch harness connector.
- Check the continuity between ASCD clutch switch harness connector and ASCD brake switch harness connector.

ASCD clu	ıtch switch	ASCD brake switch		Continuity	
Connector	Terminal	Connector Terminal		Continuity	
E111	4	E112	1	Existed	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK ASCD CLUTCH SWITCH

Refer to EC-915, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace ASCD clutch switch. Refer to CL-10, "Exploded View".

7.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD bra	ASCD brake switch ECM		ECM	
Connector	Terminal	Connector Terminal		Continuity
E112	2	E16	100	Existed

ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK ASCD BRAKE SWITCH

Refer to EC-915, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace ASCD brake switch. Refer to BR-17, "Exploded View".

9. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

1. CHECK ASCD BRAKE SWITCH-I

- Turn ignition switch OFF.
- Disconnect ASCD brake switch harness connector.
- 3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
		Fully released	Existed
1 and 2	Brake pedal	Slightly de- pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH-II

- Adjust ASCD brake switch installation. Refer to BR-18, "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 de- pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD brake switch. Refer to BR-17, "Exploded View".

Component Inspection (ASCD Clutch Switch)

1. CHECK ASCD CLUTCH SWITCH-I

- 1. Turn ignition switch OFF.
- Disconnect ASCD clutch switch harness connector.
- Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Con	Continuity	
		Fully released	Existed
1 and 2	Clutch pedal	Slightly de- pressed	Not existed

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ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK ASCD CLUTCH SWITCH-II

1. Adjust ASCD clutch switch installation. Refer to CL-11, "Inspection and Adjustment".

2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Con	Continuity	
		Fully released	Existed
1 and 2	Clutch pedal	Slightly de- pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD clutch switch. Refer to CL-10, "Exploded View".

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ASCD INDICATOR

Description INFOID:0000000007770734

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.

CRUISE lamp illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.

SET lamp illuminates when 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 ASCD setting.

SET lamp remains lit during ASCD control.

Refer to EC-546, "System Description" for the ASCD function.

Component Function Check

1. ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD indicator	Cor	Condition		
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	When vehicle speed: Between 40 km/h (25 MPH) and 190 km/h (118 MPH) (For the Middle East), 40 km/h (25 MPH) and 160 km/h (100 MPH) (Except for the Middle East) Output Description:	ASCD: Not operating	OFF	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-917, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK DTC

Check that DTC U1001 is not displayed.

Is DTC detected?

NO >> GO TO 2

YES >> Perform trouble diagnosis for DTC U1001. Refer to EC-621, "DTC Logic".

2. CHECK COMBINATION METER OPERATION

Refer to MWI-6, "METER SYSTEM: System Description".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Check combination meter circuit. Refer to MWI-6, "METER SYSTEM: System Diagram".

3.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

COOLING FAN

Description INFOID:000000007770737

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

COOLING FAN MOTOR

Models without A/C

The cooling fan operates at each speed when the current flows in the cooling fan motor as per the following.

Cooling fan Speed	Cooling fan motor terminals		
Cooling lan Speed	(+)	(-)	
Low (LOW)	1	3 and 4	
	2	3 and 4	
	1 and 2	3	
	1 and 2	4	
High (HI)	1 and 2	3 and 4	

Models with A/C

The cooling fan operates at high (HI) speed when the current flows, and operates at low (LOW) speed when cooling fan motor and the resistor are circuited in series.

Component Function Check

INFOID:0000000007770738

1. CHECK COOLING FAN FUNCTION

(II) With CONSULT

- 1. Turn ignition switch ON.
- Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.
- 3. Touch "LOW" and "Hi" on the CONSULT screen.
- 4. Check that cooling fan operates at each speed.

W Without CONSULT

- 1. Perform IPDM E/R auto active test and check cooling fan motor operation. Refer to PCS-11, "Diagnosis Description" or PCS-40, "Diagnosis Description".
- Check that cooling fan operates at each speed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Refer to EC-918, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007770739

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- 2. Check ground connection E21. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK COOLING FAN MOTOR CIRCUIT

- 1. Disconnect cooling fan motor harness connector.
- 2. Check the continuity between IPDM E/R harness connector and cooling fan motor harness connector.

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IPDM	I E/R	Cooling	fan motor	Continuity		
Connector	Terminal	Connector	Terminal	- Continuity		
E10	5		1			1
210	7	E62	2	Existed		
E11	10		3			
3. Check the o	continuity betwe	een cooling fan	motor harness	connector and	ound.	
Cooling f	an motor	Crownd	Continuity	•		
Connector	Terminal	Ground	Continuity			
E62	4	Ground	Existed	-		
. Also check	harness for she	ort to ground ar	nd short to powe	er.		
OK or NG						
OK >> GO	TO 4					
NG >> GO						
3.DETECT MA		IC DART				
		NO I AIXI				
Check the follow		4		DDM E/D		
			fan motor and If fan motor and g			
Tialliess for o	Jen or short be	tween cooming i	ian motor and g	Touriu		
D		tl t t				
•	•	•	ound or short to	power in narne	or connectors.	
LCHECK COC	DLING FAN MO	OTOR				
Refer to EC-919	, "Component	Inspection".				
OK or NG						
OK >> GO	TO 5.					
		an motor. Refer	to CO-18, "Exp	loded View".		
.CHECK INTI	ERMITTENT IN	ICIDENT				
	ERMITTENT IN					
D.CHECK INTE Perform GI-41, DK or NG						

OK or NG

OK >> Replace IPDM E/R. Refer to PCS-33, "Removal and Installation" (With I-Key) or PCS-62. "Removal and Installation" (WithouT I-Key).

NG >> Repair or replace harness or connector.

Component Inspection

COOLING FAN MOTOR

- Disconnect cooling fan motor harness connectors.
- Supply cooling fan motor terminals with battery voltage and check operation.

	Speed -	term	inals
		(+)	(–)
Cooling fan mo- tor	Low	1	4
		2	3
	High	1 and 2	3 and 4

Cooling fan motor should operate.

If NG, replace cooling fan motor.

ELECTRICAL LOAD SIGNAL

Description INFOID:000000007770741

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred via the CAN communication line.

Component Function Check

INFOID:0000000007770742

1. CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

- 1. Turn ignition switch ON.
- 2. Connect CONSULT and select "DATA MONITOR" mode.
- 3. Select "LOAD SIGNAL" and check indication under the following conditions.

Monitor item	Condition	Indication	
LOAD SIGNAL	SIGNAL Rear window defogger switch	ON	ON
LOAD GIGINAL		OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-920, "Diagnosis Procedure".

2. CHECK LIGHTING SWITCH FUNCTION

Check "LOAD SIGNAL" indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Lighting switch	ON at 2nd position	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to EC-920, "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	Heater fan control switch	ON	ON
SW	Treater fair control switch	OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-920, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007770743

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to <u>EC-920, "Component Function Check"</u>.

Which circuit is related to the incident?

Rear window defogger>>GO TO 2.

Headlamp>>GO TO 3.

Heater fan>>GO TO 4.

2.CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to DEF-3, "Work Flow".

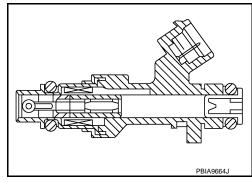
ELECTRICAL LOAD SIGNAL

ELECTRICAL LOAD SIGNAL		
< DTC/CIRCUIT DIAGNOSIS >	[MR18DE (FOR CALIFORNIA)]	
>> INSPECTION END		А
3.CHECK HEADLAMP SYSTEM		
Refer to EXL-5, "Work Flow".		EC
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>> INSPECTION END		
4.CHECK HEATER FAN CONTROL SYSTEM		С
Refer to <u>HA-3, "Work Flow"</u> .		
>> INSPECTION END		D
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FUEL INJECTOR

Description INFOID:000000007770744

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



Component Function Check

INFOID:0000000007770745

1.INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.

NO >> Go to EC-922, "Diagnosis Procedure".

2. CHECK FUEL INJECTOR FUNCTION

(I) With CONSULT

- 1. Start engine.
- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- 3. Make sure that each circuit produces a momentary engine speed drop.

⊗Without CONSULT

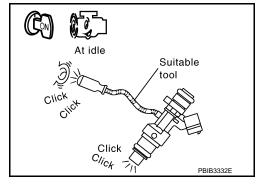
- 1. Let engine idle.
- 2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-922, "Diagnosis Procedure".



Diagnosis Procedure

INFOID:0000000007770746

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- Disconnect fuel injector harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between fuel injector harness connector and ground.

Fuel injector			Ground	Valtage
Cylinder	Connector	Terminal	Giouna	Voltage
1	F37	1		
2	F38	1	Ground	Battery voltage
3	F39	1		
4	F40	1		

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Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 2.

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INFOID:00000000007770747

2.DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R harness connector E15
- 15 A fuse (No. 62)
- Harness for open or short between fuel injector and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	Continuity
1	F37	2		31	
2	F38	2	F7	30	Existed
3	F39	2		29	LXISIEU
4	F40	2		25	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL INJECTOR

Refer to EC-923, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning fuel injector.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to <u>PCS-33</u>, "Removal and Installation" (With I-KEY), <u>PCS-62</u>, "Removal and Installation" (Without I-KEY).

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

Component Inspection

1. CHECK FUEL INJECTOR

- Turn ignition switch OFF.
- 2. Disconnect fuel injector harness connector.

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FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

3. Check resistance between fuel injector terminals as per the following.

Terminals	Resistance
1 and 2	11.1 - 14.5 Ω [at 10 - 60°C (50 - 140°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector. Refer to EM-37, "Exploded View".

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FUEL PUMP

Description INFOID:0000000007770748

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓
Battery	Battery voltage*		Fuel pump

^{*:} ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine start ability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation	
Ignition switch is turned to ON.	Operates for 1 second.	
Engine running and cranking	Operates.	
When engine is stopped	Stops in 1.5 seconds.	
Except as shown above	Stops.	

Component Function Check

1. CHECK FUEL PUMP FUNCTION

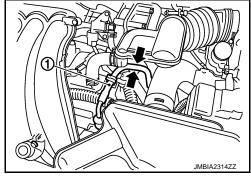
- Turn ignition switch ON.
- Pinch fuel feed hose (1) with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

YES >> INSPECTION END

>> EC-925, "Diagnosis Procedure". NO



Diagnosis Procedure

${f 1}$.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Turn ignition switch ON. 3.
- Check the voltage between ECM harness connector and ground.

E	СМ	Ground	Voltage
Connector	Terminal	Glound	voltage
F7	23	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

INFOID:0000000007770750

INFOID:0000000007770749

< DTC/CIRCUIT DIAGNOSIS >

- Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector E13.
- 3. Turn ignition switch ON.
- 4. Check the voltage between IPDM E/R harness connector and ground.

IPDN	/I E/R	Ground	Voltage
Connector	Terminal	Glound	voltage
E13	31	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4. >> GO TO 3. NO

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness or connectors E8, F1
- 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 FUEL PUMP POWER SUPPLY CIRCUIT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 4. Turn ignition switch ON.
- 5. Check the voltage between "fuel level sensor unit and fuel pump" harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage	
Connector	Terminal	Ground	voltage	
B40	1	Ground	Battery voltage should exist 1 second after ignition switch is turn ON.	

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 5.

5. CHECK FUSE

- Turn ignition switch OFF.
- 2. Disconnect 15 A fuse (No. 60) from IPDM E/R.
- Check 15 A fuse.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace15 A fuse.

6.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

- Disconnect IPDM E/R harness connector E15.
- 2. Check the continuity between IPDM E/R harness connector and "fuel level sensor unit and fuel pump" harness connector.

IPDM E/R		Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E15	55	B40	1	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 7.

FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

7. DETECT MALFUNCTIONING PART Α Check the following. Harness connectors B1, M18 Harness connectors M77, E105 EC Harness for open or short between IPDM E/R and "fuel level sensor unit and fuel pump" >> Repair open circuit or short to power in harness or connectors. 8.CHECK FUEL PUMP GROUND CIRCUIT Check the continuity between "fuel level sensor unit and fuel pump" and ground. D Fuel level sensor unit and fuel pump Ground Continuity Connector **Terminal** Е B40 3 Ground Existed Also heck harness for short to power. Is the inspection result normal? F YES >> GO TO 9. NO >> Repair open circuit or short to power in harness or connectors. 9. CHECK FUEL PUMP Refer to EC-927, "Component Inspection". Is the inspection result normal? Н YES >> GO TO 10. NO >> Replace "fuel level sensor unit and fuel pump". Refer to FL-5, "Exploded View". 10. CHECK INTERMITTENT INCIDENT Refer to GI-41, "Intermittent Incident". Is the inspection result normal? >> Replace IPDM E/R. Refer to PCS-33, "Removal and Installation" (With I-KEY), PCS-62, "Removal YES and Installation" (Without I-KEY). K NO >> Repair or replace harness or connectors. Component Inspection INFOID:0000000007770751 L 1. CHECK FUEL PUMP Turn ignition switch OFF. Disconnect "fuel level sensor unit and fuel pump" harness connector. 3. Check resistance between "fuel level sensor unit and fuel pump" terminals as per the following. **Terminals** Resistance N 1 and 3 $0.2 - 5.0 \Omega$ [at 25°C (77°F)] Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump". Refer to FL-5, "Removal and Installation".

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IGNITION SIGNAL

Description

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.

Component Function Check

INFOID:0000000007770753

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT: GO TO 2.

YES-2 >> Without CONSULT: GO TO 3.

NO >> Go to EC-928, "Diagnosis Procedure".

2.ignition signal function

(P)With CONSULT

- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- 2. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-928, "Diagnosis Procedure".

3. IGNITION SIGNAL FUNCTION

(X) Without CONSULT

- 1. Let engine idle.
- Read the voltage signal between ECM harness connector and ground.

ECM		Ground	Voltage signal	
Connector	Terminal	Ground	voltage signal	
	17	Constant		
	18			
- 7	21		Cround	
F7	22	Ground	≥ 2.0 V/DIV 50 ns/DIV T PBIA9265J	

NOTE:

The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-928, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007770754

1. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

- Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal	Giodila	voltage
E16	105	Ground	Battery voltage

IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-617, "Diagnosis Procedure".

2.check ignition coil power supply circuit-ii

- Turn ignition switch OFF.
- Disconnect Condenser harness connector. 2.
- 3. Turn ignition switch ON.
- 4. Check the voltage between condenser harness connector and ground.

Condenser		Ground	Voltage
Connector	Terminal	Glound	voitage
F13	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 E14. 2.
- Check the continuity between IPDM E/R harness connector and condenser harness connector.

IPDM E/R		Cond	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E14	44	F13	1	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

>> Go to EC-617, "Diagnosis Procedure". YES

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- IPDM E/R harness connector E14
- Harness for open or short between IPDM E/R and condenser

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.check condenser ground circuit for open and short

- Turn ignition switch OFF.
- 2. Check the continuity between Condenser harness connector and ground.

Condenser		Ground	Continuity	
Connector	Terminal	Giodila	Continuity	
F13	2	Ground	Existed	

3. Also check harness for short to power.

Is the inspection result normal?

YFS >> GO TO 6.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

O.CHECK CONDENSER

Refer to EC-932, "Component Inspection (Condenser)".

Is the inspection result normal?

YES >> GO TO 7.

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NO >> Replace condenser.

7.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

- 1. Reconnect all harness connectors disconnected.
- 2. Disconnect ignition coil harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ignition coil harness connector and ground.

Ignition coil			Ground	Voltage
Cylinder	Connector	Terminal	Giodila	voltage
1	F33	3		Battery voltage
2	F34	3	Ground	
3	F35	3	Ground	
4	F36	3		

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK 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	Giodila	Continuity	
1	F33	2			
2	F34	2	Ground	Existed	
3	F35	2	Glound		
4	F36	2			

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect ECM harness connector.
- 2. Check the continuity between ECM harness connector and ignition coil harness connector.

Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	Continuity
1	F33	1		17	
2	F34	1	F7	18	Existed
3	F35	1		22	Existed
4	F36	1		21	

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 or short to ground or short to power in harness or connectors.

10.check ignition coil with power transistor

Refer to EC-931, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-42, "Exploded View".

11. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Ignition Coil with Power Transistor)

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1.CHECK IGNITION COIL WITH POWER TRANSISTOR-I

- Turn ignition switch OFF.
- 2. Disconnect ignition coil harness connector.
- 3. Check resistance between ignition coil terminals as per the following.

Terminals	Resistance [Ω at 25°C (77°F)]	
1 and 2	Except 0 or ∞	
1 and 3	Except 0	
2 and 3		

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-42, "Exploded View".

2.CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

- Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

NOTE:

Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

- Start engine.
- 5. After engine stalls, crank it two or three times to release all fuel pressure.
- Turn ignition switch OFF.
- Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils. Refer to EM-42, "Exploded View".
- 8. Remove ignition coil and spark plug of the cylinder to be checked.
- 9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 10. Connect spark plug and harness connector to ignition coil.
- 11. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

 During the operation, always stay 0.5 cm (19.7 in) away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.

(Cylinder head, cylinder block, etc.)

JMBIA006

• It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken. NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

13 - 17 mm
(0.52-0.66 in)
Grounded metal portion
(Cylinder head, cylinder block, etc.)

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IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

YES >> INSPECTION END

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-42, "Exploded View".

Component Inspection (Condenser)

INFOID:0000000007770756

1. CHECK CONDENSER

- 1. Turn ignition switch OFF.
- 2. Disconnect condenser harness connector.
- 3. Check resistance between condenser terminals as per the following.

Terminals	Resistance
1 and 2	Above 1 MΩ [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Condenser.

MALFUNCTION INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

MALFUNCTION INDICATOR LAMP

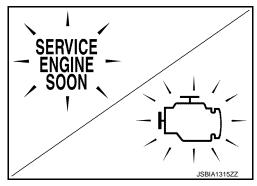
Description

The Malfunction Indicator Lamp (MIL) is located on the combination meter.

The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.

When the engine is started, the MIL should go off. If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.

For details, refer to <u>EC-596</u>, "<u>DIAGNOSIS DESCRIPTION</u>: Malfunction Indicator Lamp (MIL)".



Component Function Check

1. CHECK MIL FUNCTION

- 1. Turn ignition switch ON.
- Make sure that MIL lights up.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-933, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK DTC

Check that DTC UXXXX is not displayed.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble diagnosis for DTC UXXXX.

2. CHECK DTC WITH METER

Refer to MWI-30, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-90, "Exploded View".

NO >> Repair or replace.

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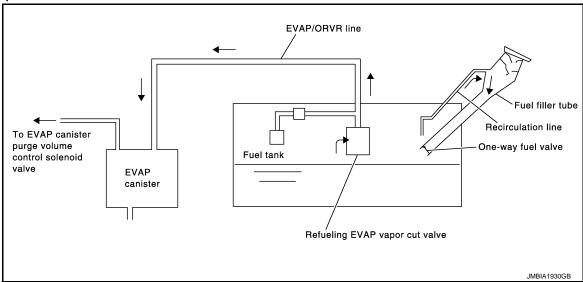
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[MR18DE (FOR CALIFORNIA)]

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

Description INFOID:000000007770760



From the beginning of refueling, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve and EVAP/ORVR line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

WARNING:

When conducting inspections below, be sure to observe the following:

- Put a "CAUTION: FLAMMABLE" sign in workshop.
- Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Be sure to furnish the workshop with a CO2 fire extinguisher.

CAUTION:

- Before removing fuel line parts, carry out the following procedures:
- Put drained fuel in an explosion-proof container and put lid on securely.
- Release fuel pressure from fuel line. Refer to EC-985, "Inspection".
- Disconnect battery ground cable.
- Always replace O-ring when the fuel gauge retainer is removed.
- Do not kink or twist hose and tube when they are installed.
- Do not tighten hose and clamps excessively to avoid damaging hoses.
- · After installation, run engine and check for fuel leaks at connection.
- Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically.
 Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.

Component Function Check

INFOID:0000000007770761

1. CHECK ORVR FUNCTION

Check whether the following symptoms are present.

- Fuel odor from EVAP canister is strong.
- Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Is any symptom present?

YES >> Go to EC-934, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007770762

1.INSPECTION START

Check whether the following symptoms are present.

A: Fuel odor from EVAP canister is strong.

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

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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 8.

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 1.9 kg (4.2 lb).

Is the inspection result normal?

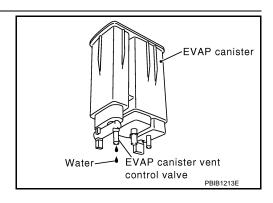
YES >> GO TO 3. NO >> GO TO 4.

3.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 4. NO >> GO TO 7.



4. REPLACE EVAP CANISTER

Replace EVAP canister with a new one. Refer to FL-14. "Exploded View".

>> GO TO 5.

5. CHECK DRAIN FILTER

Refer to EC-796, "Component Inspection (Drain filter)".

Is the inspection result normal?

OK >> GO TO 6.

NO >> Replace drain filter. Refer to <u>EC-563, "System Description"</u>.

6. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

7.CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-937, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-9, "Exploded View".

8. 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 1.9 kg (4.2 lb).

Is the inspection result normal?

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ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

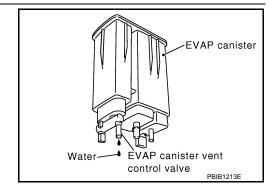
YES >> GO TO 9. NO >> GO TO 10.

9. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 10. NO >> GO TO 13.



10. REPLACE EVAP CANISTER

Replace EVAP canister with a new one. Refer to FL-14, "Exploded View".

>> GO TO 11.

11. CHECK DRAIN FILTER

Refer to EC-796, "Component Inspection (Drain filter)".

Is the inspection result normal?

OK >> GO TO 12.

NO >> Replace drain filter. Refer to <u>EC-563</u>, "System Description".

12. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

13. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 14.

NO >> Repair or replace hoses and tubes.

14. CHECK RECIRCULATION LINE

Check recirculation line for clogging, dents and cracks.

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace fuel filler tube.

15. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-937, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-9. "Exploded View".

16. CHECK FUEL FILLER TUBE

Check fuel filler tube and hose connected to the fuel tank for clogging, dents and cracks.

Is the inspection result normal?

YES >> GO TO 17.

NO >> Replace fuel filler tube.

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

17. CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair or replace one-way fuel valve with fuel tank. Refer to FL-9, "Exploded View".

18. CHECK ONE-WAY FUEL VALVE-II

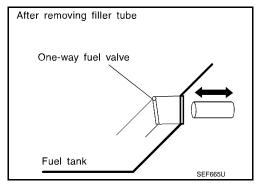
- 1. Make sure that fuel is drained from the tank.
- Remove fuel filler tube and hose.
- Check one-way fuel valve for operation as per the following. When a stick is inserted, the valve should open, when removing stick it should close.

Do not drop any material into the tank.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel filler tube or replace one-way fuel valve with fuel tank. Refer to FL-9, "Exploded View".



Component Inspection (Refueling EVAP vapor cut valve)

INFOID:0000000007770763

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK REFUELING EVAP VAPOR CUT VALVE

(P)With CONSULT

- 1. Remove fuel tank. Refer to FL-9, "Removal and Installation".
- 2. 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.
- 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.
- 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. Refer to FL-5, "Exploded View".

Always replace O-ring with new one.

- Put fuel tank upside down.
- Apply vacuum pressure to hose end [-13.3 kPa (-0.136 kg/cm³, -1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.

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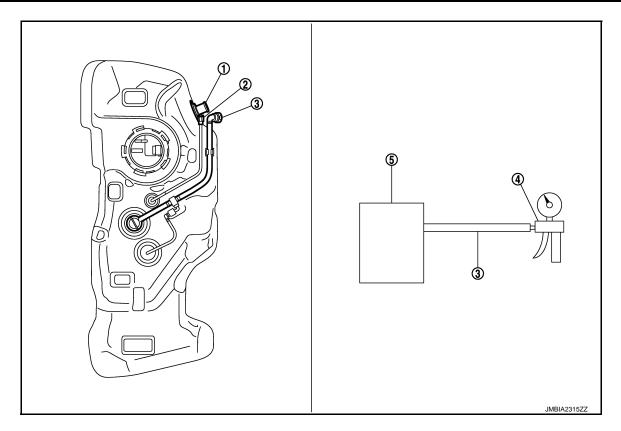
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1. Filler tube

- Recirculation line
 Fuel tank
- e 3. EVAP/ORVR line

4. Vacuum/pressure handy pump

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-9, "Exploded View".

3. CHECK REFUELING EVAP VAPOR CUT VALVE

♥Without CONSULT

- 1. Remove fuel tank. Refer to FL-9, "Removal and Installation".
- 2. 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.
- 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.
- Remove fuel gauge retainer with fuel gauge unit. Refer to FL-5, "Exploded View".

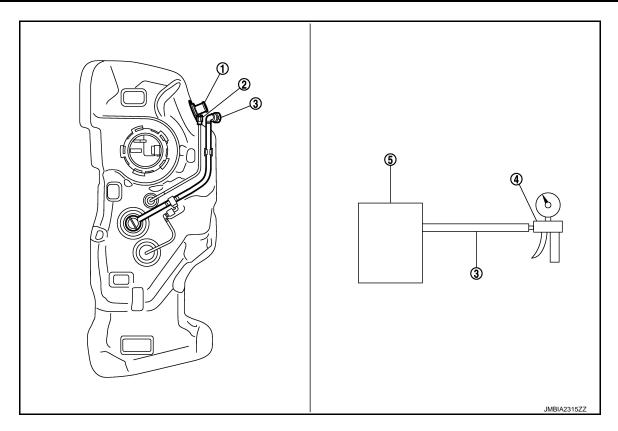
Always replace O-ring with new one.

- Put fuel tank upside down.
- Apply vacuum pressure to hose end [–13.3 kPa (–0.136 kg/cm³, –1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

[MR18DE (FOR CALIFORNIA)]

< DTC/CIRCUIT DIAGNOSIS >



- Filler tube
- . Vacuum/pressure handy pump
- Recirculation line
- 5. Fuel tank

3. EVAP/ORVR line

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-9, "Exploded View".

Component Inspection (Drain filter)

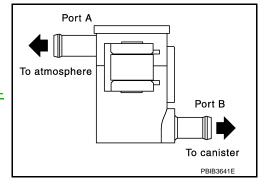
1. CHECK DRAIN FILTER

- 1. Check visually for insect nests in the drain filter air inlet.
- 2. Check visually for cracks or flaws in the appearance.
- 3. Check visually for cracks or flaws in the hose.
- 4. Blow air into port A and check that it flows freely out of port B.
- Block port B.
- 6. Blow air into port A and check that there is no leakage.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace drain filter. Refer to <u>EC-563, "System Description"</u>.



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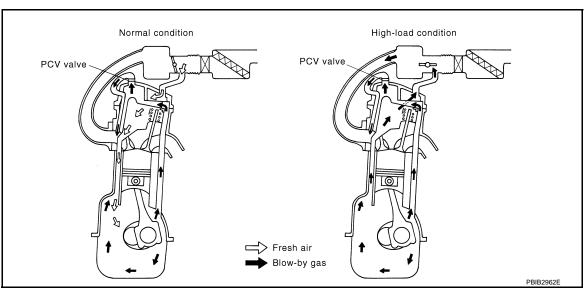
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POSITIVE CRANKCASE VENTILATION

Description INFOID:000000007770765



This system returns blow-by gas to the intake manifold.

The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

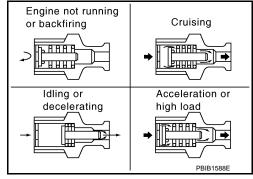
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

The ventilating air is drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



Component Inspection

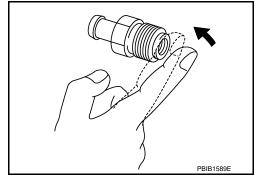
1. CHECK PCV VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.

Is the inspection result normal?

YES >> INSPECTION END

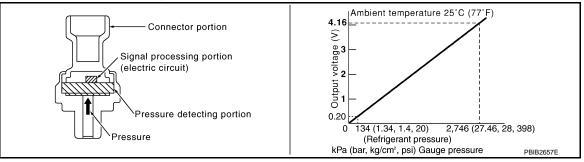
NO >> Replace PCV valve. Refer to EM-42, "Exploded View".



REFRIGERANT PRESSURE SENSOR

Description INFOID:0000000007770767

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



Component Function Check

1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

- Start engine and warm it up to normal operating temperature.
- Turn A/C switch and blower fan switch ON.
- Check the voltage between ECM harness connector and ground.

	ECM	Ground	Voltage
Connector	Terminal	Giodila	voltage
F8	41 (Refrigerant pressure sensor signal)	Ground	1.0 - 4.0V

Is the inspection result normal?

YES >> INSPECTION END

>> Go to EC-941, "Diagnosis Procedure". NO

Diagnosis Procedure

${f 1}$.CHECK GROUND CONNECTION

- 1. Turn A/C switch and blower fan switch OFF.
- 2. Stop engine.
- Turn ignition switch OFF.
- Check ground connection E38. Refer to GI-44, "Circuit Inspection".

Is the inspection result normal?

YFS >> GO TO 2.

NO >> Repair or replace ground connection.

2.check refrigerant pressure sensor power supply circuit

- Disconnect refrigerant pressure sensor harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pr	essure sensor	Ground	Voltage	
Connector	Terminal	Glodila	voltage	
E49	3	Ground	Approx. 5 V	

Is the inspection result normal?

YES >> GO TO 4. EC

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REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F1. E8
- Harness for open or short between ECM and refrigerant pressure sensor
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
E49	1	F8	48	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 E8. F1
- Harness for open or short between ECM and refrigerant pressure sensor
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between ECM harness connector and refrigerant pressure sensor harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
E49	2	F8	41	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.

1. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F1
- Harness for open or short between ECM and refrigerant pressure sensor
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor. Refer to <u>HAC-117</u>, "Exploded View".

NO >> Repair or replace.

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ECU DIAGNOSIS INFORMATION

ECM

Reference Value EC

VALUES ON THE DIAGNOSIS TOOL

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	C	condition	Values/Status
ENG SPEED	Run engine and compare CONSL	Almost the same speed as the tachometer indication.	
MAS A/F SE-B1	See EC-610, "Diagnosis Procedure"		
B/FUEL SCHDL	See EC-610, "Diagnosis Procedure"		
A/F ALPHA-B1	See EC-610, "Diagnosis Procedure"		
COOLAN TEMP/S	Engine: After warming up		More than 70°C (158F)
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
HO2S2 (B1)	are met.	00 rpm quickly after the following conditions	0 - 0.3 V ←→ Approx. 0.6 - 1.0 V
HO2S2 MNTR (B1)	Engine: After warming up After keeping engine speed betwe idle for 1 minute under no load	en 3,500 and 4,000 rpm for 1 minute and at	$LEAN \longleftrightarrow RICH$
VHCL SPEED SE	Turn drive wheels and compare C cation.	ONSULT value with the speedometer indi-	Almost the same speed as speedometer indication
BATTERY VOLT	Ignition switch: ON (Engine stopped)	ed)	11 - 14 V
ACCEL CENTA	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9 V
ACCEL SEN 1		Accelerator pedal: Fully depressed	4.0 - 4.8 V
400EL 0EN 0±1	Ignition switch: ON	Accelerator pedal: Fully released	0.6 - 0.9 V
ACCEL SEN 2*1	(Engine stopped)	Accelerator pedal: Fully depressed	3.9 - 4.8 V
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 1-B1	(Engine stopped)Selector lever position: D (CVT) or 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75 V
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 2-B1* ¹	(Engine stopped)Selector lever position: D (CVT) or 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75 V
START SIGNAL	• Ignition switch: $ON \rightarrow START \rightarrow O$	ON	$OFF \to ON \to OFF$
CLED THE DOC	Ignition switch: ON	Accelerator pedal: Fully released	ON
CLSD THL POS	(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
P/N POSI SW	Ignition switch: ON	Selector lever position: P or N (CVT) or Neutral (M/T)	ON
		Selector lever position: Except above	OFF

Monitor Item	С	ondition	Values/Status
DW/CT CICNAL	Engine: After warming up, idle the	Steering wheel: Not being turned	OFF
PW/ST SIGNAL	engine	Steering wheel: Being turned	ON
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON
LOAD SIGNAL	Ignition switch. ON	Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	• Ignition switch: $ON \rightarrow OFF \rightarrow ON$		$ON \to OFF \to ON$
HEATED FAN SW	Engine: After warming up, idle the	Heater fan switch: ON	ON
HEATER FAN SW	engine	Heater fan switch: OFF	OFF
DDAKE CW	a Ignition quitable ON	Brake pedal: Fully released	OFF
BRAKE SW	Ignition switch: ON	Brake pedal: Slightly depressed	ON
	Engine: After warming up	Idle	2.0 - 3.0 msec
INJ PULSE-B1	 Selector lever position: P or N (CVT) or Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	1.9 - 2.9 msec
	Engine: After warming up	Idle	8 - 18°BTDC
IGN TIMING	 Selector lever position: P or N (CVT) or Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	25 - 45°BTDC
Selector lever pos (CVT) or Neutral (I	Engine: After warming up Selector lever position: P or N (CVT) or Neutral (M/T)	Idle	10 - 35%
	Air conditioner switch: OFF	2,500 rpm	10 - 35%
	Engine: After warming up	Idle	1.0 - 4.0 g/s
MASS AIRFLOW	 Selector lever position: P or N (CVT) or Neutral (M/T) Air conditioner switch: OFF No load 	2,500 rpm	2.0 - 10.0 g/s
	Engine: After warming up	Idle	0%
PURG VOL C/V	 Selector lever position: P or N (CVT) or Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	0 - 50%
	Engine: After warming up	Idle	−5 - 5°CA
INT/V TIM (B1)	 Selector lever position: P or N (CVT) or Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0 - 40°CA
INT/V SOL (B1)	Engine: After warming up Selector lever position: P or N (CVT) or Neutral (M/T)	Idle	0 - 2%
OOL (D1)	Air conditioner switch: OFF No load	2,000 rpm	Approx. 0 - 90%
	Ignition switch: ON	Accelerator pedal: Fully released	ON
SWRL CONT S/V	 Engine coolant temperature: Between 5°C (41°F) and 40°C (104°F) 	Accelerator pedal: Slightly depressed	OFF
	Ignition switch: ON	Accelerator pedal: Fully released	Less than 1.2 V
TMBL POS SEN	 Engine coolant temperature: Between 5°C (41°F) and 60°C (140°F) 	Accelerator pedal: Slightly depressed	More than 2.9 V

ECM

[MR18DE (FOR CALIFORNIA)]

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Monitor Item	C	ondition	Values/Status
	• Engines Afterware in the state of	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 ignitionEngine running or cranking	switch: ON	ON
	Except above		OFF
THRTL RELAY	Ignition switch: ON		ON
	Foreign Affanon in the state of	Engine coolant temperature is 98°C (208°F) or less	OFF
COOLING FAN	Engine: After warning up, idle the engine Air conditioner switch: OFF	Engine coolant temperature is between 98°C (208°F) and 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH
HO2S2 HTR (B1)	 Engine speed: Below 3,600 rpm a Engine: After warming up Keeping the engine speed betwee idle for 1 minute under no load 	fter the following conditions are met. n 3,500 and 4,000 rpm for 1 minute and at	ON
VEHICLE SPEED	Turn drive wheels and compare Cocation.	ONSULT value with the speedometer indi-	Almost the same speed as the speedometer indication
IDL A/V LEARN	Engine: running	Idle air volume learning has not been performed yet.	YET
IDL AV LEARN	Engine. running	Idle air volume learning has already been performed successfully.	CMPLT
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	0 - 65,535 km (0 - 40,723 miles)
ENG OIL TEMP	Engine: After warming up		More than 70°C (158F)
A/F S1 HTR (B1)	Engine: After warming up, idle the (More than 140 seconds after star)		4 - 100%
AC PRESS SEN	Engine: Idle Both A/C switch and blower fan sv	vitch: ON (Compressor operates)	1.0 - 4.0 V
EVAP SYS PRES	Ignition switch: ON		Approx 1.8 - 4.8 V
VENT CONT/V	Ignition switch: ON		OFF
I/P PULLY SPD	Vehicle speed: More than 20 km/h	(12MPH)	Almost the same speed as the tachometer indication.
A/F ADJ-B1	Engine: Running		-0.330 - 0.330
FUEL T/TMP SE	Ignition switch: ON		Indicates fuel tank tempera- ture.
INT/A TEMP SE	Ignition switch: ON		Indicates intake air tempera ture.
FUEL LEVEL SE	Ignition switch: ON		Depending on fuel level of fuel tank.
	Engine speed: Idle		
BAT CUR SEN	 Battery: Fuel charged*² Selector lever: P or N (CVT), Neut Air conditioner switch: OFF No load 	Approx 2,600 - 3,500 mV	
ALT DUTY	Engine: Idle	0 - 80%	
ALT DUTY SIC	Power generation voltage variable	control: Operating	ON
ALT DUTY SIG	Power generation voltage variable	control: Not operating	OFF
VHCL SPEED SE	Turn drive wheels and compare Cocation.	Almost the same speed as the speedometer indication.	

Monitor Item	C	Condition	Values/Status
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed.
MAINI CW	a Ignition quitable ON	MAIN switch: pressed	ON
MAIN SW	Ignition switch: ON	MAIN switch: Released	OFF
CANCEL CW	- Lauritia a conitale ON	CANCEL switch: pressed	ON
CANCEL SW	Ignition switch: ON	CANCEL switch: Released	OFF
CET CW	a lamition quitable ON	SET/COAST switch: pressed	ON
SET SW	Ignition switch: ON	SET/COAST switch: Released	OFF
DECLINE (ACC C)	. Institute and take ON	RESUME/ACCELERATE switch: pressed	ON
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Released	OFF
BRAKE SW1	Ignition switch: ONI	Brake pedal: Fully released (CVT) Brake pedal and clutch pedal: Fully released (M/T)	ON
(ASCD brake switch)	Ignition switch: ON	Brake pedal: Slightly depressed (CVT) Brake pedal and/or clutch pedal: Slightly depressed (M/T)	OFF
BRAKE SW2	• Ignition switch: ON	Brake pedal: Fully released	OFF
(stop lamp switch)	Ignition switch: ON Brake pedal: Slightly depressed		ON
VHCL SPD CUT	Ignition switch: ON		NON
LO SPEED CUT	Ignition switch: ON		NON
AT OD MONITOR	Ignition switch: ON		OFF
AT OD CANCEL	Ignition switch: ON		OFF
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time \rightarrow at the 2nd time	$ON \to OFF$
	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
THRTL STK CNT B1	NOTE: The item is indicated, but not used.		_
EVAP LEAK DIAG	Ignition switch: ON		Indicates the condition of EVAP leak diagnosis.
EVAP DIAG READY	Ignition switch: ON		Indicates the ready condition of EVAP leak diagnosis.
HO2 S2 DIAG1 (B1)	DTC P0139 self-diagnosis (delayed	response) is incomplete.	INCMP
	DTC P0139 self-diagnosis (delayed	response) is complete.	CMPLT
HO2 S2 DIAG2 (B1)	DTC P0139 self-diagnosis (slow res	ponse) is incomplete.	INCMP
	DTC P0139 self-diagnosis (slow response) is complete.		CMPLT
A/F SEN1 DIAG2	EN1 DIAG2 DTC P014C and P014D self-diagnosis is incomplete.		INCMP
(B1)	DTC P014C and P014D self-diagno	sis is complete.	CMPLT
A/F SEN1 DIAG3	The vehicle condition is not within the P015A or P015B.	e diagnosis range of DTC P014C, P014D,	ABSNT
(B1)	The vehicle condition is within the di P015A or P015B.	agnosis range of DTC P014C, P014D,	PRSNT
SYSTEM 1 DIAG-	DTC P117A self-diagnosis is incomp	olete.	INCMP
NOSIS A B1	DTC P117A self-diagnosis is comple	ete.	CMPLT

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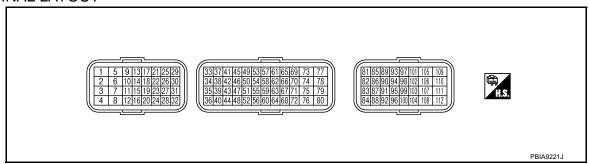
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Monitor Item	Condition	Values/Status
SYSTEM 1 DIAG-	DTC P117A self-diagnosis is on standby.	ABSENT
NOSIS B B1	DTC P117A self-diagnosis is under diagnosis.	PRSENT

^{*:} 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 in the engine room left side near battery.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT.

Termin (Wire		Description		Condition	Value	
+	_	Signal name	Input/ Output	Condition	(Approx.)	'
1 (P)	108 (B)	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	3.2 V★ 1mSec/div 5V/div JMBIA0324GB	J K L
2 (SB)	108 (B)	Throttle control motor re- lay power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	
3 (V)	108 (B)	Tumble control valve motor power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	M
4 (L)	108 (B)	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	1.8 V★ 5mSec/div 5V/div JMBIA0326GB	N 0
5 (G)	59 (O)	Heated oxygen sensor 2 heater	Output	 [Engine is running] Engine speed: Below 3,600 rpm after the following conditions are met Engine: after warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	10 V★ 50mSec/div 50mSec/div 10V/div JMBIA0325GB	P

^{*:} Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3. "How to Handle Battery".

Termin (Wire		Description		Condition	Value
+	_	Signal name	Input/ Output	Condition	(Approx.)
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
6 (W)	108 (B)	Tumble control valve motor (Close)	Output	 [Ignition switch: OFF → ON] For a few seconds after turning ignition switch ON 	0 V ↓ BATTERY VOLTAGE (11 - 14 V) ↓ 0 V
(**)	(B)	tor (crose)		 [Ignition switch: ON → OFf] For a few seconds after turning ignition switch OFF 	0 V ↓ 1.5 - 2.0 V ↓ 0 V
7	108	Tumble control valve mo-		 [Ignition switch: OFF → ON] For a few seconds after turning ignition switch ON 	0 V ↓ 0.5 V ↓ 0 V
(R)	(B) tor (Open)		Output	 [Ignition switch: ON → OFf] For a few seconds after turning ignition switch OFF 	0 V ↓ BATTERY VOLTAGE (11 - 14 V) ↓ 0 V
8 (G)	53 (LG)	A/F sensor 1 heater	Output	 [Engine is running] Warm-up condition Engine speed: Idle speed (More than 140 seconds after starting engine) 	2.9 - 8.8 V★ 50mSec/div 10V/div JMBIA0325GB
9 (P)	108 (B)	EVAP canister purge vol- ume control solenoid	Output	[Engine is running]Idle speedAccelerator pedal: Not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div 10V/div JMBIA0327GB
(୮)	(0)	valve		[Engine is running]Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)	10 V★ 50mSec/div 10V/div JMBIA0328GB
11 (B)	_	ECM ground	_	_	_

Termin (Wire		Description		Condition	Value
+	-	Signal name	Input/ Output	Condition	(Approx.)
12 (GR)	_	Sensor ground (Engine oil temperature sensor)	_	_	_
14	108 (B)	PNP signal	Input	[Ignition switch: ON] • Selector lever: P or N (CVT), Neutral (M/T)	BATTERY VOLTAGE (11 - 14 V)
(L)	(B)			[Ignition switch: ON] • Selector lever: Except above	0 V
15 (Y)	108 (B)	Throttle control motor re- lay	Output	[Ignition switch: OFF] [Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V) 0 - 1.0 V
17		Ignition signal No. 1		[igililon switch. ON]	0 - 0.3 ∨★
18 (LG)	108	Ignition signal No. 2	Outout	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	50mSec/div 2V/div JMBIA0329GB
21 (G)	(B)	Ignition signal No. 4 Ignition signal No. 3	Output		0.2 - 0.5 V★ 50mSec/div
22 (SB)				[Engine is running]Warm-up conditionEngine speed: 2,500 rpm	2V/div JMBIA0330GB
23 (GR)	108 (B)	Fuel pump relay	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.0 V
25 (V)		Fuel injector No. 4		[Engine is running]	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div_
29 (Y)		Fuel injector No. 3		Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle	
30 (O)	108 (B)	Fuel injector No. 2	Output		10V/div JMBIA0331GB BATTERY VOLTAGE
31 (L)		Fuel injector No. 1		[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	(11 - 14 V)★ 50mSec/div 10V/div JMBIA0332GB
27 (R)	12 (GR)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine oil temperature.

< ECU DIAGNOSIS INFORMATION >

Termin (Wire		Description		0	Value
+	_	Signal name	Input/ Output	Condition	(Approx.)
28 (SB)	108 (B)	EVAP canister vent control valve	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
32 (P)	108 (B)	ECM relay (Self shut-off)	Output	[Engine is running][Ignition switch: OFF]A few seconds after turning ignition switch OFF	0 - 1.0 V
(,)	(5)	(con onat on)		[Ignition switch: OFF]More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
33	36	Throttle position sensor 1	Input	 [Ignition switch: ON] Engine stopped Selector lever: D (CVT), 1st (M/T) Accelerator pedal: Fully released 	More than 0.36 V
(LG)	(Y)	Through position contact 1	Input/ Output		Less than 4.75 V
34	36	Throttle position sensor 2	Input		Less than 4.75 V
(R)	(Y)	7.1104.110 postuori contosi 2	mpat		More than 0.36 V
35 (V)	47 (LG)	Tumble control valve position sensor	Input	[Ignition switch: ON → OFf] • For a few seconds after turning igni-	0 V ↓ 0.7 V 0.7 V ↓ 3.5 V ↓ 0 V
36 (Y)	_	Sensor ground (Throttle position sensor)	_	_	_
37 (W)	40 (—)	Knock sensor	Input		2.5 V
38 (BR)	44 (GR)	Engine coolant tempera- ture sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.
40 (—)	_	Sensor ground (Knock sensor)	_	_	_
41 (GR)	48 (BR)	Refrigerant pressure sensor	Input	Warm-up condition Both A/C switch and blower fan motor switch: ON (Compressor oper-	1.0 - 4.0 V
42 (V)	51 (Y)	EVAP control system pressure sensor	Input	[Ignition switch: ON]	1.8 - 4.8 V
43 (P)	108 (B)	Fuel tank temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with fuel tank temperature.

ECM

Terminal No. (Wire color) +		Description		Condition	Value	
+	_	Signal name	Input/ Output	Condition	(Approx.)	
	_	Sensor ground (Engine coolant temperature sensor)	_	_	_	Ε
	(R) Wass air flow sensor Input [Engine is running]		Warm-up condition	0.7 - 1.1 V		
(G)	(R)	mass an new series.	mpat	[Engine is running]Warm-up conditionEngine speed: 2,500 rpm	1.3 - 1.7 V	
		Intake air temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.	
	_	Sensor ground (Tumble control valve position sensor)	_	_	_	
	_	Sensor ground (Refrigerant pressure sensor)	_	_	_	
		A/F sensor 1	Input	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	Approximately 1.8 V Output voltage varies with air fuel ratio.	
50 (W)	59 (O)	Heated oxygen sensor 2	Input	 [Engine is running] Revving engine from idle to 3,000 rpm quickly after the following conditions are met Engine: after warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	0 - 1.0 V	
51 (Y)	_	Sensor ground (EVAP control system pressure sensor)	_	_	_	
52 (R)	_	Sensor ground (Mass air flow sensor)	_	_	_	
53 (LG)	_	Sensor ground (A/F sensor 1)	_	_	_	
55 (P)	_	Sensor ground (Intake air temperature sensor)	_	_	_	
57 (GR)	64 (SB)	Battery current sensor	Input	 [Engine is running] Battery: Fully charged *1 Idle speed 	2.6 - 3.5 V	
59 (O)	_	Sensor ground (Heated oxygen sensor 2)	_	_	_	

Termin (Wire		Description		Condition	Value		
+	_	Signal name	Input/ Output	Condition	(Approx.)		
61	62	Crankshaft position sen-	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	4.0 V★ 5mSec/div 2V/div JMBIA0333GB		
(W)	(B)	sor (POS)		[Engine is running] • Engine speed: 2,000 rpm	4.0 V★ 5mSec/div 2V/div JMBIA0334GB		
62 (B)	_	Sensor ground [Crankshaft position sensor (POS)]	_	_	_		
63 (L)	_	Sensor ground [Camshaft position sensor (PHASE)]	_	_	_		
64 (SB)	_	Sensor ground (Battery current sensor)	_	_	_		
65	63	Camshaft position sensor		 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	0 - 5.0★ 20mSec/div 20mSec/div JMBIA0045GB		
(Y)	(L)	(PHASE)	Input	[Engine is running] • Engine speed is 2,000 rpm	0 - 5.0★ 20mSec/div 2V/div JMBIA0046GB		
66 (L)	108 (B)	Power supply for ECM (Back-up)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)		
69 (SB)	47 (LG)	Sensor power supply (Tumble control valve position sensor)	_	[Ignition switch: ON]	5 V		
71 (Y)	64 (SB)	Sensor power supply [Battery current sensor]	_	[Ignition switch: ON]	5 V		
72 (O)	36 (Y)	Sensor power supply (Throttle position sensor)	_	[Ignition switch: ON]	5 V		

Terminal No. (Wire color)		Description		Condition	Value
+	-	Signal name	Input/ Output	Condition	(Approx.)
				[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
73 (P)	108 (B)	Intake valve timing control solenoid valve	Output	[Engine is running]Warm-up conditionWhen revving engine up to 2,000rpm Quickly	7 - 10 V★ >> 10.0V/Div PBIA4937J
74 (W)	108 (B)	Sensor power supply (Refrigerant pressure sensor)	Input	[Ignition switch: ON]	5 V
75 (R)	62 (B)	Sensor power supply [Crankshaft position sen- sor (POS)]	_	[Ignition switch: ON]	5 V
76 (LG)	51 (Y)	Sensor power supply [EVAP control system pressure sensor]	_	[Ignition switch: ON]	5 V
78 (G)	63 (L)	Sensor power supply [Camshaft position sensor (PHASE)]	_	[Ignition switch: ON]	5 V
83 (P)	108 (B)	CAN communication line	Input/ Output	_	_
84 (L)	108 (B)	CAN communication line	Input/ Output	_	_
88 (LG)	108 (B)	Data link connector	Input/ Output	_	_
93 (L)	108 (B)	Ignition switch	Input	[Ignition switch: OFF] [Ignition switch: ON]	0 V BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON] • ASCD steering switch: OFF	4 V
				[Ignition switch: ON] • MAIN switch: Pressed	0 V
94 (SB)	95 (BR)*2	ASCD steering switch	Input	[Ignition switch: ON] • CANCEL switch: Pressed	1 V
. ,	(B)*3			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3 V
				[Ignition switch: ON] • SET/COAST switch: Pressed	2 V
95 BR) ^{*2} (B) ^{*3}	_	Sensor ground (ASCD steering switch)	_	_	
99	108	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0 V
(W)	(B)	Crop ramp switch	iiiput	[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)

		Description		Condition	Value	
Terminal No. (Wire color) +	Signal name	Input/ Output	Condition	(Approx.)		
		ASCD brake switch	Input	[Ignition switch: ON] Brake pedal: Slightly depressed (CVT) Brake pedal and clutch pedal: Slightly depressed (M/T)	0 V	
(Wire color) +	(6)			[Ignition switch: ON] Brake pedal: Fully released (CVT) Brake pedal and/or clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14 V)	
		Sensor power supply (Accelerator pedal position sensor 2)	_	[Ignition switch: ON]	5 V	
103	104	Accelerator pedal position	loout	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6 V	
(Wire color) +	(R)	sensor 2	Input	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully depressed	1.95 - 2.4 V	
	_	Sensor ground (Accelerator pedal position sensor 2)	_	_	_	
		Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	
		Sensor power supply (Accelerator pedal position sensor 1)	_	[Ignition switch: ON]	5 V	
	_	ECM ground	_	_	_	
	_	ECM ground	_	_	_	
	_	ECM ground	_	_	_	
		Accelerator pedal position	Input	[Ignition switch: ON]	0.6 - 0.9 V	
(BK)	(Y)	sensor 1	'	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully depressed	3.9 - 4.7 V	
	_	Sensor ground (Accelerator pedal position sensor 1)	_	_	_	
112 (B)	_	ECM ground	_	_		

^{★:} Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Wiring Diagram — ENGINE CONTROL SYSTEM —

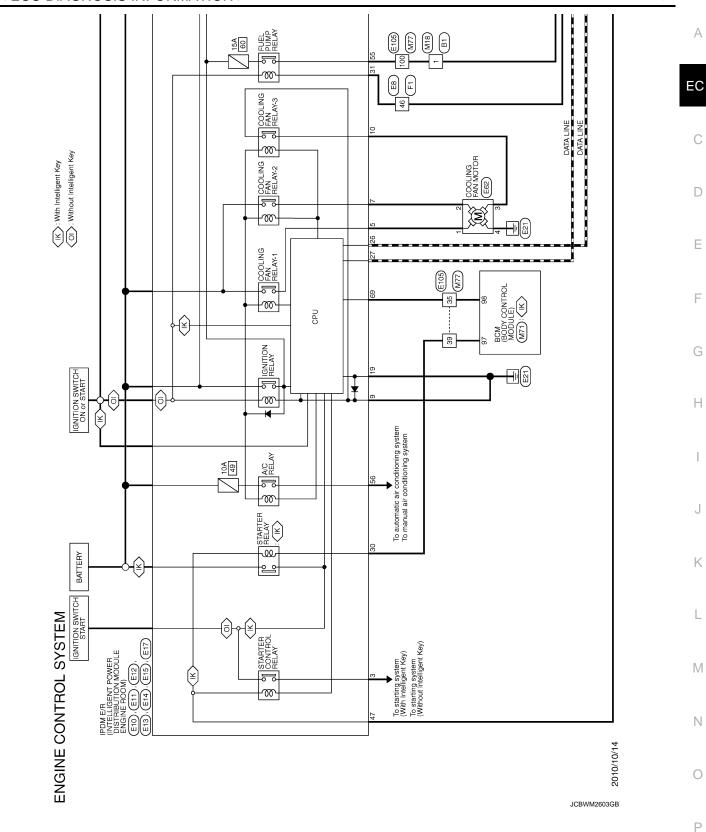
INFOID:0000000007770771

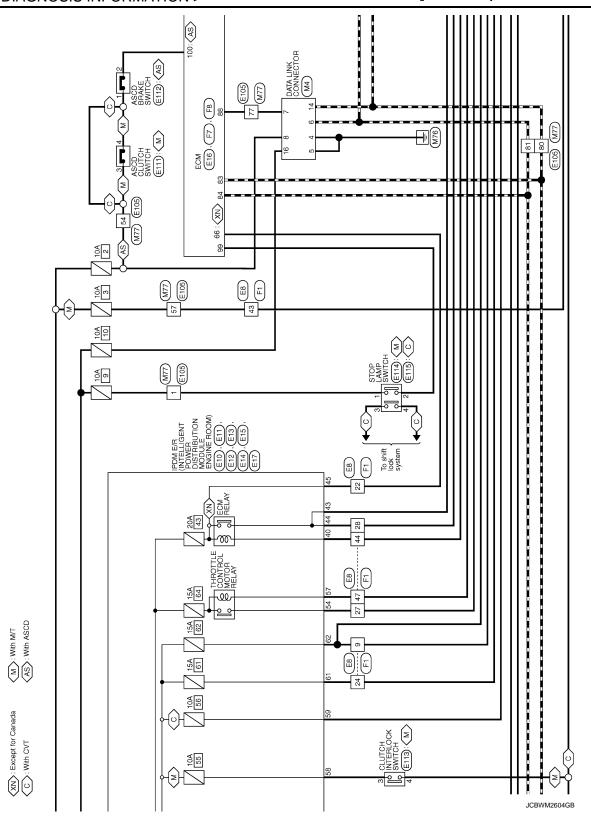
For connector terminal arrangements, harness layouts, and alphabets in a (option abbreviation; if not described in wiring diagram), refer to GI-12. "Connector Information".

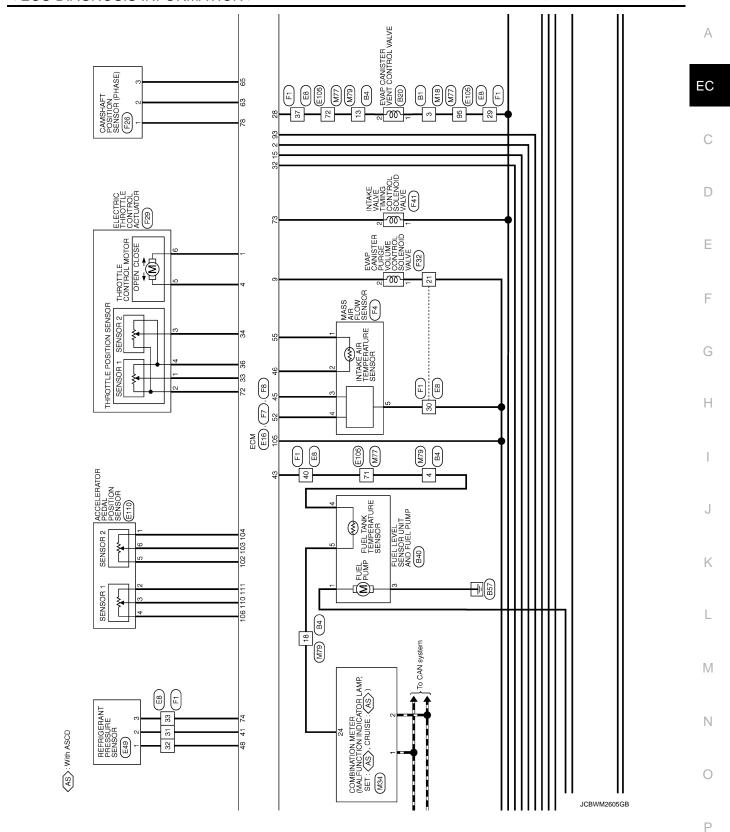
^{*1:} Before measuring the terminal voltage, confirm that the battery is fully changed. Refer to PG-3. "How to Handle Battery".

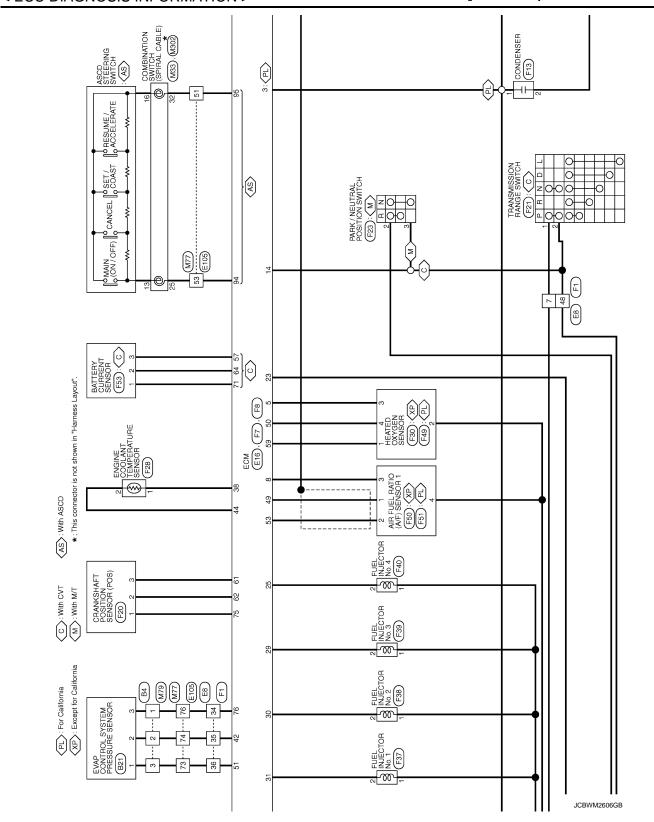
^{*2:} CVT models

^{*3:} M/T models



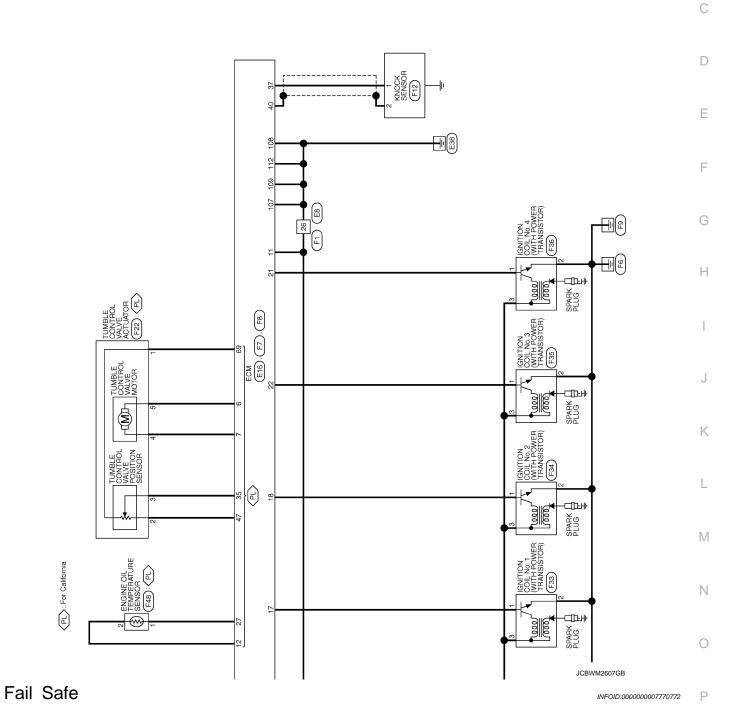






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NON DTC RELATED ITEM

Detected items	Engine operating condition in fail-safe mode	Remarks
Malfunction indicator lamp circuit	Engine speed will not rise more than 2,500 rpm due to the fuel cut	When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function. The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail-safe mode The signal is not energized to the intake valve timing control solenoid valve and the valve.				
P0011	Intake valve timing control	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function.				
P0101 P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.				
P0117 P0118	Engine coolant tempera- ture sensor circuit	Engine coolant temperature will be CONSULT displays the engine coo	determined by ECM based on the following condition. lant temperature decided by ECM.			
		Condition	Engine coolant temperature decided (CONSULT display)			
		Just as ignition switch is turned ON or START	40°C (104°F)			
		More than approx. 4 minutes 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	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.				
P0196 P0197 P0198	Engine oil temperature sensor	Intake valve timing control does no	t function.			
P0500	Vehicle speed sensor	The cooling fan operates (highest)	while engine is running.			
P0643	Sensor power supply	ECM stops the electric throttle confixed opening (approx. 5 degrees) l	erol actuator control, throttle valve is maintained at a by the return spring.			
P0605	ECM	(When ECM calculation function is ECM stops the electric throttle conf fixed opening (approx. 5 degrees) I	rol actuator control, throttle valve is maintained at a			
P1805	Brake switch	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			
P2100 P2103	Throttle control motor relay	ECM stops the electric throttle confixed opening (approx. 5 degrees) I	trol actuator control, throttle valve is maintained at a by the return spring.			
P2101	Electric throttle control function	ECM stops the electric throttle confixed opening (approx. 5 degrees)	trol actuator control, throttle valve is maintained at a by the return spring.			

ECM

[MR18DE (FOR CALIFORNIA)]

DTC No.	Detected items	Engine operating condition in fail-safe mode
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.
P2119	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P (CVT), Neutral (M/T) position, and engine speed will not exceed 1,000 rpm or more.
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Inspection Priority Chart

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If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	 U0100 U0101 U1001 CAN communication line P0101 P0102 P0103 Mass air flow sensor P0111 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 P0196 P0197 P0198 Engine oil temperature sensor P0181 P0182 P0183 Fuel tank temperature sensor P0327 P0328 Knock sensor P0335 Crankshaft position sensor (POS) P0340 Camshaft position sensor (PHASE) P0460 P0461 P0462 P0463 Fuel level sensor P0500 Vehicle speed sensor P0603 P0605 P607 ECM P0643 Sensor power supply P0705 Transmission range 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 Air fuel ratio (A/F) sensor 1 heater P0037 P0038 Heated oxygen sensor 2 heater P0075 Intake valve timing control solenoid valve P0130 P0131 P0132 P014C P014D P015A P015B P2A00 Air fuel ratio (A/F) sensor 1 P0137 P0138 P0139 Heated oxygen sensor 2 P0441 EVAP control system purge flow monitoring P0443 P0444 P0445 EVAP canister purge volume control solenoid valve P0447 P0448 EVAP canister vent control valve P0451 P0452 P0453 EVAP control system pressure sensor P0710 P0715 P0720 P0740 P0744 P0745 P0746 P0776 P0778 P0840 P1740 P1777 P1778 CVT related sensors, solenoid valves and switches P1217 Engine over temperature (OVERHEAT) P1805 Brake switch P2004 P2014 Tumble control valve P2100 P2103 Throttle control motor relay P2118 Throttle control motor
3	 P0011 Intake valve timing control P0171 P0172 Fuel injection system function P0300 - P0304 Misfire P0420 Three way catalyst function P0442 P0456 EVAP control system (SMALL LEAK, VERY SMALL LEAK) P0455 EVAP control system (GROSS LEAK) P0506 P0507 Idle speed control system P050A P050B P050E Cold start control P1148 Closed loop control P117A Air fuel ratio P1212 TCS communication line P1564 ASCD steering switch P1572 ASCD brake switch P1574 ASCD vehicle speed sensor P1715 Input speed sensor P2119 Electric throttle control actuator

DTC Index

INFOID:0000000007770774

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×:Applicable —: Not applicable

	*4							
CONSULT GST*2	ECM*3	ltems (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group*4	Reference page	EC
U0100	0100*5	LOST COMM (ECM A)	_	1	×	В	TM-102	_ C
U0101	0101*5	LOST COMM (TCM)	_	1	×	В	EC-620	_
U1001	1001 ^{*5}	CAN COMM CIRCUIT	_	2	_	_	EC-621	_
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_	_	Flashing ^{*8}	_	_	_ D
P0011	0011	INT/V TIM CONT-B1	×	2	×	В	EC-622	- E
P0031	0031	A/F SEN1 HTR (B1)	_	2	×	В	EC-626	_
P0032	0032	A/F SEN1 HTR (B1)	_	2	×	В	EC-626	F
P0037	0037	HO2S2 HTR (B1)	_	2	×	В	EC-629	-
P0038	0038	HO2S2 HTR (B1)	_	2	×	В	EC-629	_
P0075	0075	INT/V TIM V/CIR-B1	_	2	×	В	EC-632	G
P0101	0101	MAF SEN/CIRCUIT-B1	_	2	×	В	EC-635	=
P0102	0102	MAF SEN/CIRCUIT-B1	_	1	×	В	EC-640	– Н
P0103	0103	MAF SEN/CIRCUIT-B1	_	1	×	В	EC-640	_ ''
P0111	0111	IAT SENSOR 1 B1	_	2	×	А	EC-645	_
P0112	0112	IAT SEN/CIRCUIT-B1	_	2	×	В	EC-647	
P0113	0113	IAT SEN/CIRCUIT-B1	_	2	×	В	EC-647	=
P0116	0116	ECT SEN/CIRC	_	2	×	Α	EC-649	_
P0117	0117	ECT SEN/CIRC	_	1	×	В	EC-652	_ J
P0118	0118	ECT SEN/CIRC	_	1	×	В	EC-652	=
P0122	0122	TP SEN 2/CIRC-B1	_	1	×	В	EC-655	K
P0123	0123	TP SEN 2/CIRC-B1	_	1	×	В	EC-655	=
P0125	0125	ECT SENSOR	_	2	×	В	EC-658	_
P0127	0127	IAT SENSOR-B1	_	2	×	В	EC-661	- L
P0128	0128	THERMSTAT FNCTN	_	2	×	Α	EC-663	=
P0130	0130	A/F SENSOR1 (B1)	_	2	×	Α	EC-666	M
P0131	0131	A/F SENSOR1 (B1)	_	2	×	В	EC-670	_
P0132	0132	A/F SENSOR1 (B1)	_	2	×	В	EC-673	_
P0137	0137	HO2S2 (B1)	×	2	×	А	EC-676	N
P0138	0138	HO2S2 (B1)	×	2	×	А	EC-682	_
P0139	0139	HO2S2 (B1)	×	2	×	А	EC-690	0
P014C	014C	A/F SENSOR1 (B1)	×	2	×	Α	EC-696	_
P014D	014D	A/F SENSOR1 (B1)	×	2	×	Α	EC-696	=
P015A	015A	A/F SENSOR1 (B1)	×	2	×	Α	EC-696	Р
P015B	015B	A/F SENSOR1 (B1)	×	2	×	А	EC-696	_
P0171	0171	FUEL SYS-LEAN-B1	_	2	×	В	EC-701	_
P0172	0172	FUEL SYS-RICH-B1	_	2	×	В	EC-705	_
P0181	0181	FTT SENSOR	_	2	×	A and B	EC-709	_
P0182	0182	FTT SEN/CIRCUIT	_	2	×	В	EC-714	_

200 01/101	10010 1111	URIVIATION >				3E (1 OK OF	
DTC	*1	16				Permanent	D. (
CONSULT GST*2	ECM*3	 Items (CONSULT screen terms) 	SRT code	Trip	MIL	DTC group*4	Reference page
P0183	0183	FTT SEN/CIRCUIT	_	2	×	В	EC-714
P0196	0196	EOT SEN/CIRC	_	2	×	A and B	EC-717
P0197	0197	EOT SEN/CIRC	_	2	×	В	EC-721
P0198	0198	EOT SEN/CIRC	_	2	×	В	EC-721
P0222	0222	TP SEN 1/CIRC-B1	_	1	×	В	EC-723
P0223	0223	TP SEN 1/CIRC-B1	_	1	×	В	EC-723
P0300	0300	MULTI CYL MISFIRE	_	1 or 2	×	В	EC-726
P0301	0301	CYL 1 MISFIRE	_	1 or 2	×	В	EC-726
P0302	0302	CYL 2 MISFIRE	_	1 or 2	×	В	EC-726
P0303	0303	CYL 3 MISFIRE	_	1 or 2	×	В	EC-726
P0304	0304	CYL 4 MISFIRE	_	1 or 2	×	В	EC-726
P0327	0327	KNOCK SEN/CIRC-B1	_	2	_	_	EC-732
P0328	0328	KNOCK SEN/CIRC-B1	_	2	_	_	EC-732
P0335	0335	CKP SEN/CIRCUIT	_	2	×	В	EC-734
P0340	0340	CMP SEN/CIRC-B1	_	2	×	В	EC-738
P0420	0420	TW CATALYST SYS-B1	×	2	×	А	EC-742
P0441	0441	EVAP PURG FLOW/MON	×	2	×	А	EC-747
P0442	0442	EVAP SMALL LEAK	×	2	×	А	EC-753
P0443	0443	PURG VOLUME CONT/V	_	2	×	А	EC-760
P0444	0444	PURG VOLUME CONT/V	_	2	×	В	EC-765
P0445	0445	PURG VOLUME CONT/V	_	2	×	В	EC-765
P0447	0447	VENT CONTROL VALVE	_	2	×	В	EC-768
P0448	0448	VENT CONTROL VALVE	_	2	×	В	EC-772
P0451	0451	EVAP SYS PRES SEN	_	2	×	А	EC-776
P0452	0452	EVAP SYS PRES SEN	_	2	×	В	EC-780
P0453	0453	EVAP SYS PRES SEN	_	2	×	В	EC-785
P0455	0455	EVAP GROSS LEAK	_	2	×	А	EC-791
P0456	0456	EVAP VERY SML LEAK	×*7	2	×	А	EC-797
P0460	0460	FUEL LEV SEN SLOSH	_	2	×	А	EC-803
P0461	0461	FUEL LEVEL SENSOR	_	2	×	В	EC-804
P0462	0462	FUEL LEVL SEN/CIRC	_	2	×	В	EC-806
P0463	0463	FUEL LEVL SEN/CIRC	_	2	×	В	EC-806
P0500	0500	VEHICLE SPEED SEN A*6	_	2	×	В	EC-808 (M/ EC-809 (CV
P0506	0506	ISC SYSTEM	_	2	×	В	EC-812
P0507	0507	ISC SYSTEM	_	2	×	В	EC-814
P050A	050A	COLD START CONTROL	_	2	×	А	EC-816
P050B	050B	COLD START CONTROL	_	2	×	А	EC-816
P050E	050E	COLD START CONTROL		2	×	А	EC-816
P0603	0603	ECM BACK UP/CIRCUIT		2	×	В	EC-818
P0605	0605	ECM	_	1 or 2	× or —	В	EC-820
P0607	0607	ECM	_	1 (CVT) 2 (M/T)	× (CVT) — (M/T)	В	EC-822

DTC	<u></u> *1	Items				Permanent	Reference	
CONSULT GST*2	ECM*3	(CONSULT screen terms)	SRT code	Trip	MIL	DTC group*4	page	
P0643	0643	SENSOR POWER/CIRC	_	1	×	В	EC-823	-
P0705	0705	T/M RANGE SENSOR A	_	2	×	В	TM-108	-
P0710	0710	FLUID TEMP SENSOR A*9	_	1	×	В	<u>TM-111</u>	_
P0715	0715	INPUT SPEED SENSOR A	_	2	×	В	<u>TM-115</u>	-
P0720	0720	OUTPUT SPEED SENSOR*6	_	2	×	В	<u>TM-118</u>	_
P0740	0740	TORQUE CONVERTER	_	2	×	В	<u>TM-122</u>	_
P0744	0744	TORQUE CONVERTER	_	2	×	В	TM-125	-
P0745	0745	PC SOLENOID A	_	2	×	В	TM-128	-
P0746	0746	PC SOLENOID A	_	1	×	В	TM-130	-
P0776	0776	PC SOLENOID B	_	2	×	В	TM-132	-
P0778	0778	PC SOLENOID B	_	2	×	В	TM-134	-
P0840	0840	FLUID PRESS SEN/SW A	_	2	×	В	TM-136	_
P0850	0850	P-N POS SW/CIRCUIT	_	2	×	В	EC-825	_
P1148	1148	CLOSED LOOP-B1	_	1	×	Α	EC-828	-
P117A	117A	AIR FUEL RATIO B1	_	2	×	Α	EC-829	_
P1212	1212	TCS/CIRC	_	2	_	_	EC-834	_
P1217	1217	ENG OVER TEMP	_	1	×	В	EC-835	_
P1225	1225	CTP LEARNING-B1	_	2	_	_	EC-839	_
P1226	1226	CTP LEARNING-B1	_	2	_	_	EC-841	_
P1550	1550	BAT CURRENT SENSOR	_	2	_	_	EC-843	_
P1551	1551	BAT CURRENT SENSOR	_	2	_	_	EC-847	_
P1552	1552	BAT CURRENT SENSOR	_	2	_	_	EC-847	-
P1553	1553	BAT CURRENT SENSOR	_	2	_	_	EC-851	-
P1554	1554	BAT CURRENT SENSOR	_	2	_	_	EC-855	-
P1564	1564	ASCD SW	_	1	_	_	EC-859	_
P1572	1572	ASCD BRAKE SW	_	1	_	_	EC-862	_
P1574	1574	ASCD VHL SPD SEN	_	1	_	_	EC-869	-
P1610	1610	LOCK MODE	_	2	_	_	SEC-34	-
P1611	1611	ID DISCORD, IMMU-ECM	_	2	_	_	SEC-35	_
P1612	1612	CHAIN OF ECM-IMMU	_	2	_	_	SEC-37	_
P1614	1614	CHAIN OF IMMU-KEY	_	2	_	_	SEC-6	_
P1615	1615	DIFFERENCE OF KEY	_	2	_	_	SEC-6	_
P1715	1715	IN PULY SPEED	_	2	_	_	EC-871	-
P1740	1740	SLCT SOLENOID	_	2	×	В	<u>TM-153</u>	-
P1777	1777	STEP MOTOR	_	1	×	В	<u>TM-156</u>	_
P1778	1778	STEP MOTOR	_	2	×	В	<u>TM-159</u>	_
P1805	1805	BRAKE SW/CIRCUIT	_	2	_	_	EC-873	_
P2004	2004	TUMBLE CONT/V	_	2	×	В	EC-876	_
P2014	2014	TUMBLE POS SEN	_	2	×	В	EC-881	_
P2100	2100	ETC MOT PWR-B1	_	1	×	В	EC-884	_
P2101	2101	ETC FNCTN/CIRC-B1	_	1	×	В	EC-887	_
P2103	2103	ETC MOT PWR	_	1	×	В	EC-884	-

< ECU DIAGNOSIS INFORMATION >

DTC	<u>)</u> *1	- Items				Permanent	Reference	
CONSULT GST*2	ECM*3	(CONSULT screen terms)	SRT code	Trip	MIL	DTC group*4		
P2118	2118	ETC MOT-B1	_	1	×	В	EC-891	
P2119	2119	ETC ACTR-B1	_	1	×	В	EC-893	
P2122	2122	APP SEN 1/CIRC	_	1	×	В	EC-895	
P2123	2123	APP SEN 1/CIRC	_	1	×	В	EC-895	
P2127	2127	APP SEN 2/CIRC	_	1	×	В	EC-898	
P2128	2128	APP SEN 2/CIRC	_	1	×	В	EC-898	
P2135	2135	TP SENSOR-B1	_	1	×	В	EC-902	
P2138	2138	APP SENSOR	_	1	×	В	EC-905	
P2A00	2A00	A/F SENSOR1 (B1)	_	2	×	А	EC-909	

^{*1: 1}st trip DTC No. is the same as DTC No.

Test Value and Test Limit

INFOID:0000000007922067

The following is the information specified in Service \$06 of SAE J1979/ISO 15031-5.

The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

These data (test value and test limit) are specified by On Board Monitor ID (OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.

The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (e.g., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

^{*2:} This number is prescribed by SAE J2012/ISO 15031-6.

^{*3:} In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

^{*4:} Refer to EC-510, "Description", "PERMANENT DTC".

^{*5:} The troubleshooting for this DTC needs CONSULT.

^{*6:} When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

^{*7:} SRT code will not be set if the self-diagnostic result is NG.

^{*8:} When the ECM is in the mode that displays SRT status, MIL may flash. For the details, refer to EC-504, "Description".

^{*9:} When erasing this DTC, always use CONSULT or GST.

	655	Self-diagnostic test item		li	e and Test mit display)	
Itom .	OBD- MID		DTC	TID	Unitand Scaling ID	Description
			P0131	83H	0BH	Minimum sensor output voltage for test cycle
			P0131	84H	0BH	Maximum sensor output voltage for test cycle
			P0130	85H	0BH	Minimum sensor output voltage for test cycle
			P0130	86H	0BH	Maximum sensor output voltage for test cycle
			P0133	87H	04H	Response rate: Response ratio (lean to rich)
			P0133	88H	04H	Response rate: Response ratio (rich to lean)
			P2A00	89H	84H	The amount of shift in air fuel ratio
			P2A00	8AH	84H	The amount of shift in air fuel ratio
		Air fuel ratio (A/F) sensor 1 (Bank 1)	P0130	8BH	0BH	Difference in sensor output voltage
	01H		P0133	8CH	83H	Response gain at the limited frequency
3			P014C	8DH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1
			P014C	8EH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1
			P014D	8FH	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1
HO2S			P014D	90H	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1
			P015A	91H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1
			P015A	92H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1
			P015B	93H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1
			P015B	94H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1
			P0138	07H	0CH	Minimum sensor output voltage for test cycle
		Heated oxygen sensor 2	P0137	08H	0CH	Maximum sensor output voltage for test cycle
	02H	(Bank 1)	P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
			P0139	82H	11H	Rear O2 sensor delay response diagnosis
			P0143	07H	0CH	Minimum sensor output voltage for test cycle
	03H	Heated oxygen sensor 3 (Bank 1)	P0144	08H	0CH	Maximum sensor output voltage for test cycle
		()	P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage

		Self-diagnostic test item		li	e and Test mit display)	
Item	OBD- MID		DTC	-	Unitand	Description
				TID	Scaling ID	
			P0151	83H	овн	Minimum sensor output voltage for tes cycle
			P0151	84H	0BH	Maximum sensor output voltage for test cycle
			P0150	85H	0BH	Minimum sensor output voltage for tes cycle
			P0150	86H	0BH	Maximum sensor output voltage for test cycle
			P0153	87H	04H	Response rate: Response ratio (lear to rich)
			P0153	88H	04H	Response rate: Response ratio (rich t lean)
			P2A03	89H	84H	The amount of shift in air fuel ratio
			P2A03	8AH	84H	The amount of shift in air fuel ratio
		Air fuel ratio (A/F) sensor 1 (Bank 2)	P0150	8BH	0BH	Difference in sensor output voltage
	05H		P0153	8CH	83H	Response gain at the limited frequen
			P014E	8DH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1
			P014E	8EH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1
			P014F	8FH	84H	O2 sensor slow response - Lean to ric bank 2 sensor 1
HO2S			P014F	90H	84H	O2 sensor slow response - Lean to ric bank 2 sensor 1
			P015C	91H	01H	O2 sensor delayed response - Rich t lean bank 2 sensor 1
			P015C	92H	01H	O2 sensor delayed response - Rich lean bank 2 sensor 1
			P015D	93H	01H	O2 sensor delayed response - Lean trich bank 2 sensor 1
			P015D	94H	01H	O2 sensor delayed response - Lean t rich bank 2 sensor 1
			P0158	07H	0CH	Minimum sensor output voltage for teacycle
	06H	Heated oxygen sensor 2 (Bank 2)	P0157	08H	0CH	Maximum sensor output voltage for test cycle
0	ОбП		P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
			P0159	82H	11H	Rear O2 sensor delay response diagnosis
			P0163	07H	0CH	Minimum sensor output voltage for te 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

	OBD-	Self-diagnostic test item		I	ue and Test imit display)			
IIAII I	MID		Seir-alagnostic test item	Sell-diadnostic test tiem	Sell-diadhostic test tiem 1 1110.	DTC	TID	Unit and Scaling ID
2		Three way catalyst function	P0420	80H	01H	O2 storage index		
	21H		P0420	82H	01H	Switching time lag engine exhaust index value		
	2111	(Bank1)	P2423	83H	0СН	Difference in 3rd O2 sensor output voltage		
CATA-			P2423	84H	84H	O2 storage index in HC trap catalyst		
LYST			P0430	80H	01H	O2 storage index		
	22H	Three way catalyst function	P0430	82H	01H	Switching time lag engine exhaust index value		
		(Bank2)	P2424	83H	0CH	Difference in 3rd O2 sensor output voltage		
			P2424	84H	84H	O2 storage index in HC trap catalyst		
		H EGR function	P0400	80H	96H	Low flow faults: EGR temp change rate (short term)		
			P0400	81H	96H	Low flow faults: EGR temp change rate (long term)		
EGR SYSTEM	31H		P0400	82H	96H	Low flow faults: Difference between max EGR temp and EGR temp under idling condition		
			P0400	83H	96H	Low flow faults: Max EGR temp		
			P1402	84H	96H	High Flow Faults: EGR temp increase rate		
		VVT Monitor (Bank1)	P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)		
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)		
	35H		P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)		
			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)		
			P100A	84H	10H	VEL slow response diagnosis		
VVT			P1090	85H	10H	VEL servo system diagnosis		
SYSTEM			P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)		
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)		
	36H	VVT Monitor (Bank2)	P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)		
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)		
			P100B	84H	10H	VEL slow response diagnosis		
			P1093	85H	10H	VEL servo system diagnosis		

	OBD- MID	Self-diagnostic test item		liı	e and Test mit display)	- Description
Item			DTC	TID	Unitand Scaling ID	
	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3ВН	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)
EV/AD			P0456	80H	05H	Leak area index (for more than 0.02 inch)
EVAP SYSTEM	3СН	EVAP control system leak (Very small leak)	P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
			P0456	82H	FDH	Internal pressure of EVAP system at the end of monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close
	41H	A/F sensor 1 heater (Bank 1)	Low Input: P0031 High Input: P0032	81H	0BH	Converted value of heater electric current to voltage
	42H	Heated oxygen sensor 2 heater (Bank 1)	Low Input: P0037 High Input: P0038	80H	0CH	Converted value of heater electric current to voltage
O2 SEN-	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of heater electric current to voltage
SOR HEATER	45H	A/F sensor 1 heater (Bank 2)	Low Input: P0051 High Input: P0052	81H	0BH	Converted value of heater electric 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
		Secondary air system	P0411	80H	01H	Secondary air injection system incor- rect flow detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary air injection system insufficient flow
			P2445	82H	01H	Secondary air injection system pump stuck off
SEC- OND- ARY AIR	71H		P2448	83H	01H	Secondary air injection system high airflow
7uti 7uit			Bank1: P2440 Bank2: P2442	84H	01H	Secondary air injection system switching valve stuck open
			P2440	85H	01H	Secondary air injection system switching valve stuck open
			P2444	86H	01H	Secondary air injection system pump stuck on
			P0171 or P0172	80H	2FH	Long term fuel trim
	81H	Fuel injection system function (Bank 1)	P0171 or P0172	81H	24H	The number of lambda control clamped
FUEL			P117A	82H	03H	Cylinder A/F imbalance monitoring
SYSTEM	82H		P0174 or P0175	80H	2FH	Long term fuel trim
		Fuel injection system function (Bank 2)	P0174 or P0175	81H	24H	The number of lambda control clamped
			P117B	82H	03H	Cylinder A/F imbalance monitoring

	OBD-	Self-diagnostic test item		li	e and Test mit display)	
ITAM	MID		DTC	TID	Unitand Scaling ID	- Description
			P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second cylinder
			P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000 revolution of the fourth cylinder
		Multiple cylinder misfires	P0305	84H	24H	Misfiring counter at 1000 revolution of the fifth cylinder
			P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder
			P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder
			P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder
			P0300	88H	24H	Misfiring counter at 1000 revolution of the multiple cylinders
MISFIRE	A1H		P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder
MISFIRE	АІП		P0302	8AH	24H	Misfiring counter at 200 revolution of the second cylinder
			P0303	8BH	24H	Misfiring counter at 200 revolution of the third cylinder
			P0304	8CH	24H	Misfiring counter at 200 revolution of the fourth cylinder
			P0305	8DH	24H	Misfiring counter at 200 revolution of the fifth cylinder
			P0306	8EH	24H	Misfiring counter at 200 revolution of the sixth cylinder
			P0307	8FH	24H	Misfiring counter at 200 revolution of the seventh cylinder
			P0308	90H	24H	Misfiring counter at 200 revolution of the eighth cylinder
			P0300	91H	24H	Misfiring counter at 1000 revolution of the single cylinder
			P0300	92H	24H	Misfiring counter at 200 revolution of the single cylinder
			P0300	93H	24H	Misfiring counter at 200 revolution of the multiple cylinders

< ECU DIAGNOSIS INFORMATION >

				1		
	OPP	Self-diagnostic test item		liı	e and Test mit display)	- Description
Item	OBD- MID		DTC -	TID	Unitand Scaling ID	
	A2H	No. 1 cylinder misfire	P0301	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0301	0CH	24H	Misfire counts for last/current driving cycles
	АЗН	No. 2 cylinder misfire	P0302	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
			P0302	0CH	24H	Misfire counts for last/current driving cycles
	A4H	No. 3 cylinder misfire	P0303	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0303	0CH	24H	Misfire counts for last/current driving cycles
	A5H	No. 4 cylinder misfire	P0304	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 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
	A7H	No. 6 cylinder misfire No. 7 cylinder misfire	P0306	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0306	0CH	24H	Misfire counts for last/current driving cycles
	A8H		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
			P0308	0CH	24H	Misfire counts for last/current driving cycles

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

Α

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table EC

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM												С		
		HA)				TION					E HIGH					D
		(EXCP.		FLAT SPOT	ATION	RACCELERATION				IDLE	TEMPERATURE	SUMPTION	CONSUMPTION	R CHARGE)		Е
		START/RESTART	71	SURGING/	CK/DETON/	POWER/POOR	OW IDLE	/HUNTING	ATION	TURN TO	/WATER TE	FUEL CON		AD (UNDEI	Reference page	F
		HARD/NO ST	ENGINE STALL	HESITATION/SURGING/FLAT	SPARK KNOCK/DETONATION	LACK OF PO	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL	BATTERY DEAD (UNDER CHARGE)		G
Warranty	y symptom code	AA	AB	AC	AD	AE	AF	AG	АН	AJ	AK	AL	AM	НА		Н
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-925	
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-985	
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-922	
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-563	
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-940	J
	Incorrect idle speed adjustment						1	1	1	1		1			EC-498	K
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-887 EC-891	1.
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-499	L
	Ignition circuit	1	1	2	2	2		2	2			2			EC-928	
Main po	wer supply and ground circuit	2	2	3	3	3		3	3		2	3			EC-617	
Mass air	flow sensor circuit	1			2										EC-635 EC-640	M
Engine o	coolant temperature sensor circuit						3			3					EC-649 EC-652	Ν
Air fuel r	ratio (A/F) sensor 1 circuit		1	2	3	2		2	2			2			EC-666 EC-670 EC-673 EC-696 EC-909	0
Throttle position sensor circuit							2			2					EC-655 EC-723 EC-839 EC-841 EC-902	Ρ
Accelerator pedal position sensor circuit				3	2	1									EC-895 EC-898 EC-905	
Knock sensor circuit				2								3			EC-732	

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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	
Crankshaft position sensor (POS) circuit	2	2												EC-734
Camshaft position sensor (PHASE) circuit	3	2												EC-738
Vehicle speed signal circuit		2	3		3						3			EC-808
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-820 EC-822
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-622
transmission range switch circuit			3		3		3	3			3			EC-825
PNP switch circuit			3		3		3	3			3			EC-825
Refrigerant pressure sensor circuit		2				3			3		4			EC-941
Electrical load signal circuit							3							EC-920
Tumble control valve motor					4	4								EC-876
Tumble control valve position sensor					4	4								EC-881
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-103 HAC-210
ABS actuator and electric unit (control unit)			4											BRC-93

^{1 - 6:} The numbers refer to the order of inspection. (continued on next table)

SYSTEM — ENGINE MECHANICAL & OTHER

ENGINE CONTROL SYSTEM SYMPTOMS

[MR18DE (FOR CALIFORNIA)]

							S	YMPT	OM							Α
						NO					HIGH					
		P. HA)		F		RATI					URE	z		E)		EC
				/FLAT SPO	MATION	R ACCELE		(2)) IDLE	'EMPERATI	ISUMPTIOI	CONSUMPTION	ER CHARG		С
		TART/RES	ALL	N/SURGING	OCK/DETON	OWER/POC	LOW IDLE	E/HUNTING	RATION	RETURN TO	S/WATER 1	FUEL CON	OF	EAD (UNDI	Reference page	D
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE	BATTERY DEAD (UNDER CHARGE)		Е
Warranty	symptom code	A A	AB	AC	AD	AE	AF	AG	АН	AJ	AK	AL	AM	НА		F
Fuel	Fuel tank														<u>FL-13</u>	
	Fuel piping	5		5	5	5		5	5			5			FL-4	G
	Vapor lock		5												_	
	Valve deposit														_	Ш
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5			5			_	Н
Air	Air duct															ı
	Air cleaner														EN 45	- 1
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)		5	5	5	5		5	5			5			<u>EM-15</u>	J
	Electric throttle control actuator	5					5			5					EM-26	K
	Air leakage from intake mani- fold/Collector/Gasket														<u> </u>	r
Cranking	Battery	1	1	1		1		1	1					1	<u>PG-3</u>	L
	Generator circuit							-						·	CHG-5	
	Starter circuit	3										1			STR-2	
	Signal plate	6													<u>EM-88</u>	M
	Transmission range switch	4													TM-108 (CVT)	
	PNP switch	4													<u>TM-8</u> (M/T)	Ν
Engine	Cylinder head	5	5	5	5	5		5	5			5			<u>EM-67</u>	1.4
	Cylinder head gasket									-	4		3			
	Cylinder block															0
	Piston												4			
	Piston ring	6	6	6	6	6		6	6			6			<u>EM-88</u>	Р
	Connecting rod														_	Г
	Bearing															
	Crankshaft															

							S'	YMPT	OM						
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	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	A A	AB	AC	AD	AE	AF	AG	АН	AJ	AK	AL	AM	НА	
Valve	Timing chain														<u>EM-44</u>
mecha-	Camshaft														<u>EM-55</u>
nism	Intake valve timing control	5	5	5	5	5		5	5			5			<u>EM-44</u>
	Intake valve												_		
	Exhaust valve												3		<u>EM-67</u>
Exhaust	Exhaust manifold/Tube/Muf- fler/Gasket	5	5	5	5	5		5	5			5			EM-30
	Three way catalyst														<u>EX-4</u>
Lubrica- tion	Oil pan/Oil strainer/Oil pump/ Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			<u>EM-34</u> <u>LU-7</u> <u>LU-11</u>
	Oil level (Low)/Filthy oil														<u>LU-7</u>
Cooling	Radiator/Hose/Radiator filler cap														<u>CO-13</u> <u>CO-13</u>
	Thermostat									5					<u>CO-22</u>
	Water pump	5	_	_	_	_		_	_			_			<u>CO-20</u>
	Water gallery		5	5	5	5		5	5		4	5			<u>CO-2</u>
	Cooling fan										1				EC-918
	Coolant level (Low)/Contami- nated coolant									5					<u>CO-2</u>
NVIS (NIS	SSAN Vehicle Immobilizer Sys- ATS)	1	1												<u>SEC-16</u>

^{1 - 6:} The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS >

[MR18DE (FOR CALIFORNIA)]

NORMAL OPERATING CONDITION

Description

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,500 rpm under no load (for example, the selector lever position is neutral and engine speed is over 2,500 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 2,000 rpm, then fuel cut will be cancelled. **NOTE:**

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, <u>EC-523.</u> "System Description".

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PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the "SRS AIR BAG" and "SEAT BELT" of this Service Manual.

WARNING:

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see "SRS AIR BAG".
- Never use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

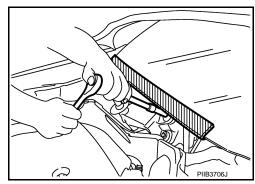
WARNING:

Always observe the following items for preventing accidental activation.

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the
 ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with
 a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing
 serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Precaution for Procedure without Cowl Top Cover

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



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On Board Diagnosis (OBD) System of Engine and CVT

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

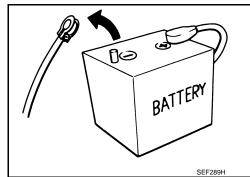
- Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair
 or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will
 cause the MIL to light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will
 cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease,
 dirt, bent terminals, etc.)

Revision: 2011 November EC-978 2012 CUBE

- 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-84, "Description".
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube
 may cause the MIL to light up due to the malfunction of the EVAP system or fuel injection system,
 etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

General Precautions

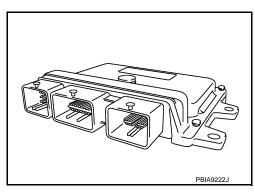
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- Before removing parts, turn ignition switch OFF and then disconnect negative battery cable.

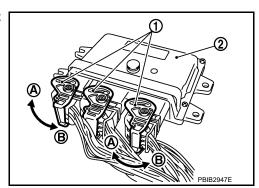


- Do not disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.

The ECM will now start to self-control at its initial value. Thus, engine operation can vary slightly in this case. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.

- If the battery is disconnected, the following emission-related diagnostic information will be 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 (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.
 - 2. ECM
 - A. Loosen





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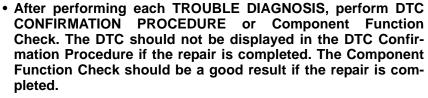
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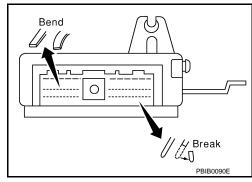
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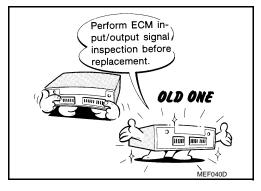
Revision: 2011 November EC-979 2012 CUBE

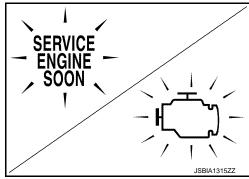
< PRECAUTION >

- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).
 - Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors.
 A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harness dry.
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to <u>EC-943</u>, "<u>Reference Value</u>".
- Handle mass air flow sensor carefully to avoid damage.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).

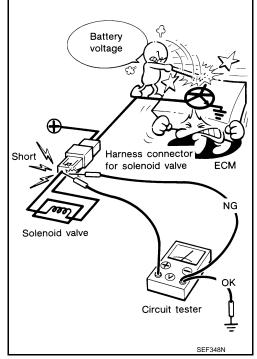




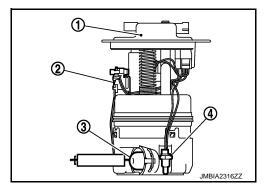




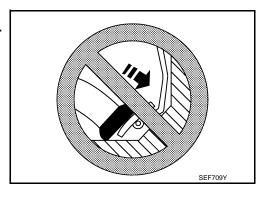
 When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.
 Accidental contact of probes will cause a short circuit and damage the ECM power transistor.



- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.
- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel level sensor (3)
- Fuel tank temperature sensor (4)



- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.



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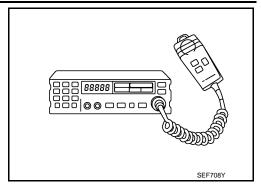
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PRECAUTIONS

< PRECAUTION >

[MR18DE (FOR CALIFORNIA)]

- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.
- Keep the antenna as far as possible from the electronic control units.
- Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.
 Do not let them run parallel for a long distance.
- Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
- Be sure to ground the radio to vehicle body.



PREPARATION

PREPARATION

Special Service Tools

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NOTE:

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name		Description
(J-44321) Fuel pressure gauge kit	LEC642	Checks fuel pressure
(J-44321-6) Fuel pressure adapter	LBIA0376E	Connects fuel pressure gauge to quick connector type fuel lines.
KV10118400 Fuel tube adapter	PBIB3043E	Measures fuel pressure

Commercial Service Tools

INFOID:00000000007770783

Tool name (Kent-Moore No.)		Description	
Leak detector i.e.: (J-41416)		Locates the EVAP leak	- 11
			1
	S-NT703		(
EVAP service port adapter i.e.: (J-41413-OBD)		Applies positive pressure through EVAP service port	F
i.e (J-41413-OBD)			
	S-NT704		_

PREPARATION

[MR18DE (FOR CALIFORNIA)]

PREPARATION >		[IIII(1052 (1 OK OAEII OKKIA)
Tool name (Kent-Moore No.)		Description
Fuel filler cap adapter i.e.: (MLR-8382)		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
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)	Mating surface shave cylinder	Reconditions the exhaust system threads before installing a new oxygen sensor. Use with antiseize lubricant shown below. a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor
Anti-seize lubricant i.e.: (Permatex TM 133AR or equivalent meeting MIL specifica- tion MIL-A-907)	S-NT779	Lubricates oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

PERIODIC MAINTENANCE

FUEL PRESSURE

Inspection INFOID:00000000007770784 EC

FUEL PRESSURE RELEASE

(P) With CONSULT

- 1. Turn ignition switch ON.
- 2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT.
- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- Turn ignition switch OFF.

₩ithout CONSULT

- 1. Remove fuel pump fuse located in IPDM E/R.
- 2. Start engine.
- 3. After engine stalls, crank it two or three times to release all fuel pressure.
- 4. Turn ignition switch OFF.
- Reinstall fuel pump fuse after servicing fuel system.

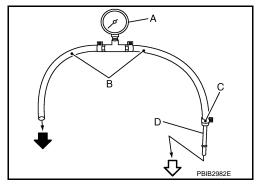
FUEL PRESSURE CHECK

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 C11 models do not have fuel return system.
- The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.
- Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains seal ability with O-rings inside.
- Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.
- Release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".
- 2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.
 - <: To quick connector
 - **(=:** To fuel tube (engine side)
 - C: Clamp
 - Use suitable fuel hose for fuel pressure check (genuine NIS-SAN fuel hose without quick connector).
 - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
 - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
 - Use Pressure Gauge to check fuel pressure.
- 3. Remove fuel hose. Refer to EM-37, "Removal and Installation".
 - Do not twist or kink fuel hose because it is plastic hose.



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FUEL PRESSURE

[MR18DE (FOR CALIFORNIA)]

1 - 2 mm

f(0.04 - 0.08 in)

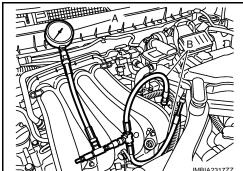
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< PERIODIC MAINTENANCE >

- Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
 - No.2 spool (5)
 - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
 - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
 - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
 - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
 - When reconnecting fuel line, always use new clamps.
 - Use a torque driver to tighten clamps.
 - Install hose clamp to the position within 1 2 mm (0.04 0.08 in).

Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

- Make sure that clamp screw does not contact adjacent parts.
- Connect fuel tube adapter to quick connector.
 - A: Fuel pressure gauge
 - B: Fuel hose for fuel pressure check
- 6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
- 7. Turn ignition switch ON and check for fuel leakage.
- 8. Start engine and check for fuel leakage.
- 9. Read the indication of fuel pressure gauge.
 - · Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
 - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.



At idling: Approximately 350 kPa (3.57 kg/cm², 51 psi)

- 10. If result is unsatisfactory, go to next step.
- 11. 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 pressure regulator.

If NG, repair or replace.

12. Before disconnecting Fuel Pressure Gauge and Fuel Pressure Adapter J-44321-6, release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".

EVAP LEAK CHECK

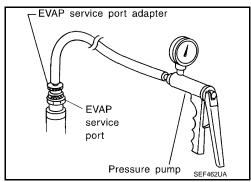
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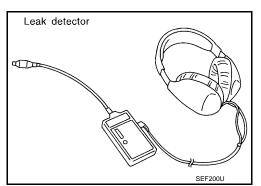
CAUTION:

- Do not use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system. NOTE:
- Do not start engine.
- Improper installation of EVAP service port adapter [commercial service tool: (J-41413-OBD)] to the EVAP service port may cause a leak.

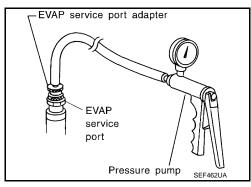
(P) WITH CONSULT

- Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.
- 2. Turn ignition switch ON.
- 3. Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT.
- 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: (J-41413-OBD)] and hose with pressure pump.
- Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to <u>EC-563</u>, "System Description".





- Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.
- 2. Apply battery voltage between the terminals of EVAP canister vent control valve to make a closed EVAP system.
- To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm², 0.2 to 0.4 psi).
- Remove EVAP service port adapter [commercial service tool: (J-41413-OBD)] and hose with pressure pump.



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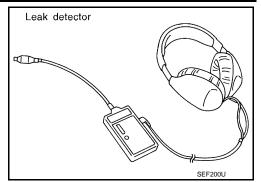
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EVAP LEAK CHECK

< PERIODIC MAINTENANCE >

[MR18DE (FOR CALIFORNIA)]

5. Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to <u>EC-563</u>, "System Description".



SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR18DÉ (FOR CALIFORNIA)]

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

Transmission	Condition	Specification
CVT	No load* (in P or N position)	$700\pm50~\mathrm{rpm}$
M/T	No load* (in Neutral position)	700 ± 50 rpm

^{*:} Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Timing

Transmission	Condition	Specification
CVT	No load* (in P or N position)	13 ± 5°BTDC
M/T	No load* (in Neutral position)	13 ± 5°BTDC

^{*:} Under the following conditions

- · A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- · Steering wheel: Kept in straight-ahead position

Calculated Load Value

Condition	Specification (Using CONSULT or GST)
At idle	10 – 35 %
At 2,500 rpm	10 – 35 %

Mass Air Flow Sensor

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	0.9 – 1.3V*
Mass air flow (Using CONSULT or GST)	1.0 – 4.0 g/sec at idle* 2.0 – 10.0 g/sec at 2,500 rpm*

^{*:} Engine is warmed up to normal operating temperature and running under no load.

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