SECTION ECQ
ENGINE CONTROL SYSTEM (QR25DE)

CONTENTS

QR25DE (WITH EURO-OBD)

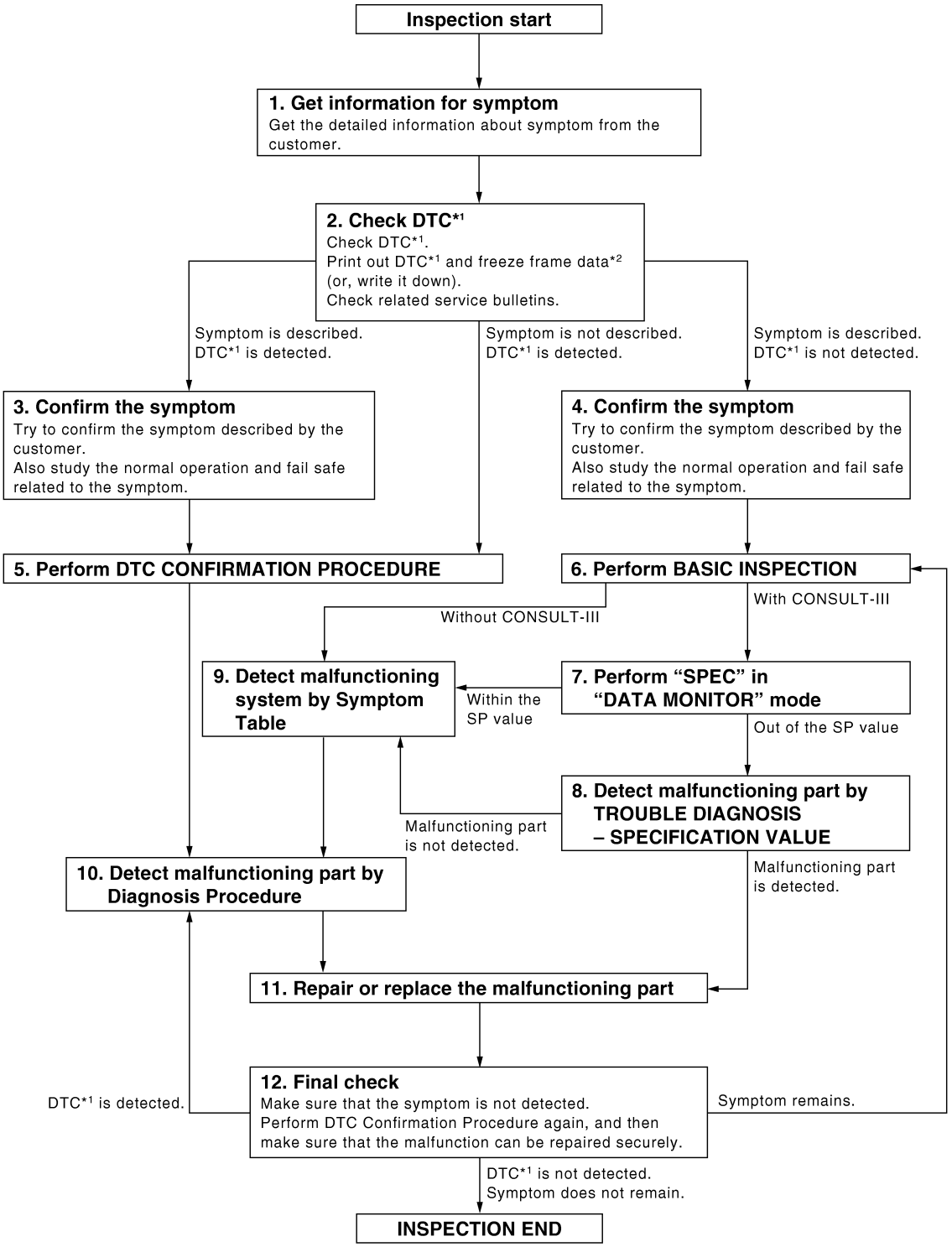
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000001309613

OVERALL SEQUENCE



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

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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 ECQ-12, "Diagnostic Work Sheet".)

>> GO TO 2.

2.CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is displayed.

- Record DTC and freeze frame data. (Print them out with CONSULT-III or GST.)
- Erase DTC. (Refer to ECQ-79, "Diagnosis Description".)
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to ECQ-345, "Symptom Table".)

3. Check related service bulletins for information.

Is any symptom described and is any DTC detected?

Symptom is described, DTC is detected>>GO TO 3.
Symptom is described, DTC is not detected>>GO TO 4.
Symptom is not described, DTC is detected>>GO TO 5.

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MI ON).
Also study the normal operation and fail safe related to the symptom. Refer to ECQ-349, "Description" and ECQ-336, "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 ECQ-349, "Description" and ECQ-336, "Fail Safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then make sure that DTC is detected again.
If two or more DTCs are detected, refer to ECQ-338, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

- Freeze frame data is useful if the DTC is not detected.
- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.
  If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIRMATION PROCEDURE.

Is DTC detected?

YES >> GO TO 10.
NO >> Check according to ECQ-339, "DTC Index".

6.PERFORM BASIC INSPECTION

Perform ECQ-14, "BASIC INSPECTION : Special Repair Requirement".

Do you have CONSULT-III?

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

7. PERFORM SPEC IN DATA MONITOR MODE

With CONSULT-III

Make sure that “MAS A/F SE-B1”, “B/FUEL SCHDL” and “A/F ALPHA-B1” are within the SP value using CONSULT-III in “SPEC” of “DATA MONITOR” mode. Refer to ECQ-98, "Component Function Check".

Is the measurement value within the SP value?

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

8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to ECQ-99, "Diagnosis Procedure".

Is malfunctioning part detected?

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

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to ECQ-345, "Symptom Table" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> 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 Circuit Inspection in GI-41, "Circuit Inspection".

Is malfunctioning part detected?

YES >> GO TO 11.
NO >> Monitor input data from related sensors or check the voltage of related ECM terminals using CONSULT-III. Refer to ECQ-314, "Reference Value".

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it. Refer to ECQ-79, "Diagnosis Description".

>> GO TO 12.

12. FINAL CHECK

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then make sure that the malfunction have been repaired securely.
When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 10.
YES-2 >> Symptom remains: GO TO 6.
NO >> Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM and TCM (Transmission Control Module). (Refer to ECQ-79, "Diagnosis Description".) If the completion of SRT is needed, drive vehicle under the specific DRIVING PATTERN in ECQ-341, "How to Set SRT Code".

Diagnostic Work Sheet

INFOID:0000000001309614

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 a incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.
Some conditions may cause the MI to come on steady or blink and DTC to be detected. Examples:

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

KEY POINTS

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

SEF907L

WORKSHEET SAMPLE

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

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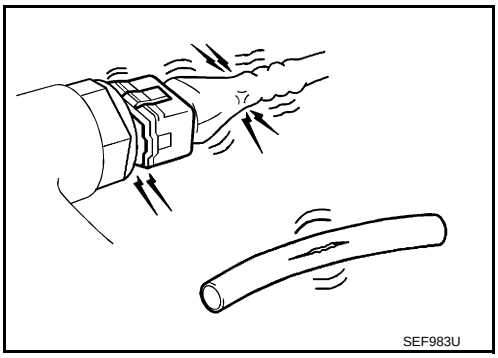
INSPECTION AND ADJUSTMENT
BASIC INSPECTION

BASIC INSPECTION : Special Repair Requirement

INFOID:0000000001309615

1.INSPECTION START

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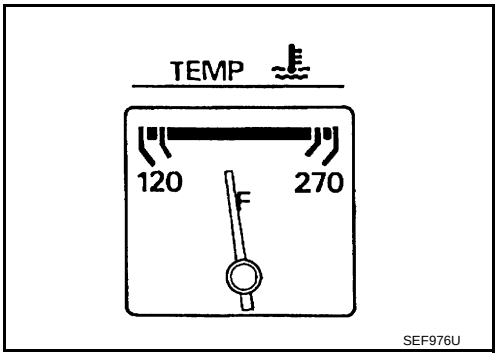

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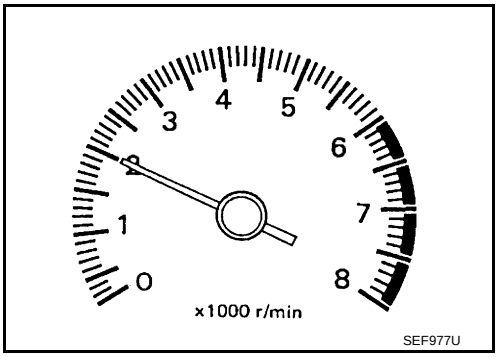
5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT-III or GST.

Is any DTC detected?

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



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2.REPAIR OR REPLACE

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

>> GO TO 3

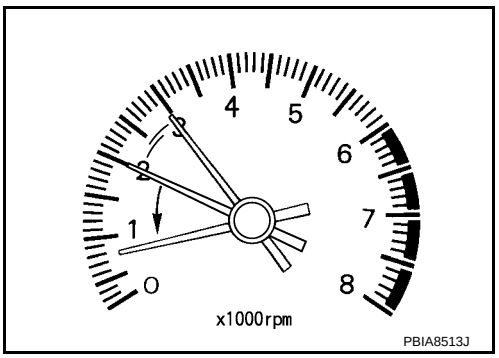
3.CHECK TARGET IDLE SPEED

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

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 ECQ-17, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to ECQ-358, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 4.



4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform ECQ-19, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform ECQ-19, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 6.

6. CHECK TARGET IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   For procedure, refer to "IDLE SPEED" ECQ-17, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to ECQ-358, "Idle Speed".

Is the inspection result normal?

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

7. DETECT MALFUNCTIONING PART

Check the Following.
- Check camshaft position sensor (PHASE) and circuit. Refer to ECQ-210, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to ECQ-206, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace. Then GO TO 4.

8. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to ECQ-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 4.

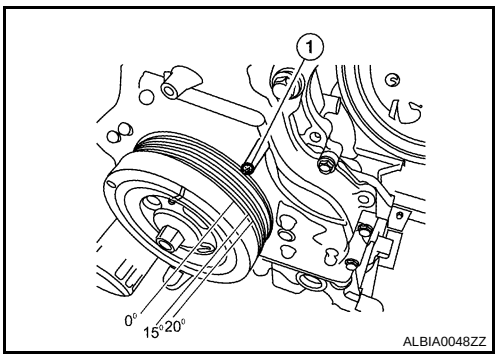
9. CHECK IGNITION TIMING

1. Run engine at idle.

2. Check ignition timing with a timing light.

For procedure, refer to ECQ-18, "IGNITION TIMING : Special Repair Requirement".

For specification, refer to ECQ-358, "Ignition Timing".



1 : Timing indicator

Is the inspection result normal?

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

10. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform ECQ-19, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 11.

11. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform ECQ-19, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 12.

12. CHECK TARGET IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   For procedure, refer to ECQ-17, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to ECQ-358, "Idle Speed".

Is the inspection result normal?

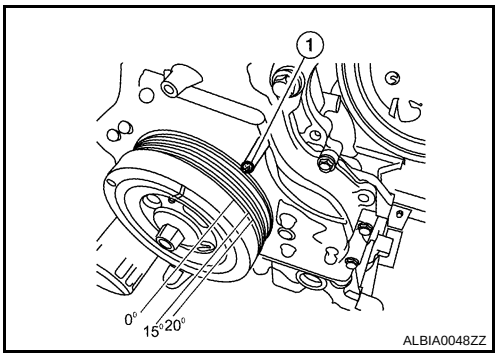
YES >> GO TO 13.
NO >> GO TO 15.

13. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.

For procedure, refer to ECQ-18, "IGNITION TIMING : Special Repair Requirement".

For specification, refer to ECQ-358, "Ignition Timing".



1 : Timing indicator

Is the inspection result normal?

YES >> GO TO 17.
NO >> GO TO 14.

14. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-193, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair the timing chain installation. Then GO TO 4.

15. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to ECQ-210, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to ECQ-206, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Repair or replace. Then GO TO 4.

16.CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer toSEC-10, "ECM RE-COMMUNICATING FUNCTION : Description".

>> GO TO 4.

17.INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, go to ECQ-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description

INFOID:0000000001309616

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement

INFOID:0000000001309617

1.PERFORM INITIALIZATION OF NATS SYSTEM AND REGISTRATION OF ALL NATS IGNITION KEY IDS

Refer to ECQ-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 2.

2.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to ECQ-19, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-19, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> END

IDLE SPEED

IDLE SPEED : Description

INFOID:0000000001309618

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

IDLE SPEED : Special Repair Requirement

INFOID:0000000001309619

1.CHECK IDLE SPEED

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

>> INSPECTION END

IGNITION TIMING

IGNITION TIMING : Description

INFOID:0000000001309620

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

IGNITION TIMING : Special Repair Requirement

INFOID:0000000001309621

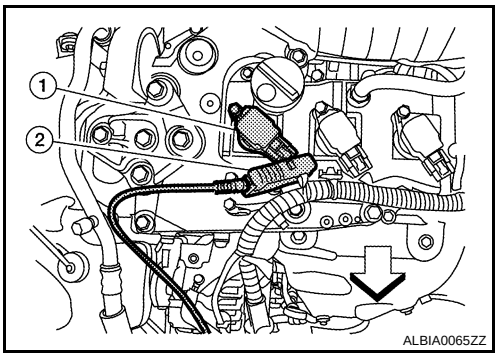
1.CHECK IGNITION TIMING

With CONSULT-III

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

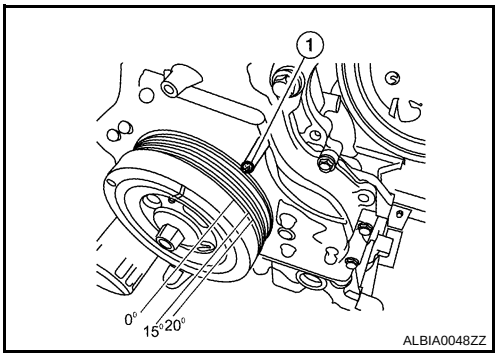
2 : Timing light

⇦ : Vehicle front



2. Select "TARGET ING TIM HLD" in "WORK SUPPORT" mode.
3. Touch "START".
4. Check ignition timing.

1 : Timing indicator

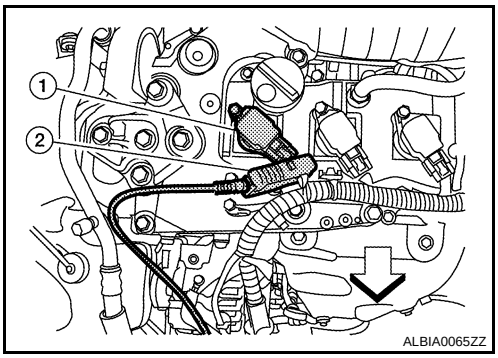


Without CONSULT-III

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

2 : Timing light

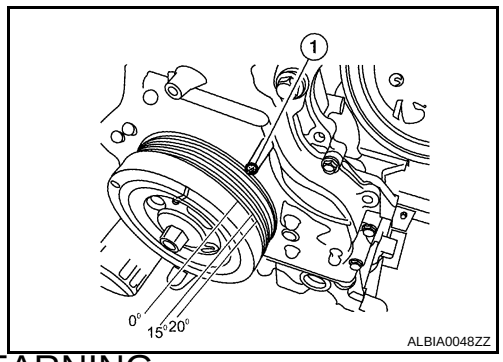
⇦ : Vehicle front



2. Set ECM in Diagnostic Test Mode II (Ignition timing hold). Refer to ECQ-79, "Diagnosis Description".

3. Check ignition timing.

1 : Timing indicator



>> INSPECTION END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description

INFOID:0000000001309624

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:0000000001309625

1.START

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

>> END

THROTTLE VALVE CLOSED POSITION LEARNING

THROTTLE VALVE CLOSED POSITION LEARNING : Description

INFOID:0000000001309626

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 electric throttle control actuator or ECM is replaced.

THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement

INFOID:0000000001309627

1.PRECONDITIONING

Make sure that all of the following conditions are satisfied.Learning will be cancelled if any of the following conditions are missed for even a moment.

NOTE:

If the throttle valve does not operate correctly (ex. frozen valve on housing), the learning may not be done successfully.

- Vehicle speed: 0 km/h (0 MPH)
- Accelerator pedal: Fully released
- Battery voltage: More than 10V (Ignition switch ON and engine stopped)
- Engine coolant temperature: -20 - 100°C
- Intake air temperature: More than -20°C

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

With CONSULT-III

1. Turn ignition switch ON.

2. Select “CLSD THL POS LEARN“ in “WORK SUPPORT“ mode.
3. Touch “START“ and wait at least 10 seconds.
4. Make sure that “CMPLT“ is displayed on CONSULT-III screen.

Without CONSULT-III

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

>> GO TO 3.

3.CHECK DTC

1. Turn ignition switch and wait at least 10 seconds.
2. Check DTC.

Is DTC P1299 or P2109 detected?

YES-1 >> DTC P1299: Refer toECQ-238, "Description"
YES-2 >> DTC P2109: Refer toECQ-272, "Description"
>> END.

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description

INFOID:0000000001309630

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:0000000001309631

1.START

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
3. Clear 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.

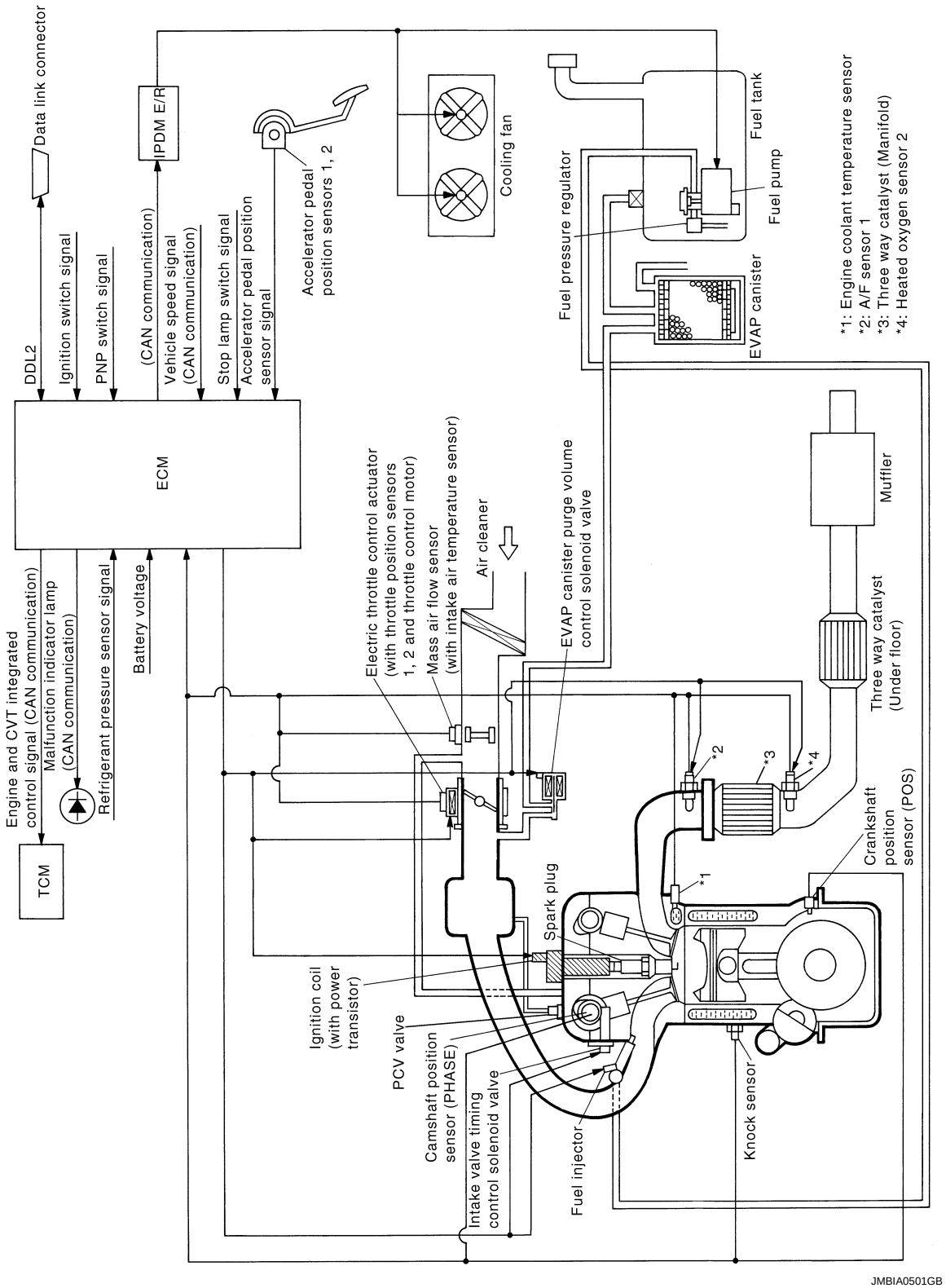
>> END

FUNCTION DIAGNOSIS

ENGINE CONTROL SYSTEM

System Diagram

INFOID:0000000001309632



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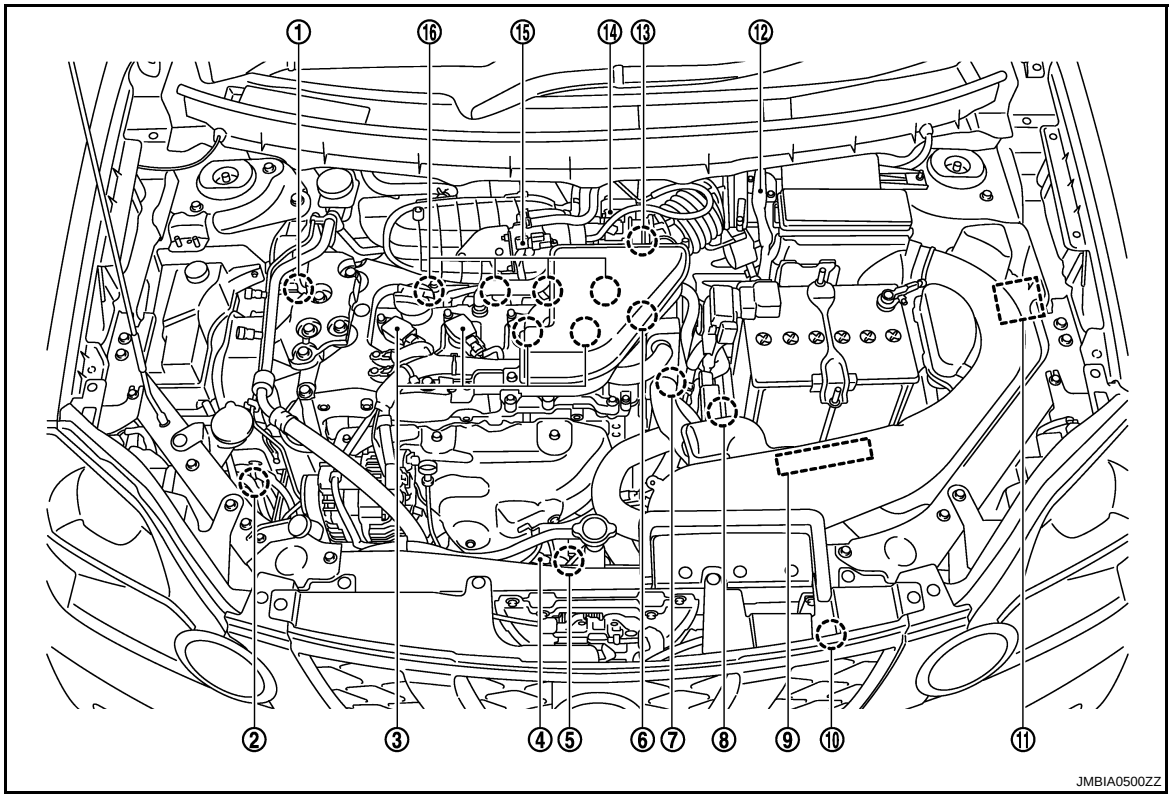
System Description

INFOID:0000000001309633

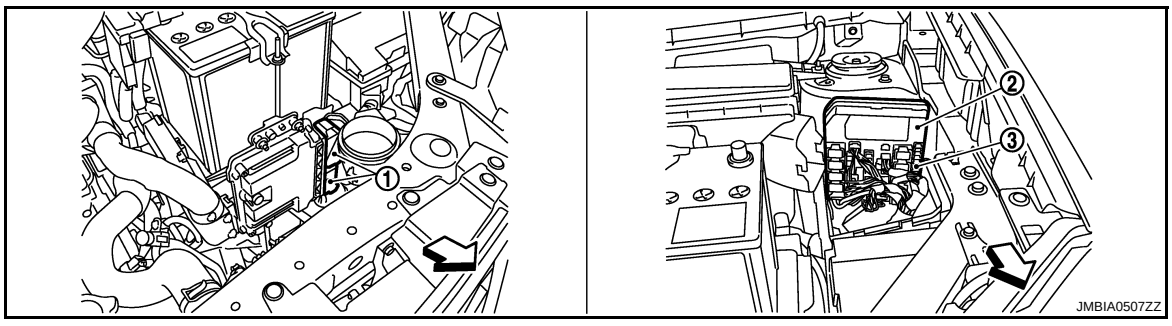
ECM performs various controls such as fuel injection control and ignition timing control.

Component Parts Location

INFOID:0000000001338871

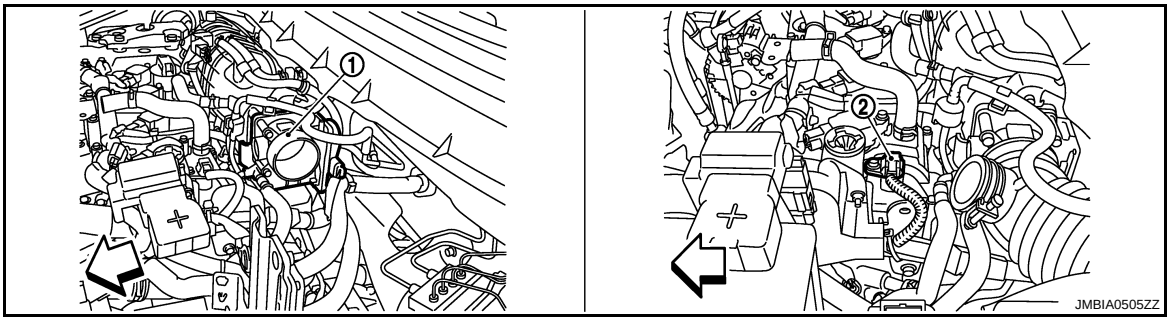


1. Intake valve timing control solenoid valve
2. EVAP canister
3. Ignition coil (with power transistor)
4. Air fuel ratio (A/F) sensor 1
5. Heated oxygen sensor 2
6. Camshaft position sensor (PHASE)
7. Engine coolant temperature sensor
8. Park/neutral position (PNP) switch
9. ECM
10. Refrigerant pressure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



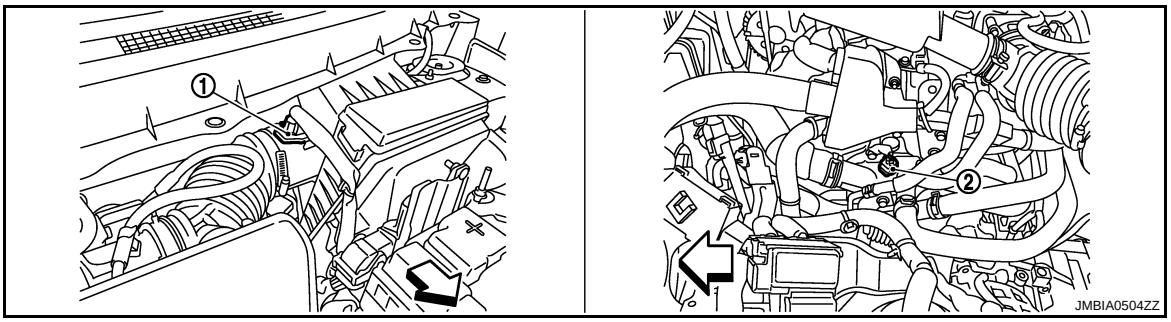
1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

⇦ : Vehicle front



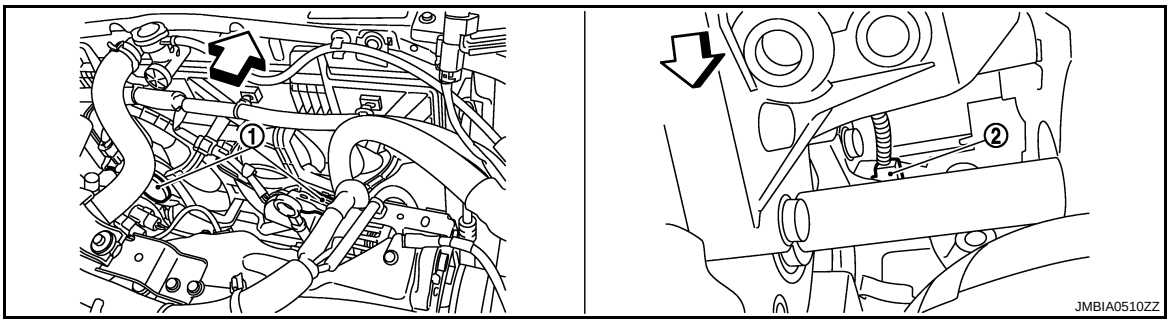
1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Camshaft position sensor (PHASE)

⇦ : Vehicle front



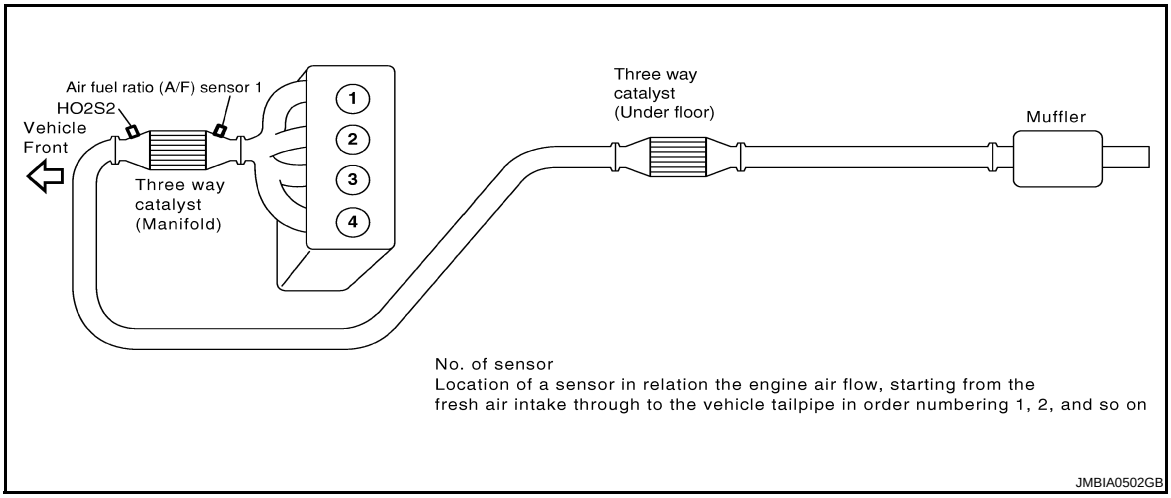
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

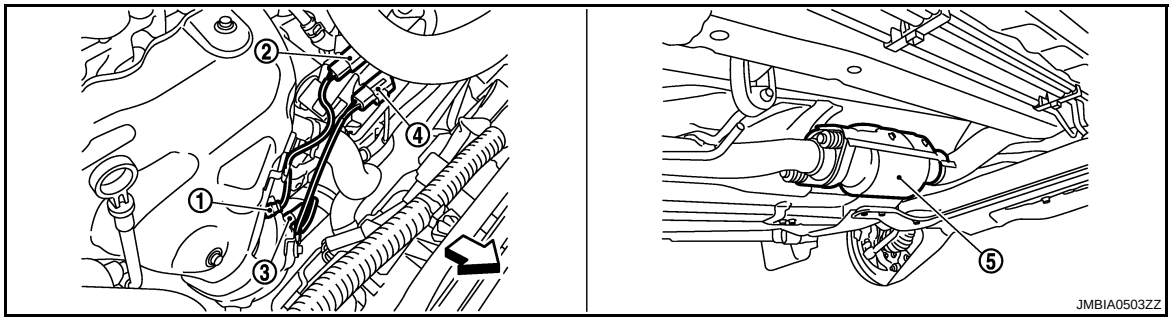
⇦ : Vehicle front



1. Cooling fan motor
2. Crankshaft position sensor (POS)

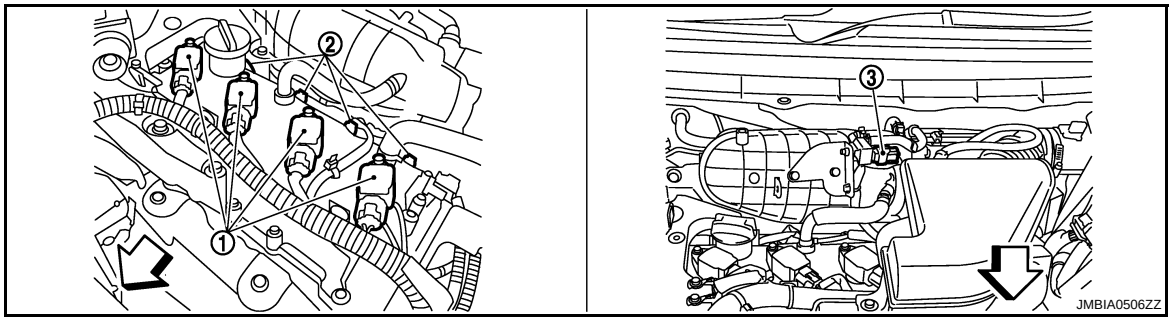
⇦ : Vehicle front





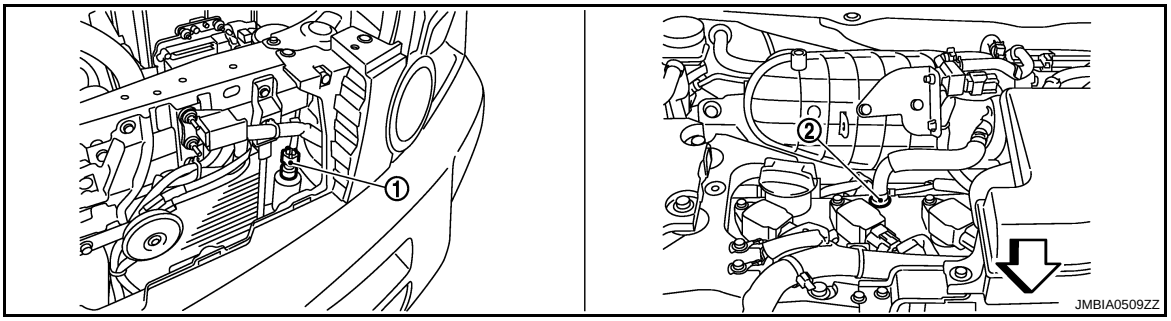
1. Air fuel ratio (A/F) sensor 1
2. Air fuel ratio (A/F) sensor 1 harness connector
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector
5. Three way catalyst (Under floor)

⇦ : Vehicle front



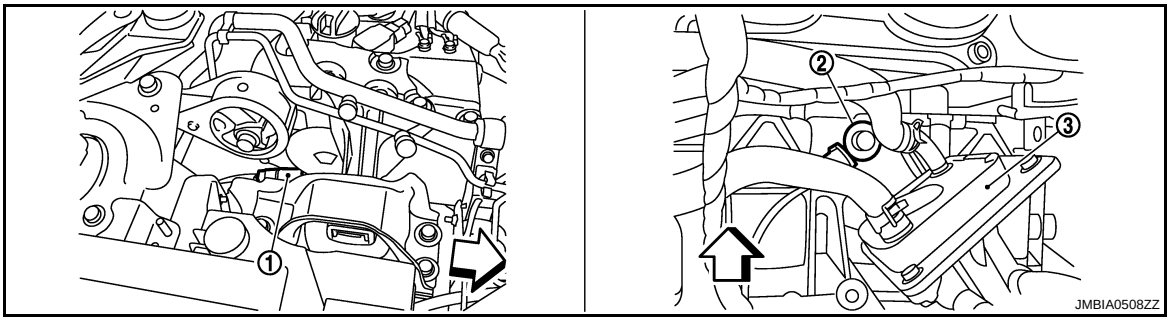
1. Ignition coil (with power transistor) and spark plug
2. Fuel injection
3. EVAP canister purge volume control solenoid valve

⇦ : Vehicle front



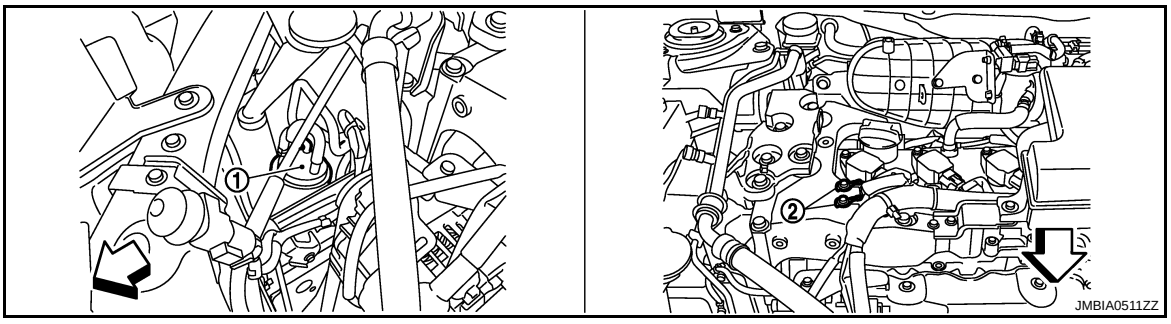
1. Refrigerant pressure sensor 2. PCV valve

⇦ : Vehicle front



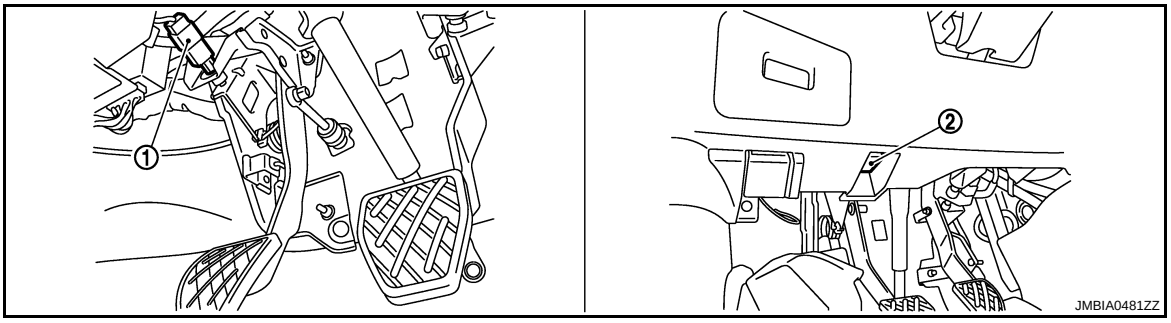
1. Intake valve timing control solenoid valve 2. Knock sensor 3. Engine oil cooler

⇦ : Vehicle front

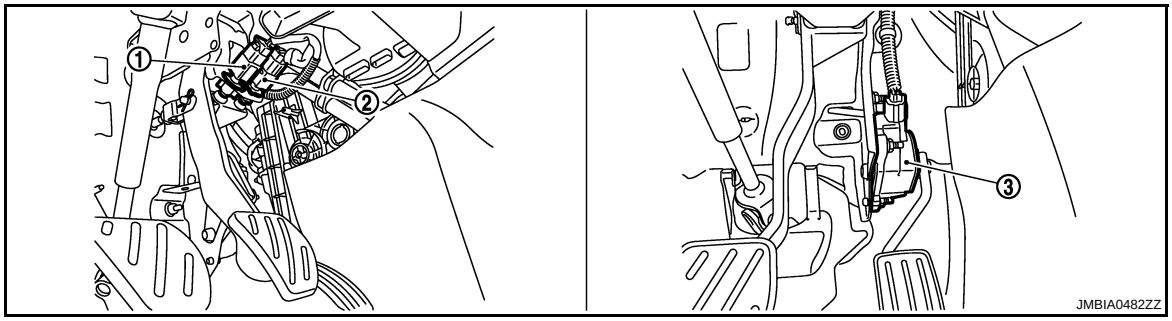


1. EVAP canister 2. Ground

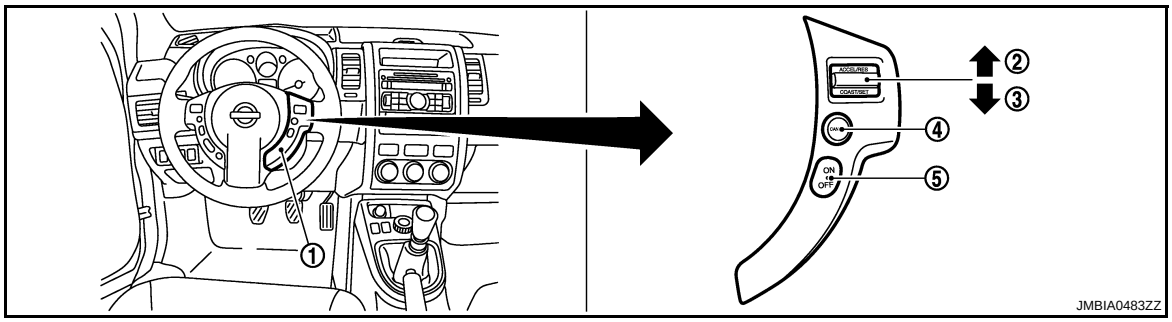
⇦ : Vehicle front



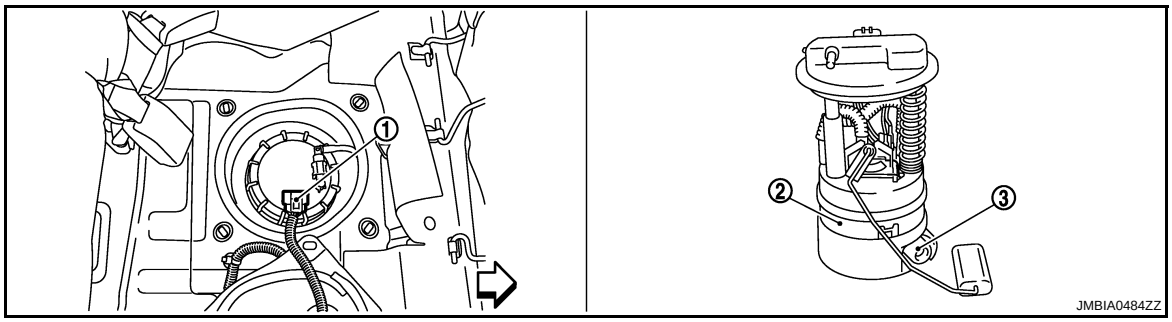
1. ASCD clutch switch 2. Data link connector



1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH



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

⇦ : Vehicle front

Component Description

INFOID:0000000001309635

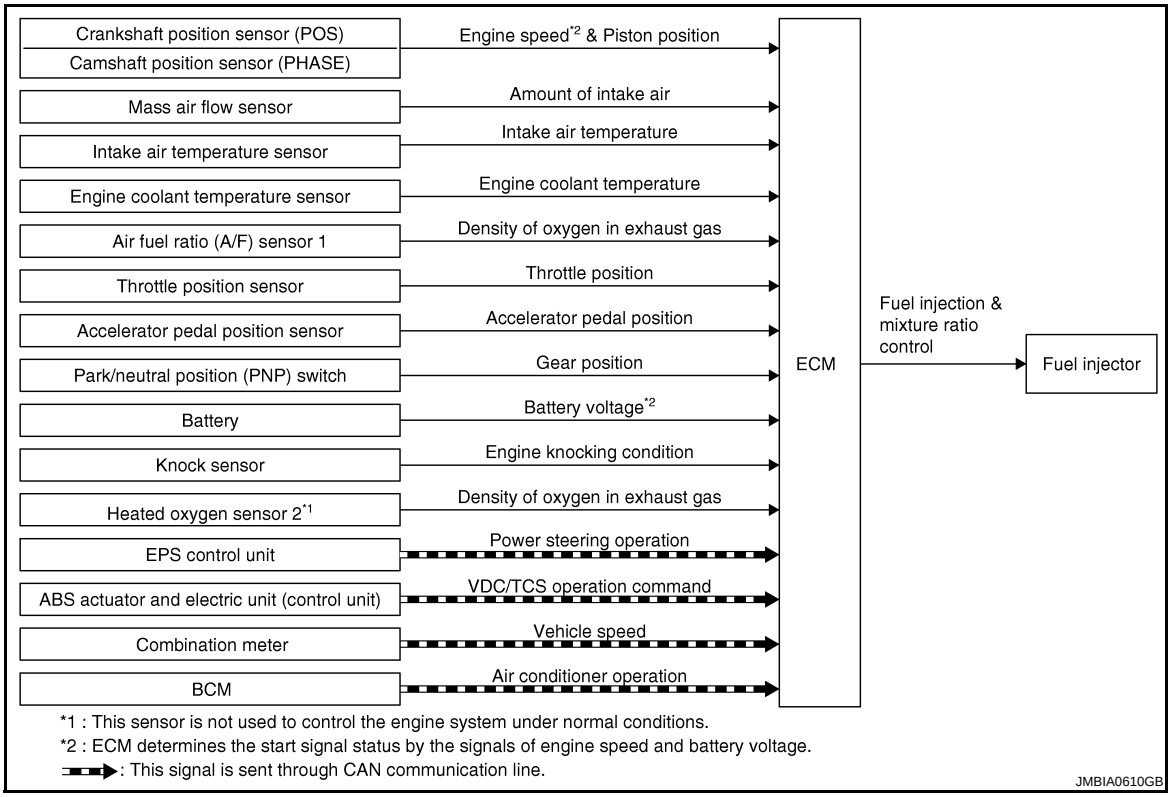
Component	Reference
A/F sensor 1	ECQ-144, "Description"
A/F sensor 1 heater	ECQ-115, "Description"
Accelerator pedal position sensor	ECQ-275, "Description"
ASCD brake switch	ECQ-249, "Description"
ASCD steering switch	ECQ-246, "Description"
ASCD vehicle speed sensor	ECQ-256, "Description"
Camshaft position sensor (PHASE)	ECQ-210, "Description"
Crankshaft position sensor (POS)	ECQ-206, "Description"

Component	Reference
Cooling fan motor	ECQ-58, "System Description"
Electric throttle control actuator	ECQ-273, "Description"
Engine coolant temperature sensor	ECQ-134, "Description"
EVAP canister purge volume control solenoid valve	ECQ-219, "Description"
Fuel injector	ECQ-191, "Description"
Fuel pump	ECQ-307, "Description"
Heated oxygen sensor 2	ECQ-163, "Description"
Heated oxygen sensor 2 heater	ECQ-118, "Description"
Ignition signal	ECQ-241, "Description"
Intake air temperature sensor	ECQ-131, "Description"
Intake valve timing control solenoid valve	ECQ-73, "System Description"
Knock sensor	ECQ-204, "Description"
Mass air flow sensor	ECQ-121, "Description"
Park/neutral position switch	ECQ-258, "Description"
PCV valve	ECQ-311, "Description"
Refrigerant pressure sensor	ECQ-312, "Description"
Stop lamp switch	ECQ-263, "Description"
Throttle control motor	ECQ-137, "Description"
Throttle control motor relay	ECQ-266, "Description"
Throttle position sensor	ECQ-137, "Description"
Vehicle speed sensor	ECQ-222, "Description"

MULTIPORT FUEL INJECTION SYSTEM

System Diagram

INFOID:0000000001309636



System Description

INFOID:0000000001309637

INPUT/OUTPUT SIGNAL CHART

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

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

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

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

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.

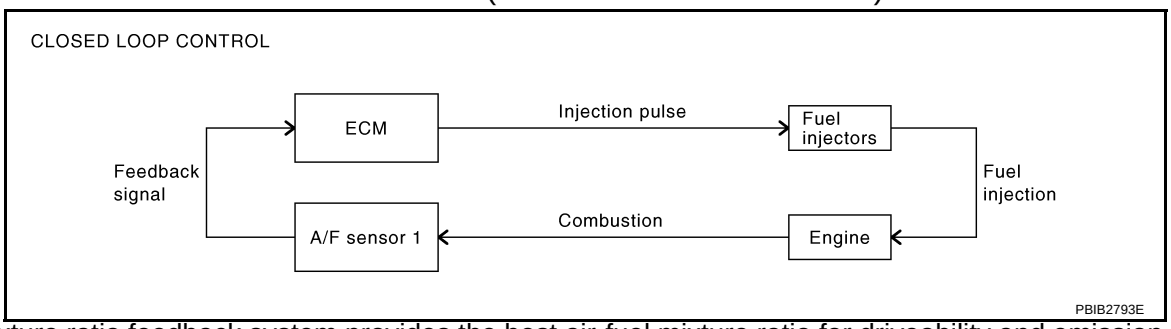
VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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
- High-load, high-speed operation

<Fuel decrease>
- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses A/F sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about A/F sensor 1, refer to ECQ-144, "DTC Logic". 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.

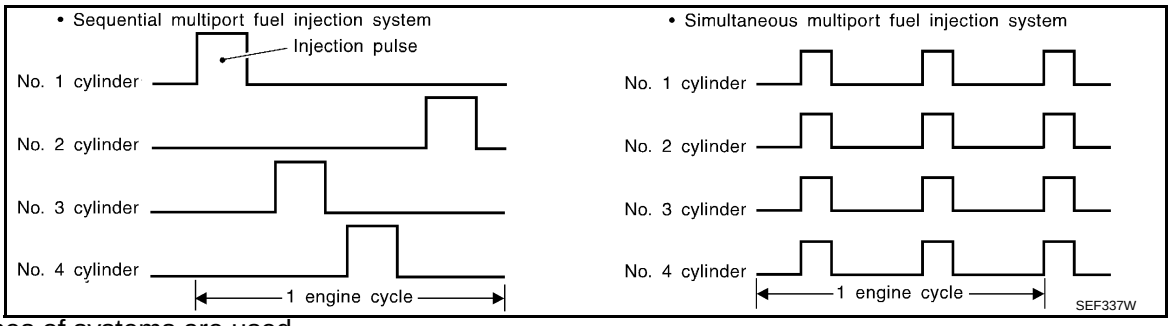
- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of A/F sensor 1 or its circuit
- Insufficient activation of A/F sensor 1
- High engine coolant temperature
- During warm-up
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

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

Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios.
“Fuel trim” refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
“Short term fuel trim” is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from A/F sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.
“Long term fuel trim” is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



Two types of systems are used.

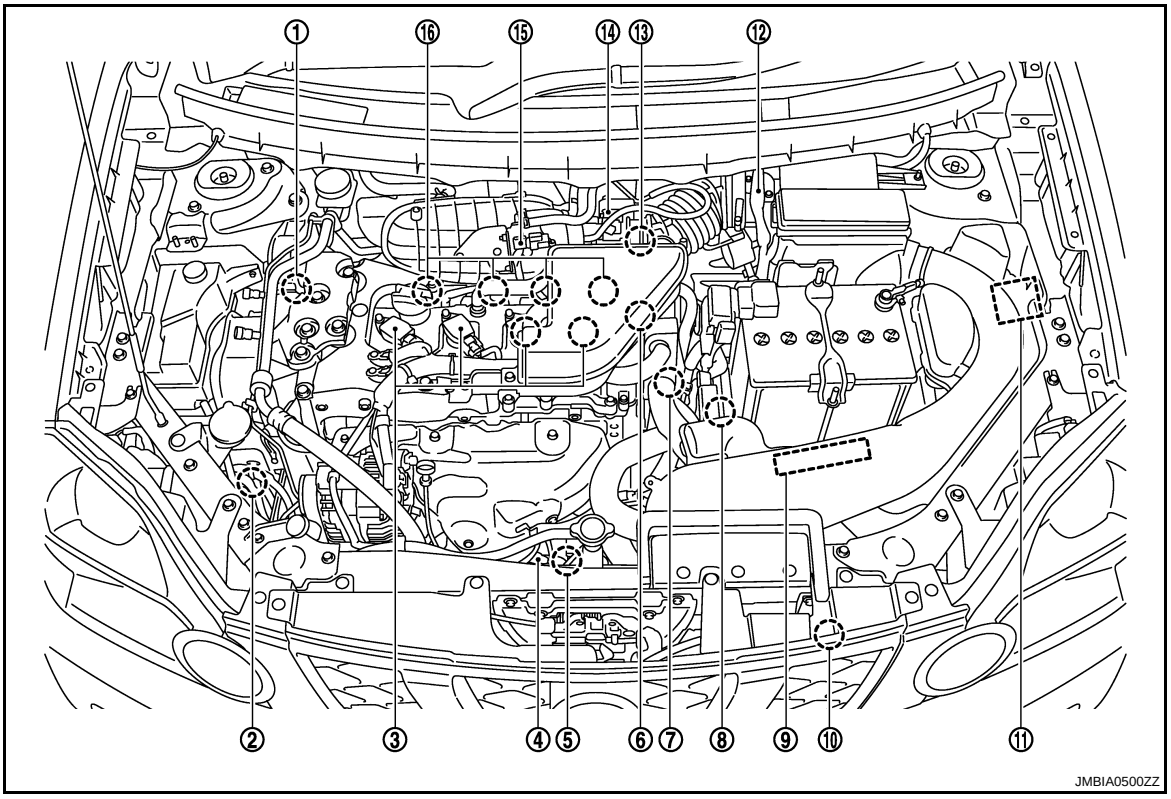
- Sequential Multiport Fuel Injection System
  Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.
- Simultaneous Multiport Fuel Injection System
  Fuel is injected simultaneously into all four cylinders twice each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

FUEL SHUT-OFF

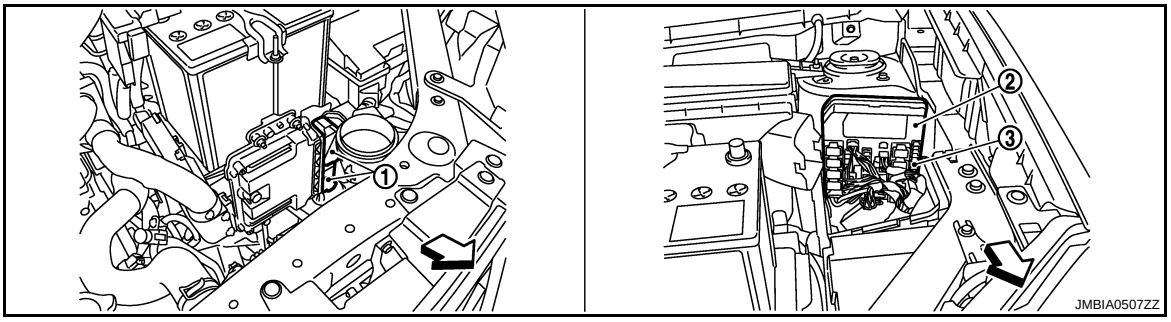
Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

Component Parts Location

INFOID:0000000001340254

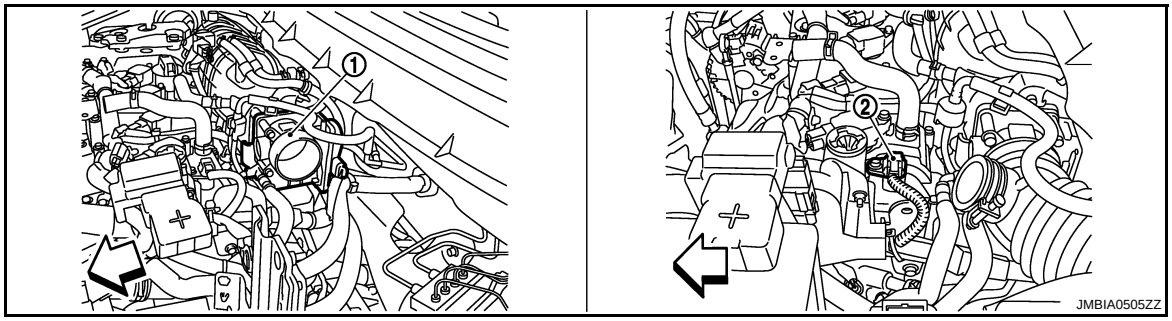


1. Intake valve timing control solenoid valve
2. EVAP canister
3. Ignition coil (with power transistor)
4. Air fuel ratio (A/F) sensor 1
5. Heated oxygen sensor 2
6. Camshaft position sensor (PHASE)
7. Engine coolant temperature sensor
8. Park/neutral position (PNP) switch
9. ECM
10. Refrigerant pressure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



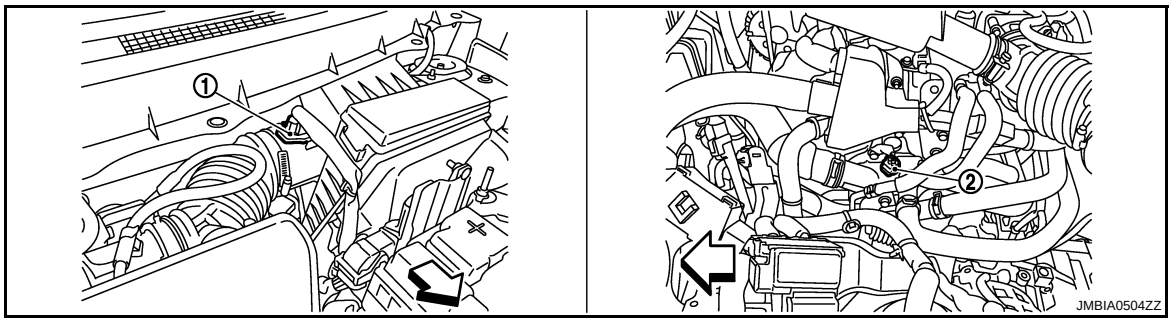
1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

⇦ : Vehicle front



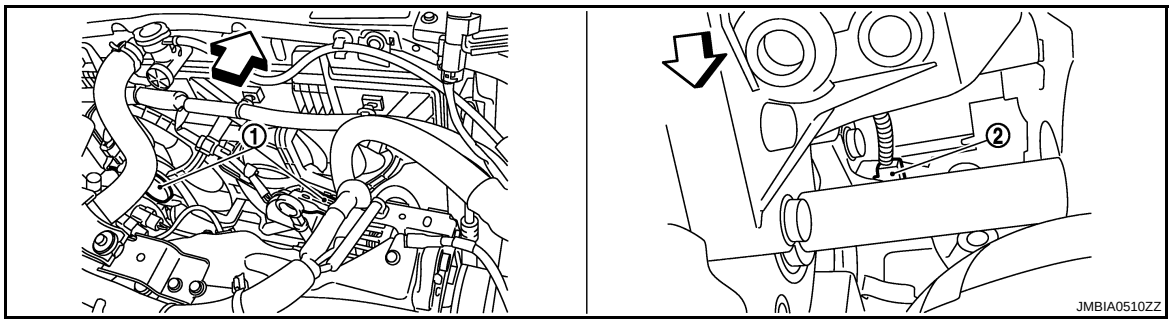
1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Camshaft position sensor (PHASE)

⇦ : Vehicle front



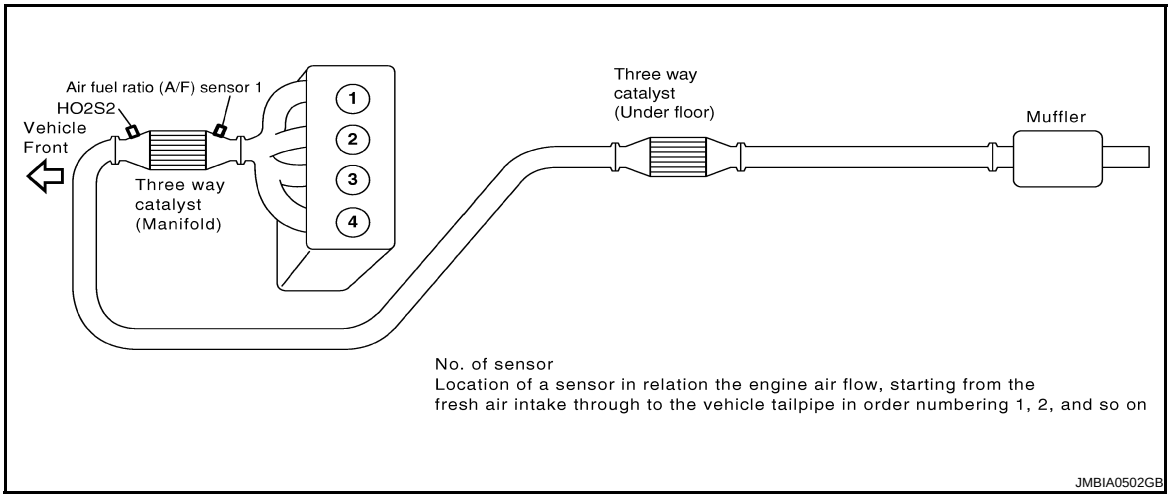
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

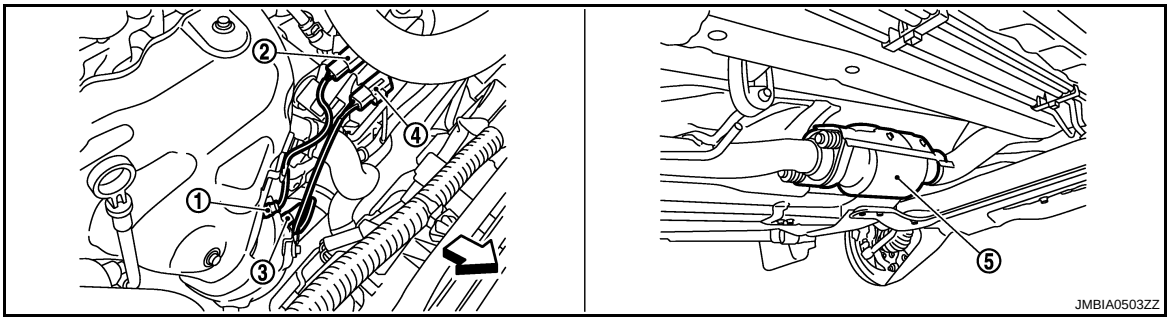
⇦ : Vehicle front



1. Cooling fan motor
2. Crankshaft position sensor (POS)

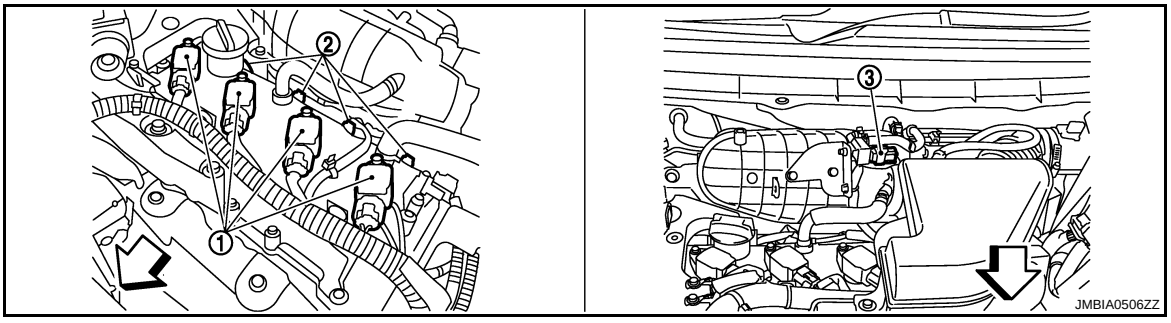
⇦ : Vehicle front





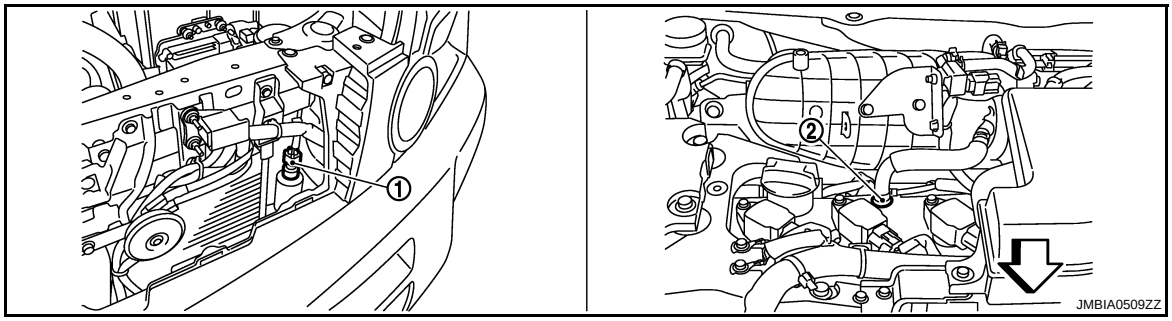
1. Air fuel ratio (A/F) sensor 1
2. Air fuel ratio (A/F) sensor 1 harness connector
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector
5. Three way catalyst (Under floor)

⇦ : Vehicle front



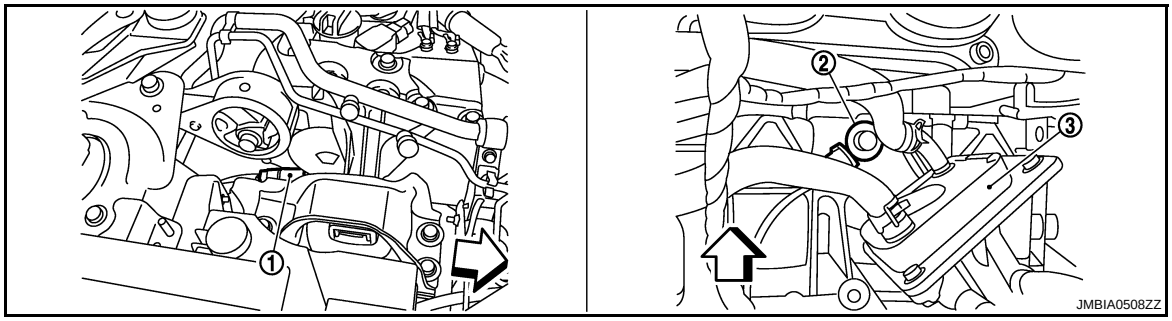
1. Ignition coil (with power transistor) and spark plug
2. Fuel injection
3. EVAP canister purge volume control solenoid valve

⇦ : Vehicle front



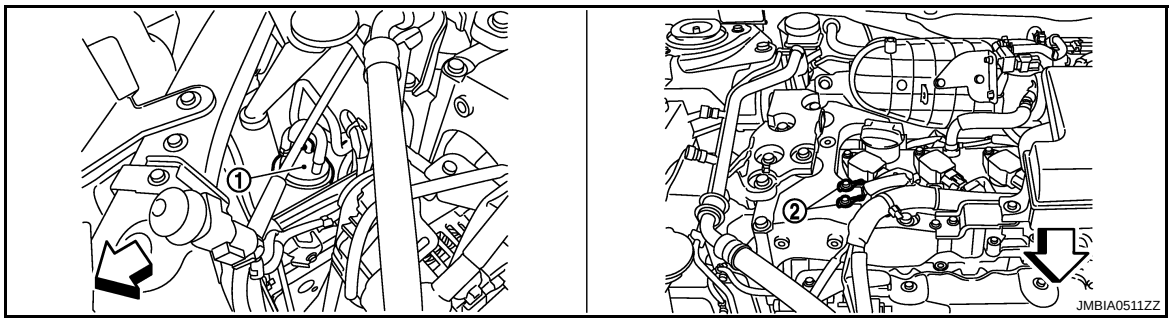
1. Refrigerant pressure sensor 2. PCV valve

⇦ : Vehicle front



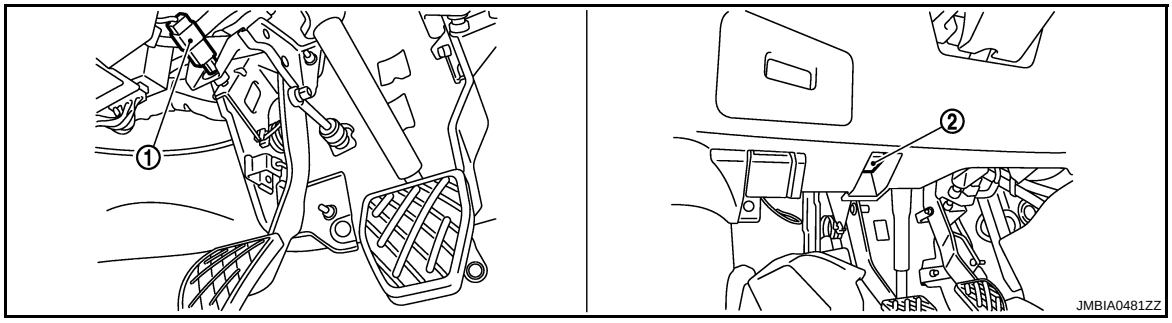
1. Intake valve timing control solenoid valve 2. Knock sensor 3. Engine oil cooler

⇦ : Vehicle front

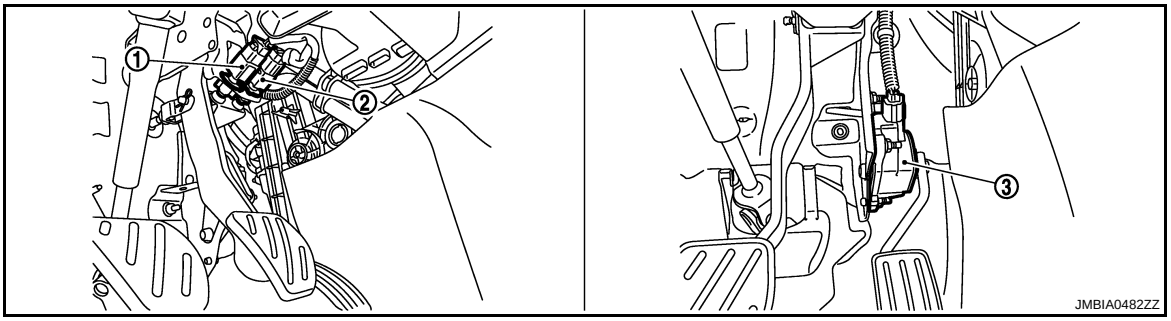


1. EVAP canister 2. Ground

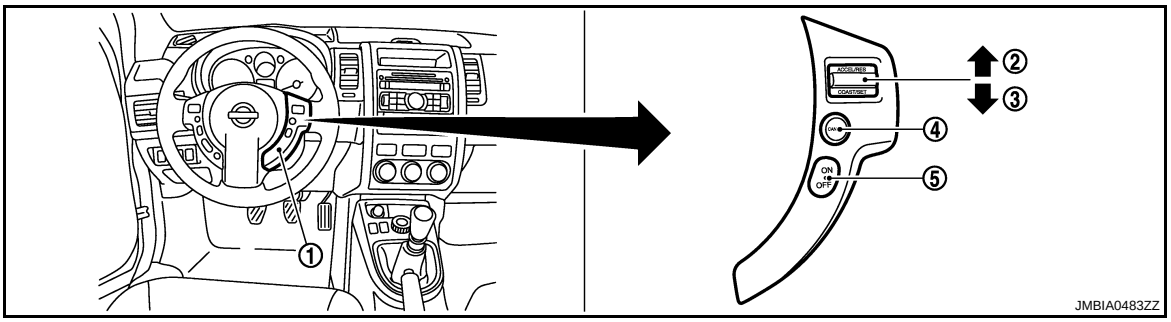
⇦ : Vehicle front



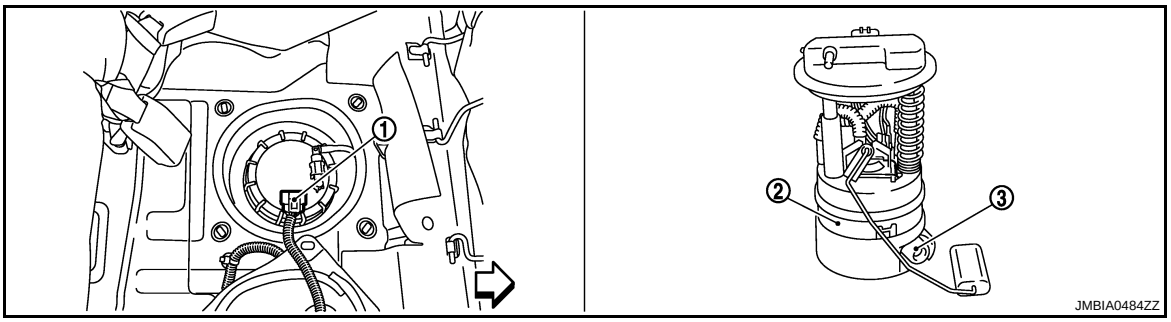
1. ASCD clutch switch 2. Data link connector



1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH



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

⇦ : Vehicle front

Component Description

INFOID:0000000001309639

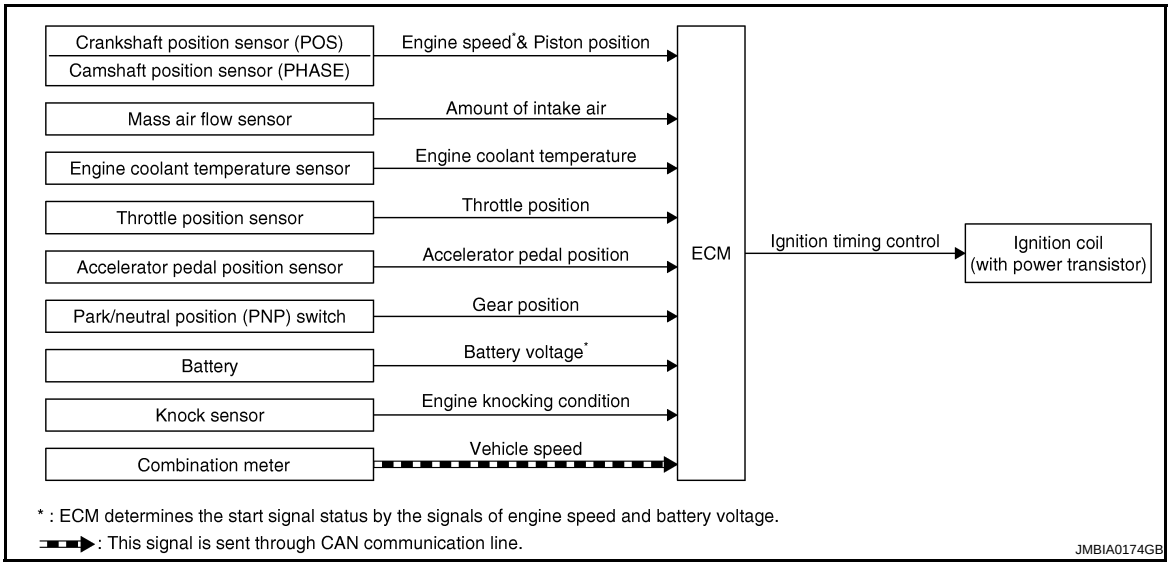
Component	Reference
A/F sensor 1	ECQ-144, "Description"
Accelerator pedal position sensor	ECQ-275, "Description"
Camshaft position sensor (PHASE)	ECQ-210, "Description"
Crankshaft position sensor (POS)	ECQ-206, "Description"
Engine coolant temperature sensor	ECQ-134, "Description"
Fuel injector	ECQ-191, "Description"
Heated oxygen sensor 2	ECQ-118, "Description"
Intake air temperature sensor	ECQ-131, "Description"

Component	Reference
Knock sensor	ECQ-204, "Description"
Mass air flow sensor	ECQ-121, "Description"
Park/neutral position switch	ECQ-258, "Description"
Throttle position sensor	ECQ-137, "Description"
Vehicle speed sensor	ECQ-222, "Description"

ELECTRIC IGNITION SYSTEM

System Diagram

INFOID:0000000001309640



System Description

INFOID:0000000001309641

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2 Piston position	Ignition timing control	Ignition coil (with power transistor)
Camshaft position sensor (PHASE)			
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		
Battery	Battery voltage*2		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Combination meter*1	Vehicle speed		

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

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

SYSTEM DESCRIPTION

Firing 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.

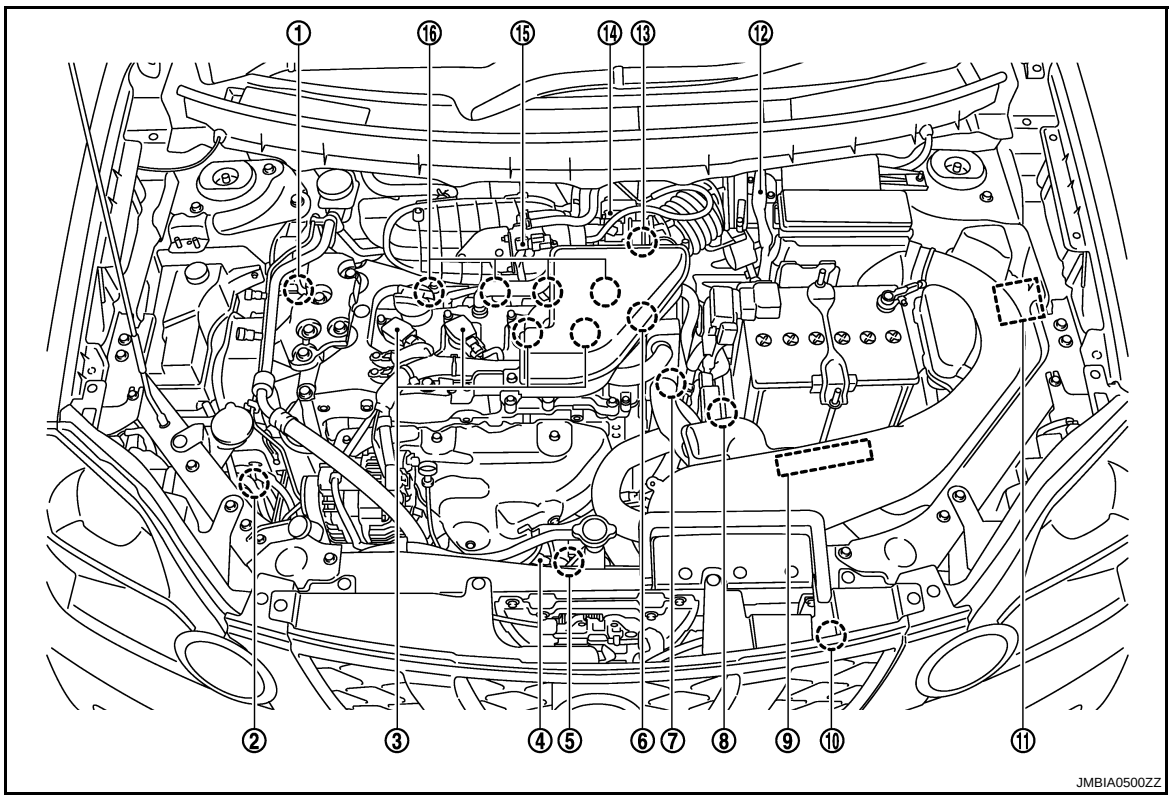
- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

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

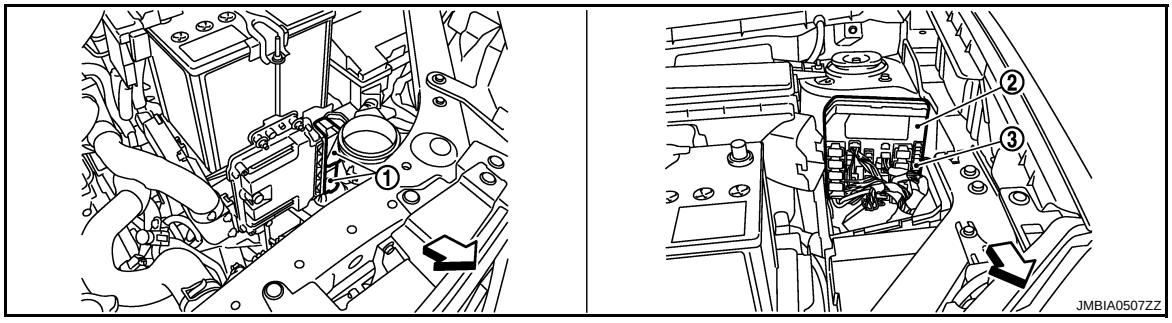
operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Component Parts Location

INFOID:0000000001340255

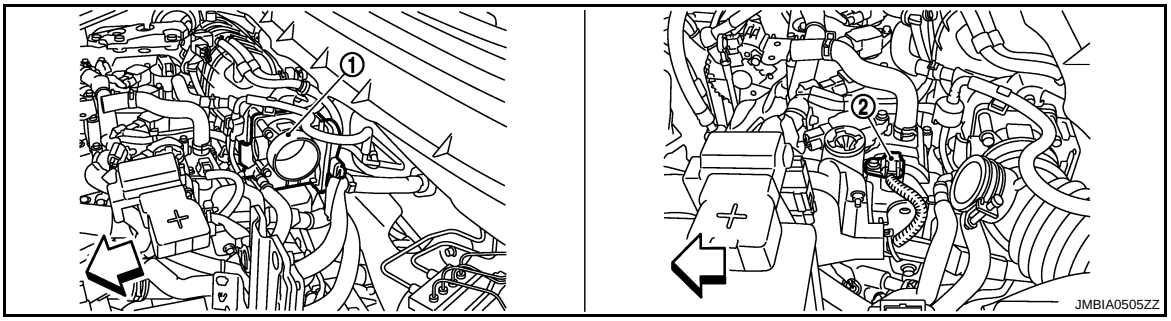


1. Intake valve timing control solenoid valve
2. EVAP canister
3. Ignition coil (with power transistor)
4. Air fuel ratio (A/F) sensor 1
5. Heated oxygen sensor 2
6. Camshaft position sensor (PHASE)
7. Engine coolant temperature sensor
8. Park/neutral position (PNP) switch
9. ECM
10. Refrigerant pressure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



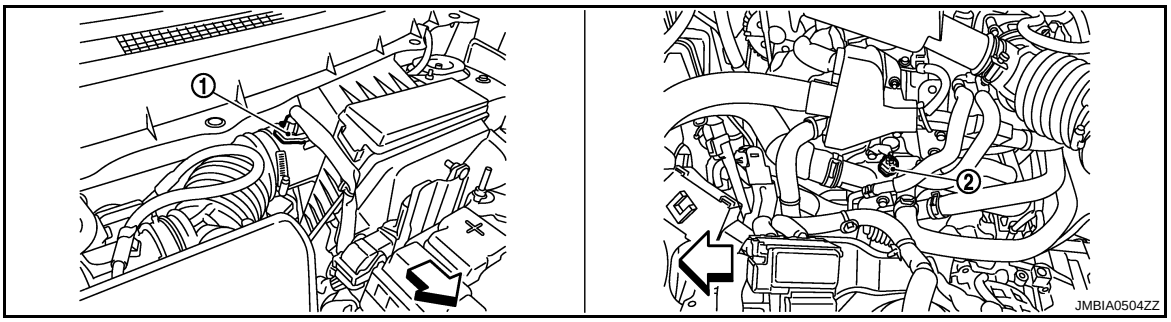
1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

⇦ : Vehicle front



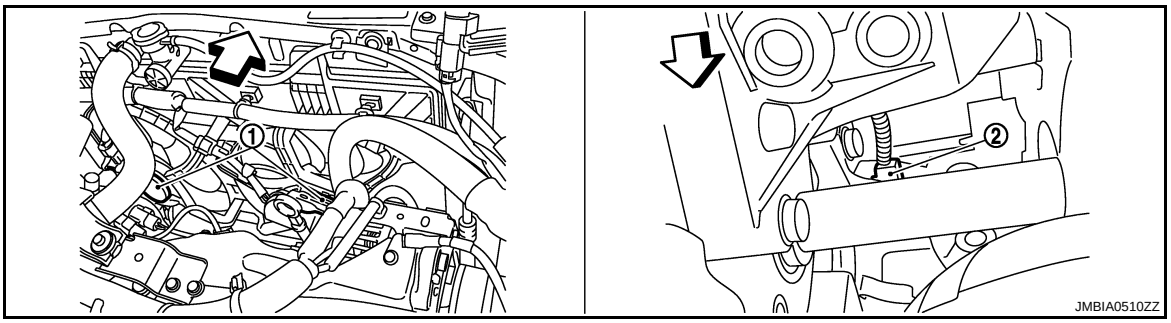
1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Camshaft position sensor (PHASE)

⇦ : Vehicle front



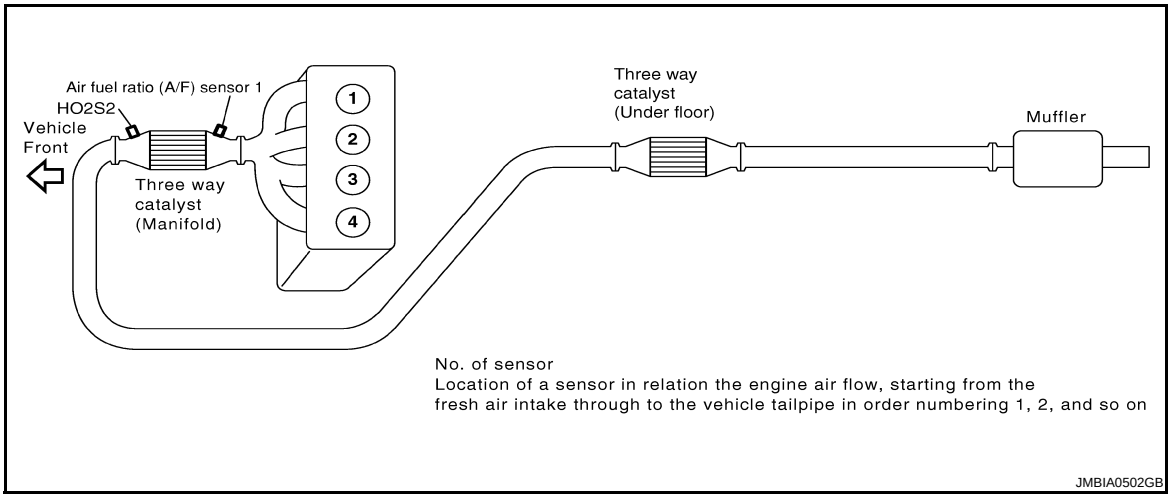
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

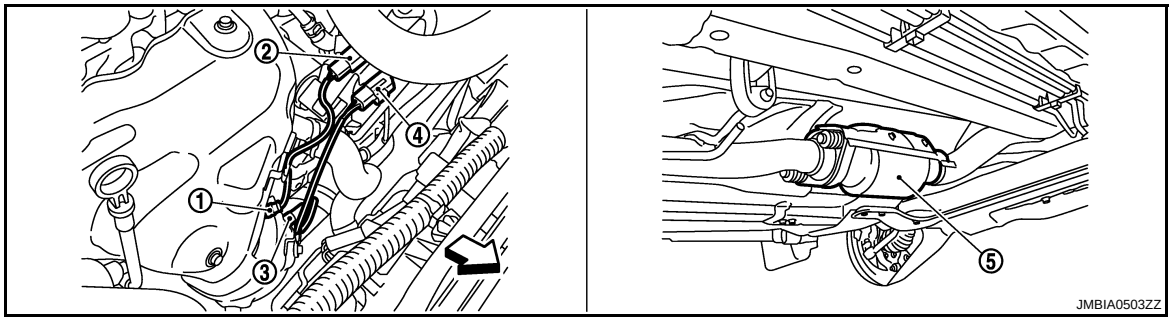
⇦ : Vehicle front



1. Cooling fan motor
2. Crankshaft position sensor (POS)

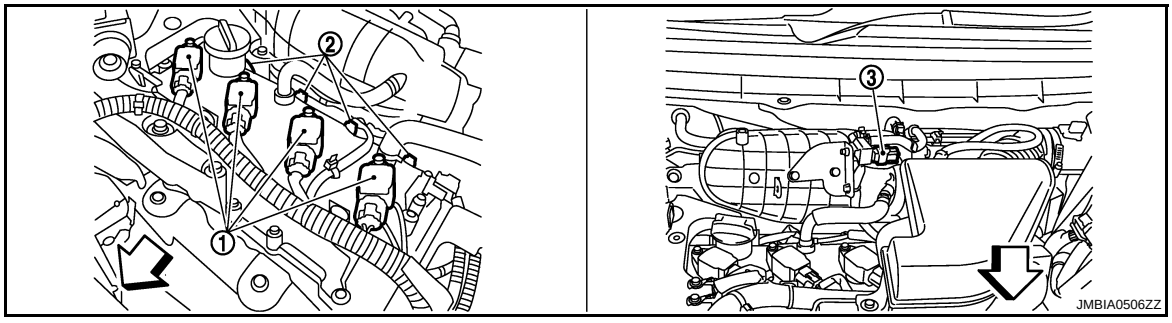
⇦ : Vehicle front





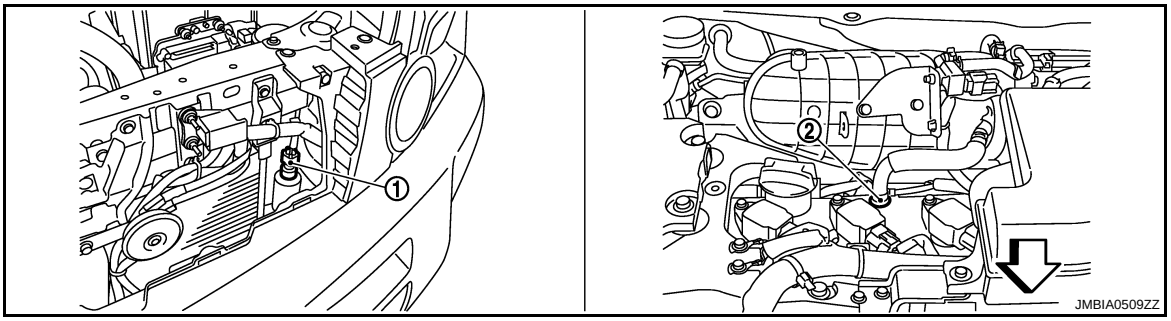
1. Air fuel ratio (A/F) sensor 1
2. Air fuel ratio (A/F) sensor 1 harness connector
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector
5. Three way catalyst (Under floor)

⇦ : Vehicle front



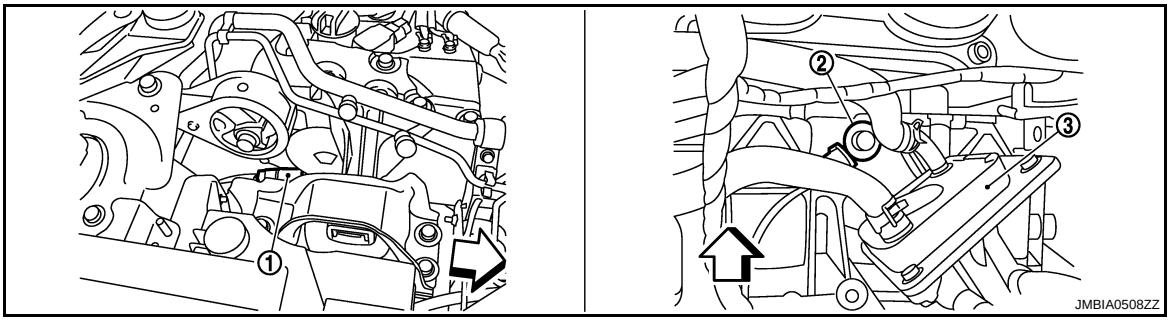
1. Ignition coil (with power transistor) and spark plug
2. Fuel injection
3. EVAP canister purge volume control solenoid valve

⇦ : Vehicle front



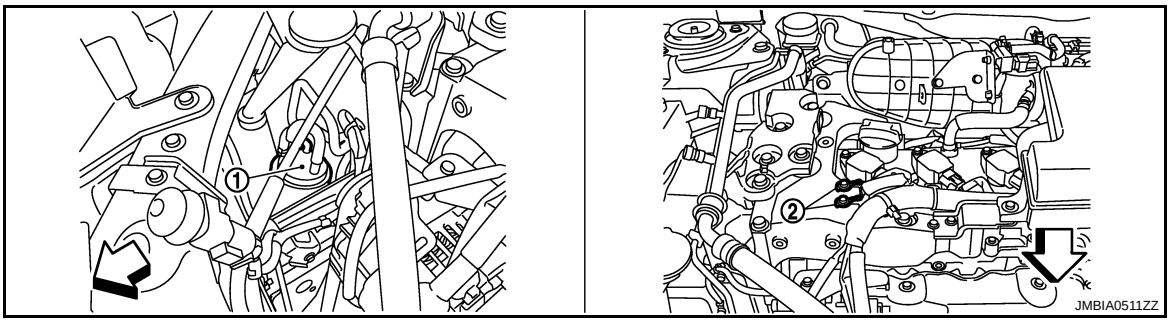
1. Refrigerant pressure sensor 2. PCV valve

⇦ : Vehicle front



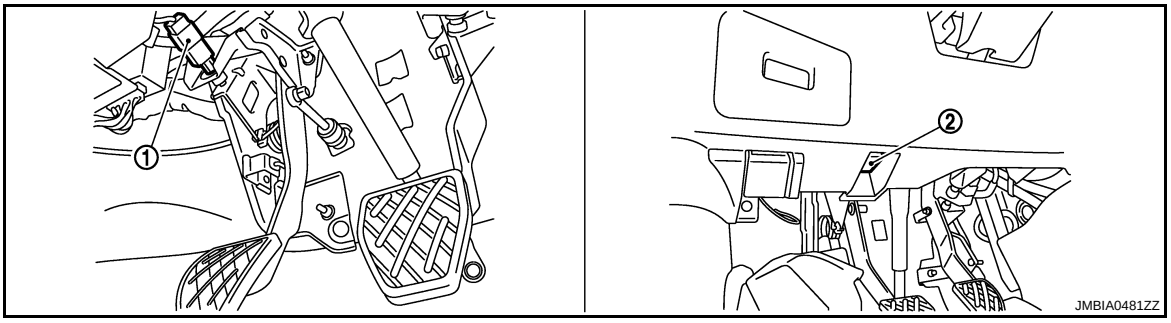
1. Intake valve timing control solenoid valve 2. Knock sensor 3. Engine oil cooler

⇦ : Vehicle front

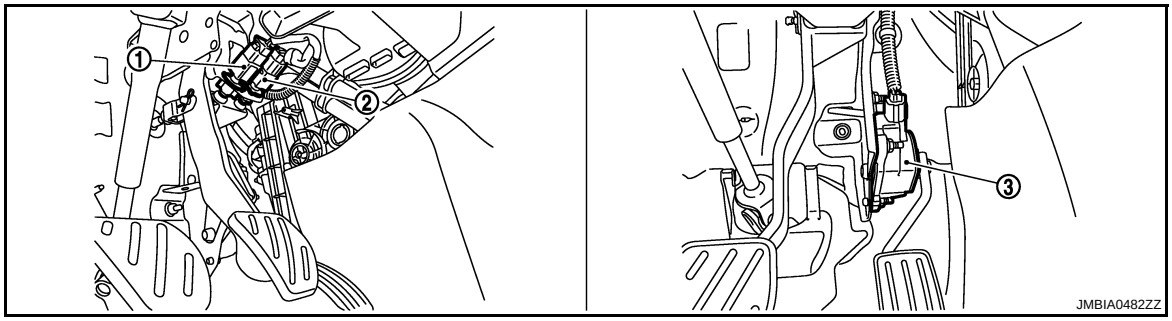


1. EVAP canister 2. Ground

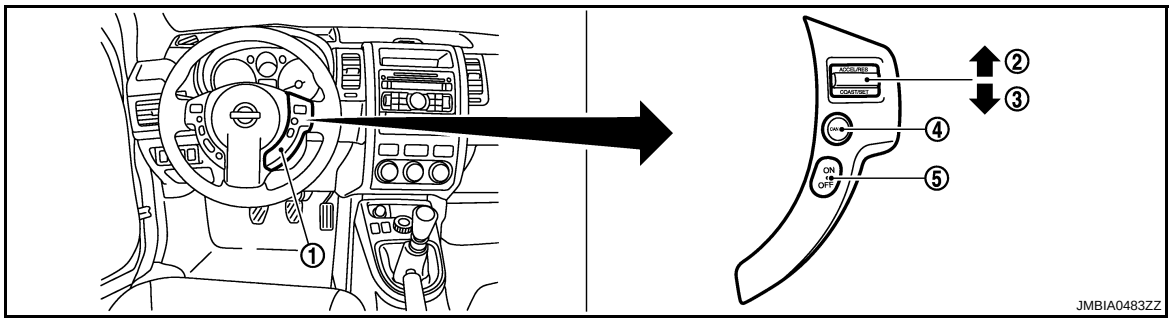
⇦ : Vehicle front



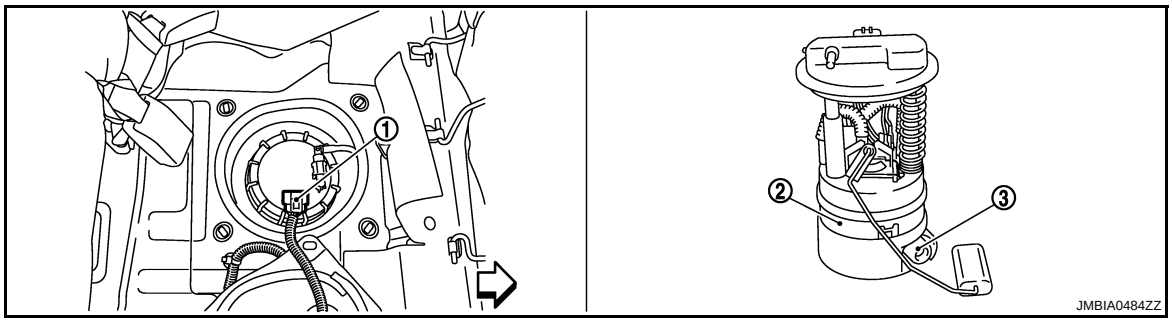
1. ASCD clutch switch 2. Data link connector



1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH



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

⇦ : Vehicle front

Component Description

INFOID:0000000001309643

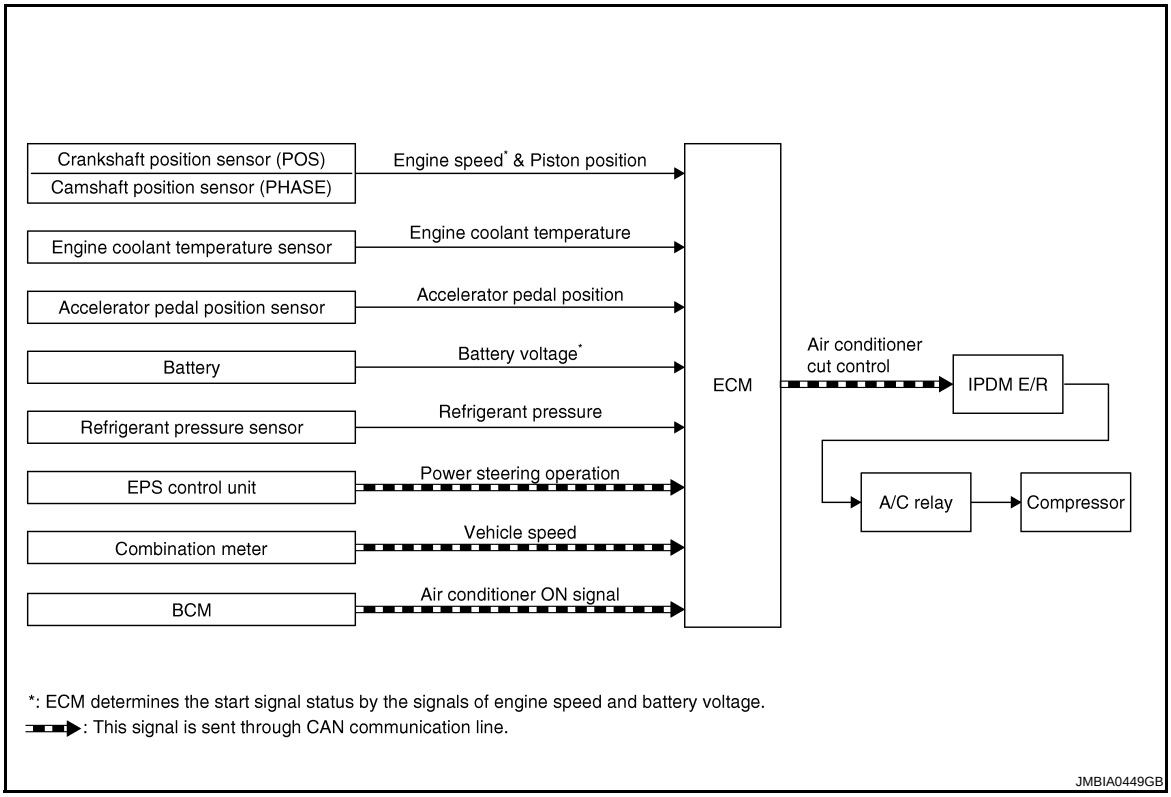
Component	Reference
Accelerator pedal position sensor	ECQ-275, "Description"
Camshaft position sensor (PHASE)	ECQ-210, "Description"
Crankshaft position sensor (POS)	ECQ-206, "Description"
Engine coolant temperature sensor	ECQ-134, "Description"
Ignition signal	ECQ-241, "Description"
Knock sensor	ECQ-204, "Description"
Mass air flow sensor	ECQ-121, "Description"
Park/neutral position switch	ECQ-258, "Description"

Component	Reference
Throttle position sensor	ECQ-137, "Description"
Vehicle speed sensor	ECQ-222, "Description"

AIR CONDITIONING CUT CONTROL

System Diagram

INFOID:0000000001309644



System Description

INFOID:0000000001309645

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
BCM*1	Air conditioner ON signal	Air conditioner cut control	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		
Battery	Battery voltage*2		
Refrigerant pressure sensor	Refrigerant pressure		
EPS control unit*1	Power steering operation		
Combination meter*1	Vehicle speed		

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

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

SYSTEM DESCRIPTION

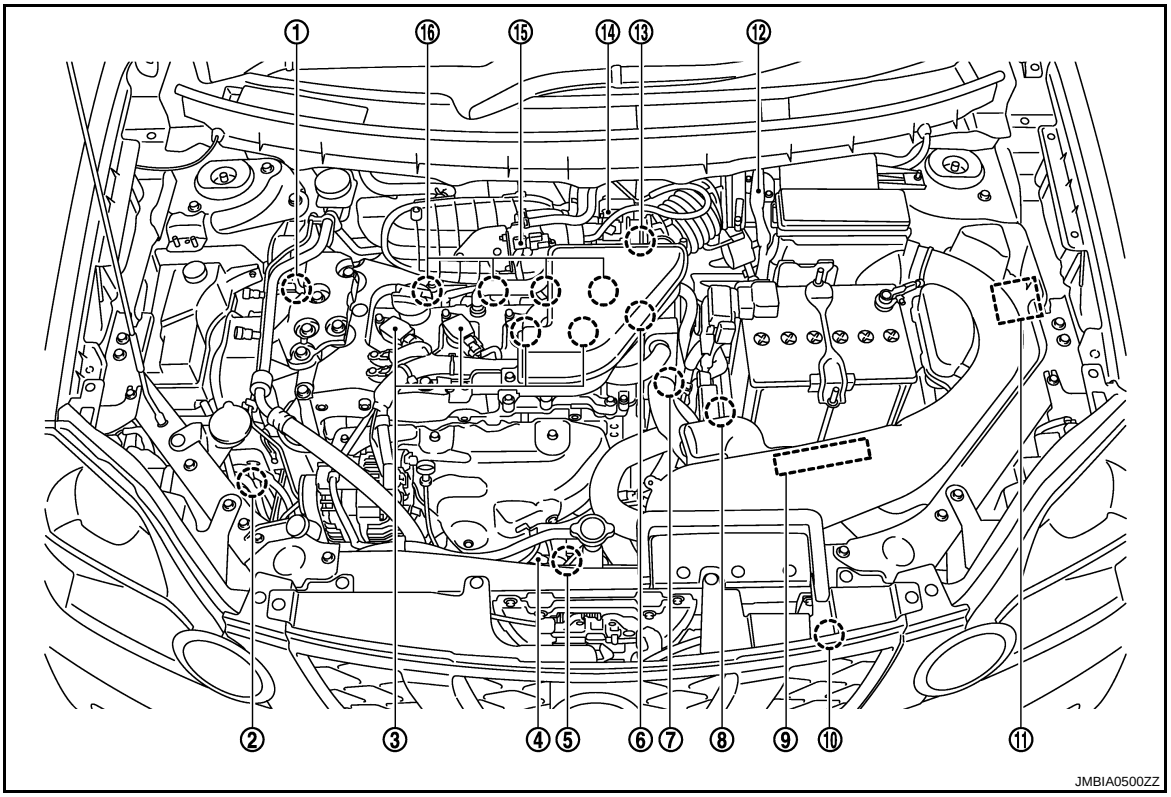
This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

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

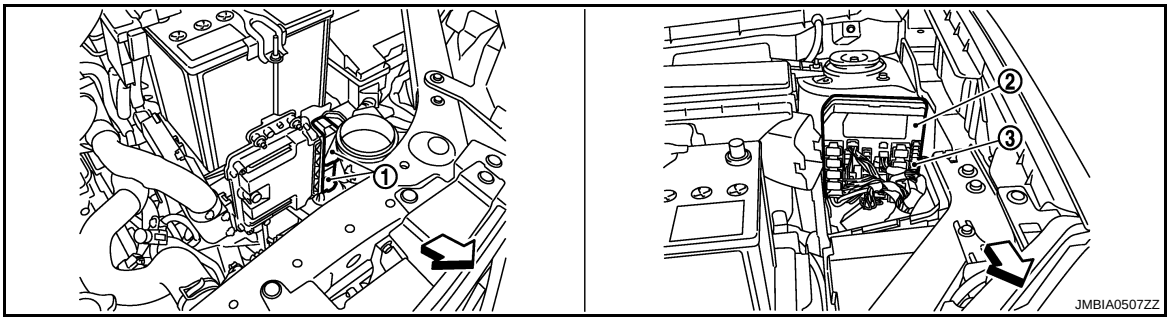
• When refrigerant pressure is excessively low or high.

Component Parts Location

INFOID:0000000001340256

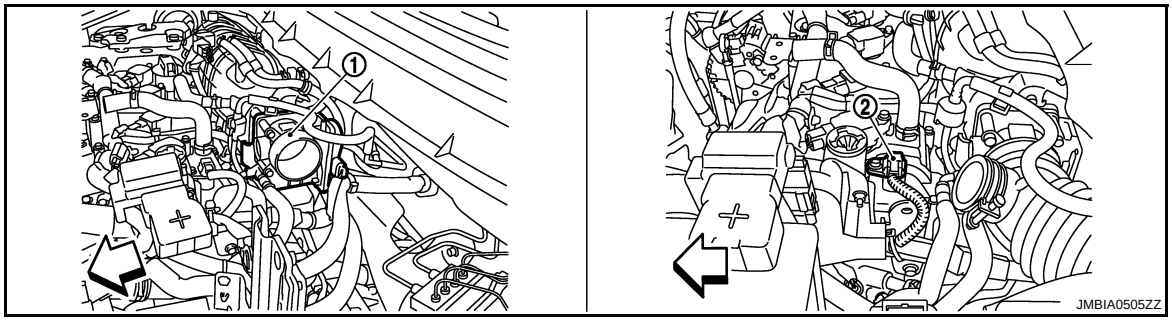


1. Intake valve timing control solenoid valve
2. EVAP canister
3. Ignition coil (with power transistor)
4. Air fuel ratio (A/F) sensor 1
5. Heated oxygen sensor 2
6. Camshaft position sensor (PHASE)
7. Engine coolant temperature sensor
8. Park/neutral position (PNP) switch
9. ECM
10. Refrigerant pressure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



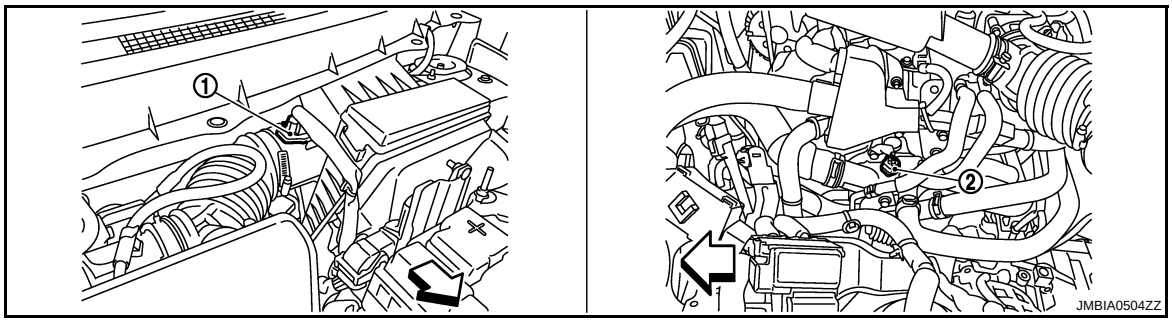
1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

⇦ : Vehicle front



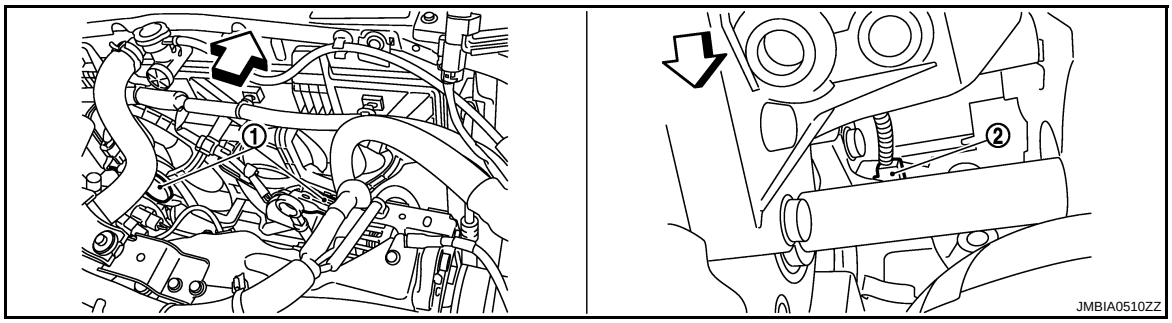
1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Camshaft position sensor (PHASE)

⇦ : Vehicle front



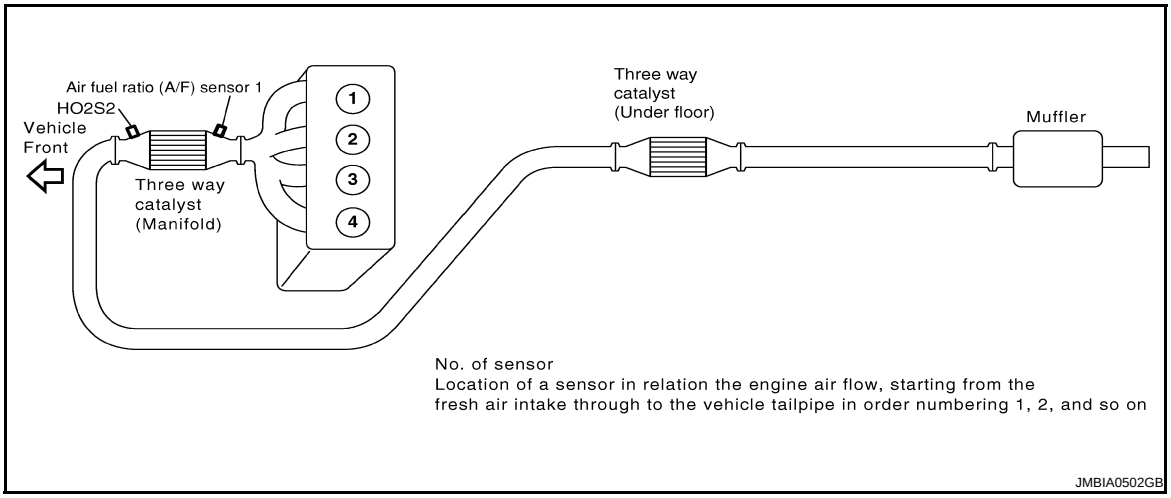
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

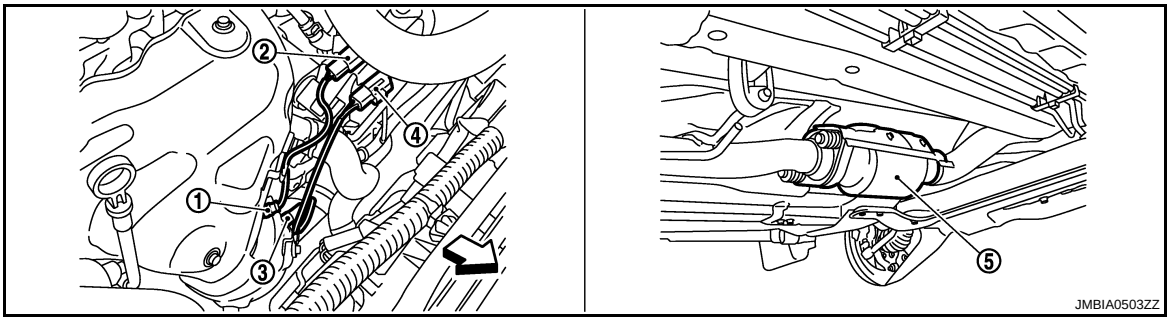
⇦ : Vehicle front



1. Cooling fan motor
2. Crankshaft position sensor (POS)

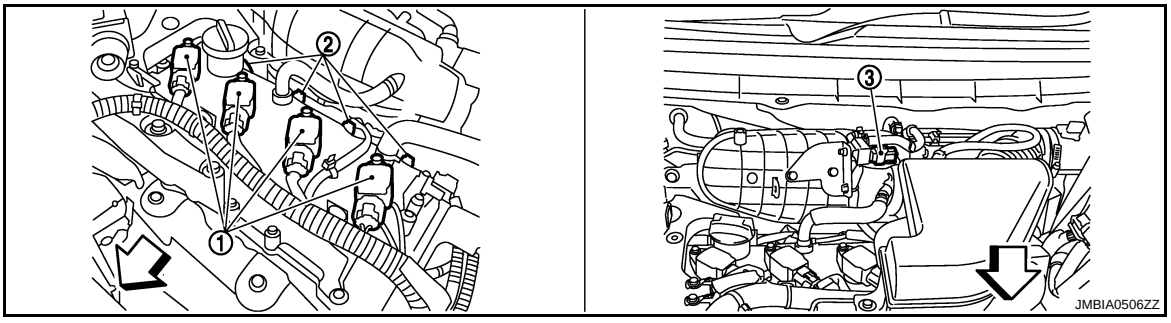
⇦ : Vehicle front





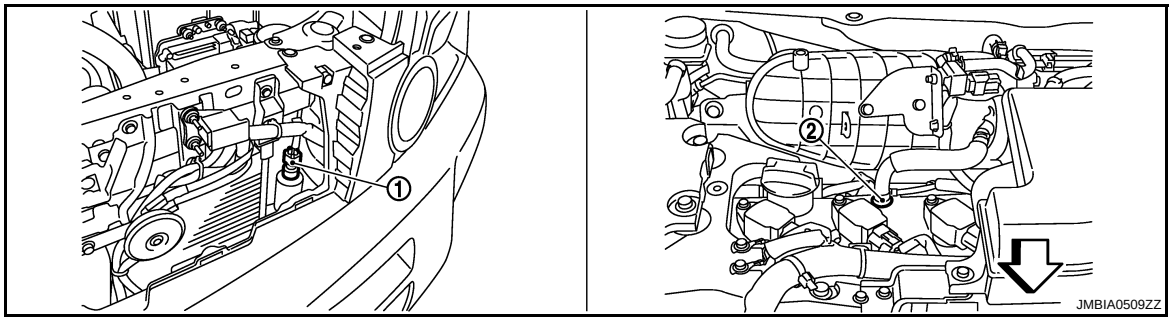
1. Air fuel ratio (A/F) sensor 1
2. Air fuel ratio (A/F) sensor 1 harness connector
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector
5. Three way catalyst (Under floor)

⇦ : Vehicle front



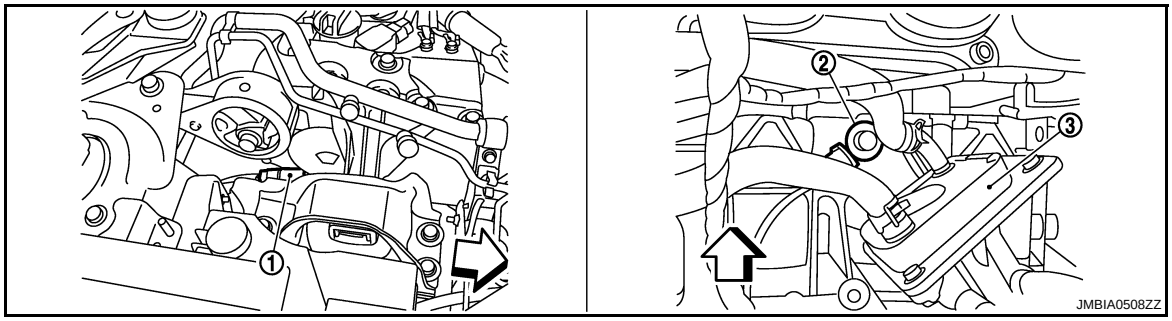
1. Ignition coil (with power transistor) and spark plug
2. Fuel injection
3. EVAP canister purge volume control solenoid valve

⇦ : Vehicle front



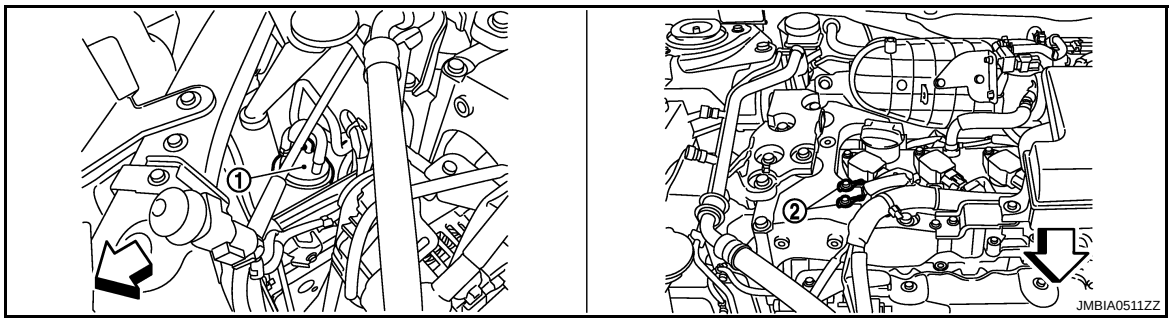
1. Refrigerant pressure sensor 2. PCV valve

⇦ : Vehicle front



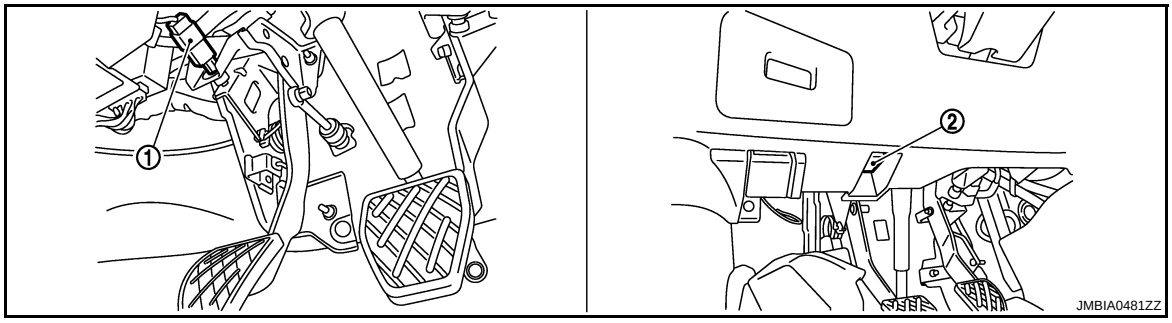
1. Intake valve timing control solenoid valve 2. Knock sensor 3. Engine oil cooler

⇦ : Vehicle front

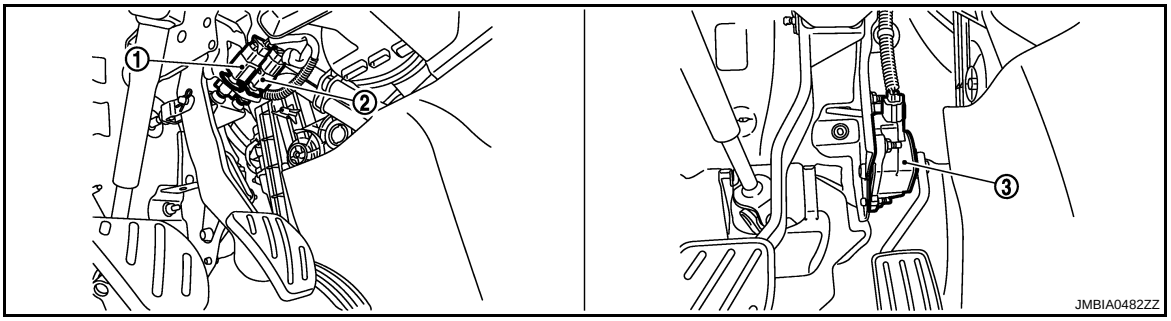


1. EVAP canister 2. Ground

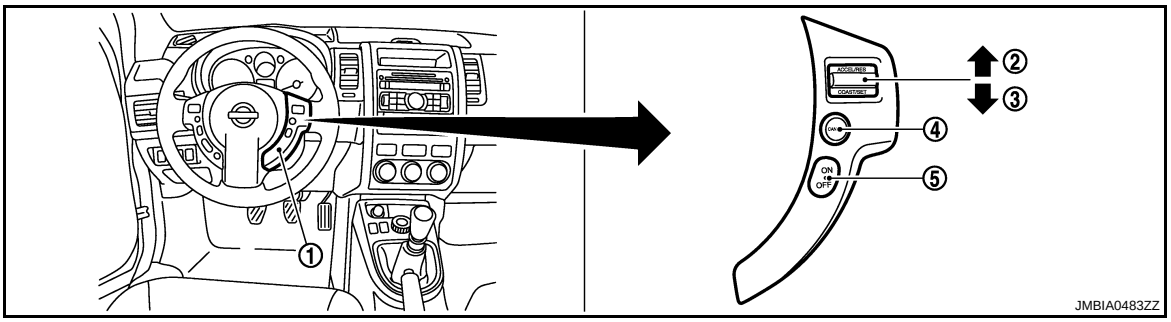
⇦ : Vehicle front



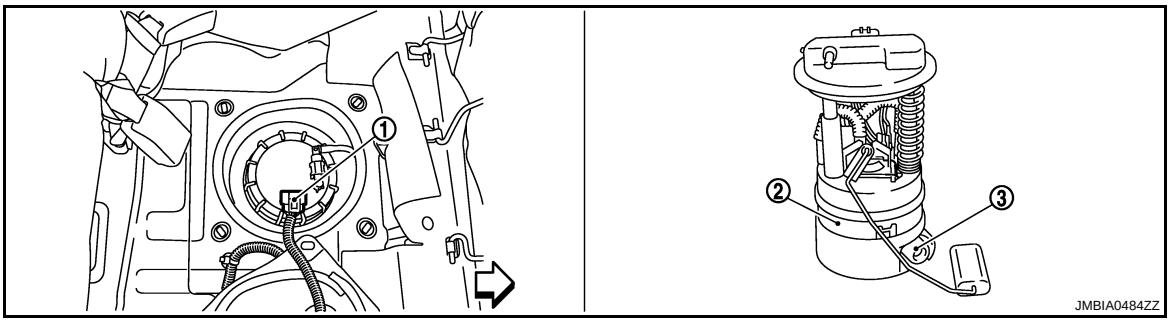
1. ASCD clutch switch 2. Data link connector



1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH



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

⇦ : Vehicle front

Component Description

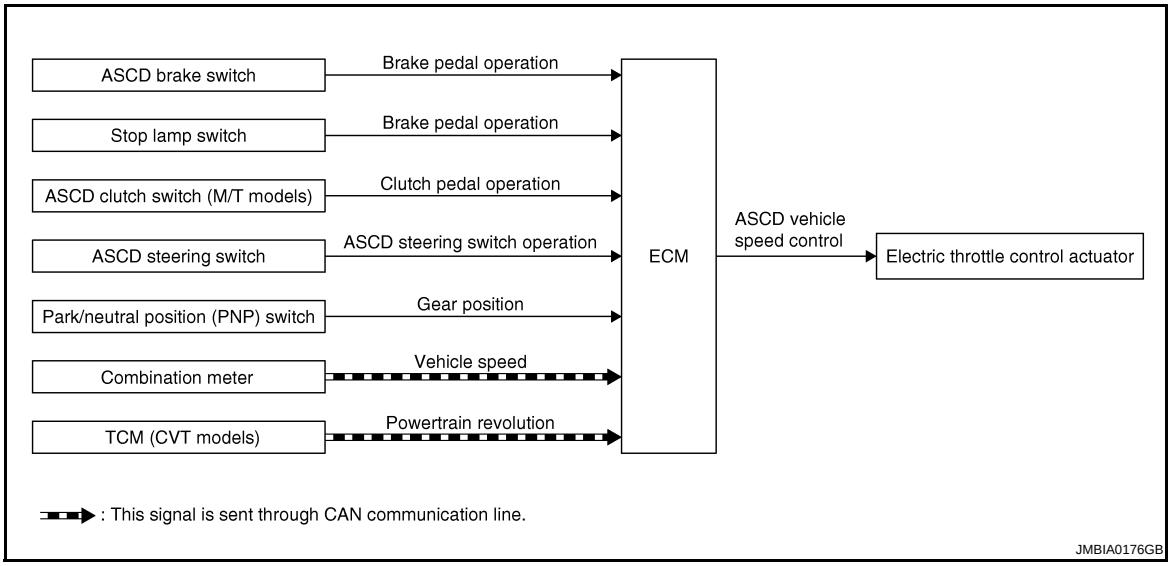
INFOID:0000000001309647

Component	Reference
Accelerator pedal position sensor	ECQ-275, "Description"
Camshaft position sensor (PHASE)	ECQ-210, "Description"
Crankshaft position sensor (POS)	ECQ-206, "Description"
Engine coolant temperature sensor	ECQ-134, "Description"
Refrigerant pressure sensor	ECQ-312, "Description"
Vehicle speed sensor	ECQ-222, "Description"

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram

INFOID:0000000001309648



System Description

INFOID:0000000001309649

INPUT/OUTPUT SIGNAL CHART

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

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

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and M/T models:171 km/h (106 MPH),CVT models:166 km/h (103 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 ASCD system, it automatically deactivates control.
NOTE:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (The CRUISE lamp in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and M/T models:171 km/h (106 MPH),CVT models:166 km/h (103 MPH). press SET/COAST switch. (Then SET lamp in combination meter illuminates.)

ACCELERATE OPERATION

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

CANCEL OPERATION

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

- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to neutral position. (M/T models)
- Selector lever is changed to N, P, R position (CVT models)
- Vehicle speed decreased to 12 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 during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

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

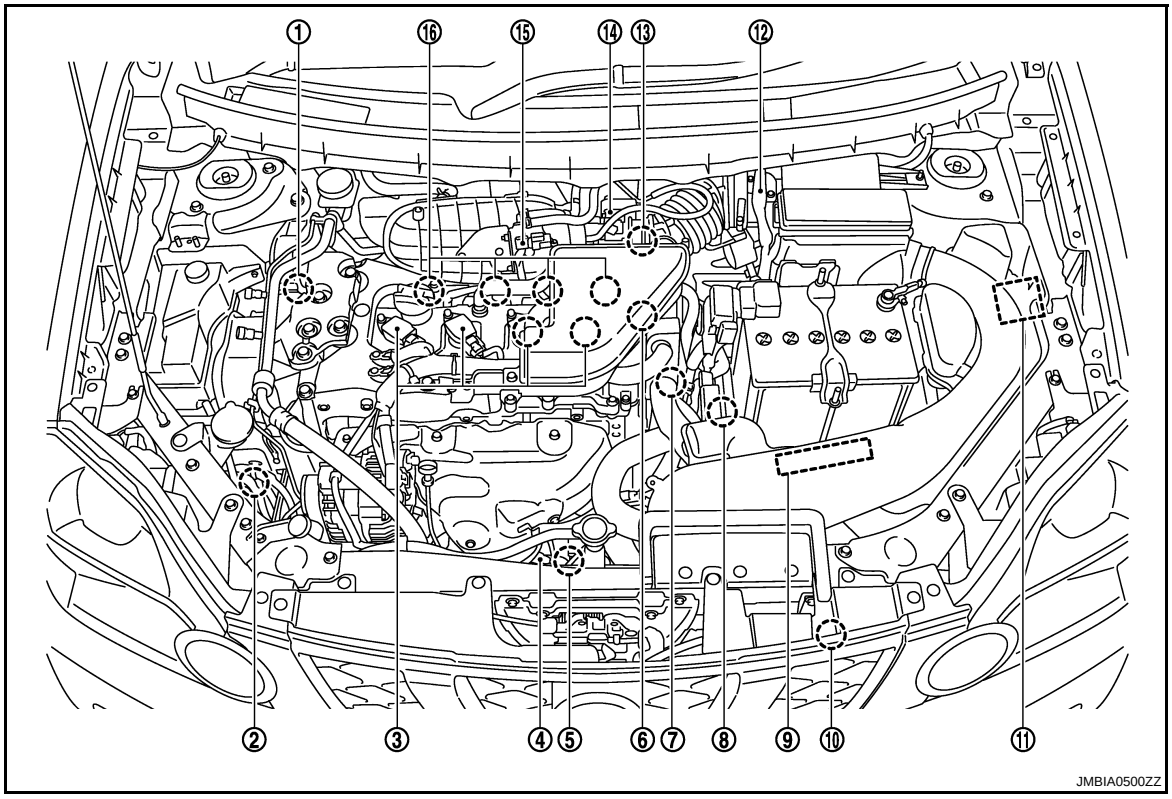
RESUME OPERATION

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

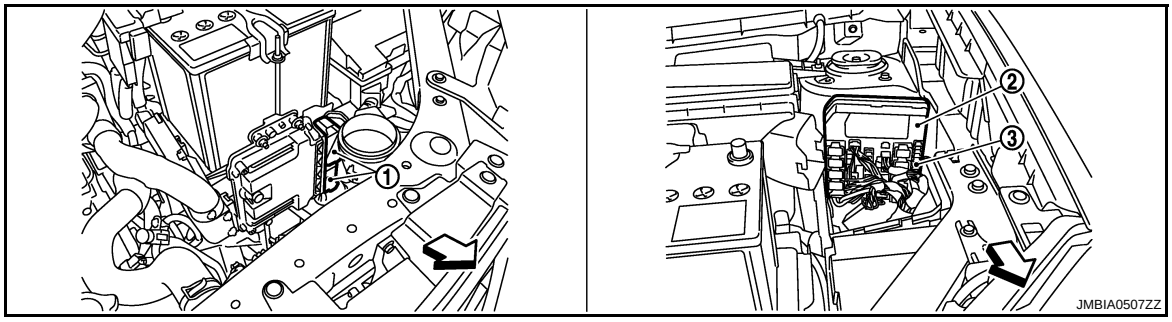
- Brake pedal is released
- Clutch pedal is released (M/T models)
- Selector lever is in other than P and N positions (CVT models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than M/T models:171 km/h (106 MPH),CVT models:166 km/h (103 MPH).

Component Parts Location

INFOID:0000000001340257

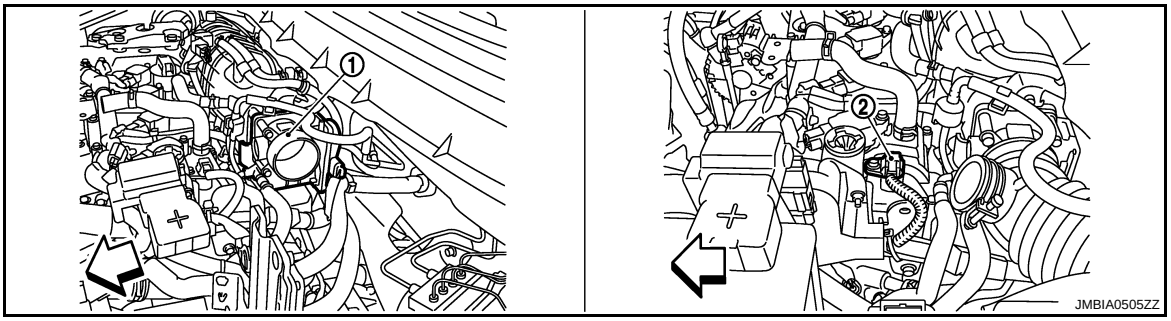


1. Intake valve timing control solenoid valve
2. EVAP canister
3. Ignition coil (with power transistor)
4. Air fuel ratio (A/F) sensor 1
5. Heated oxygen sensor 2
6. Camshaft position sensor (PHASE)
7. Engine coolant temperature sensor
8. Park/neutral position (PNP) switch
9. ECM
10. Refrigerant pressure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



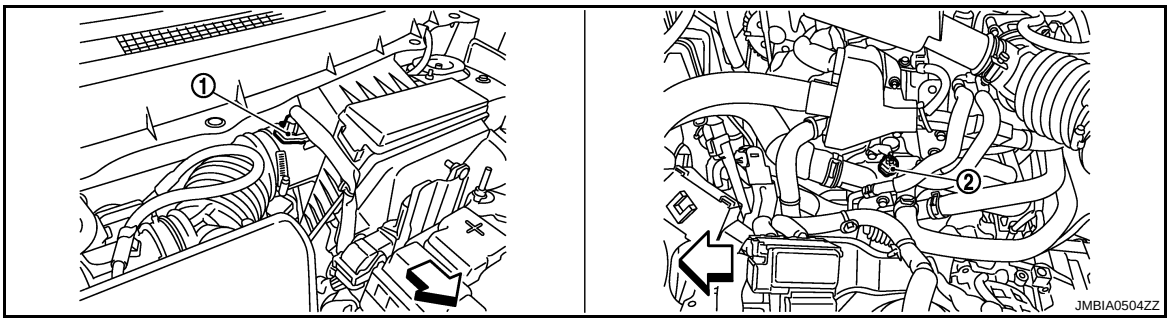
1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

⇦ : Vehicle front



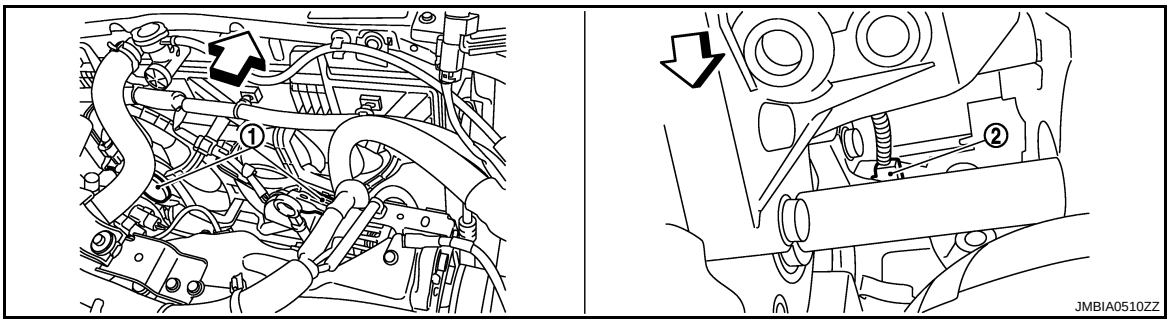
1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Camshaft position sensor (PHASE)

⇦ : Vehicle front



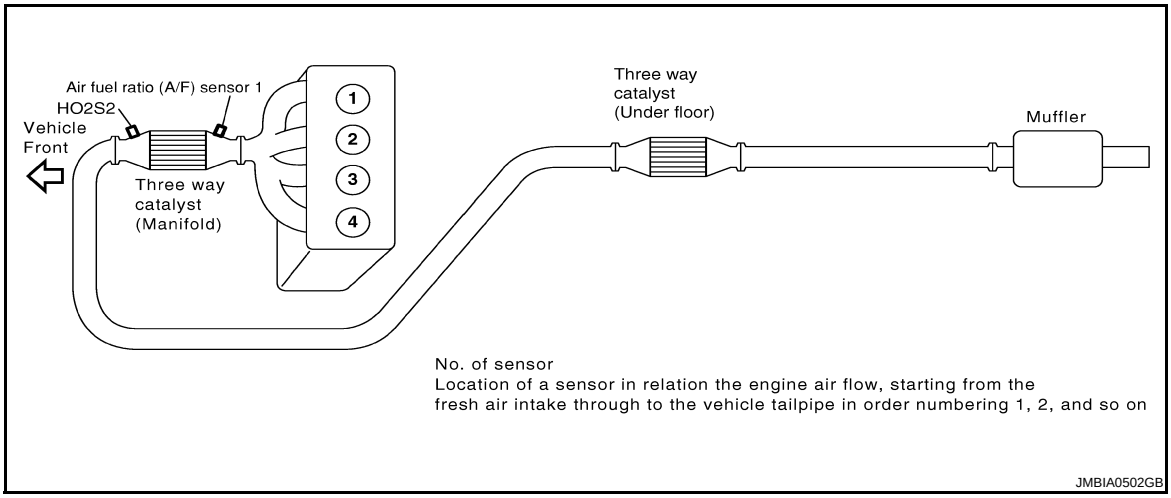
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

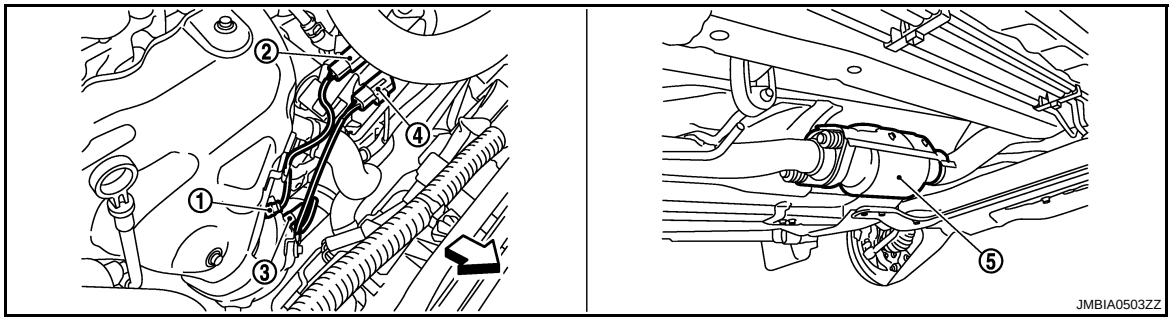
⇦ : Vehicle front



1. Cooling fan motor
2. Crankshaft position sensor (POS)

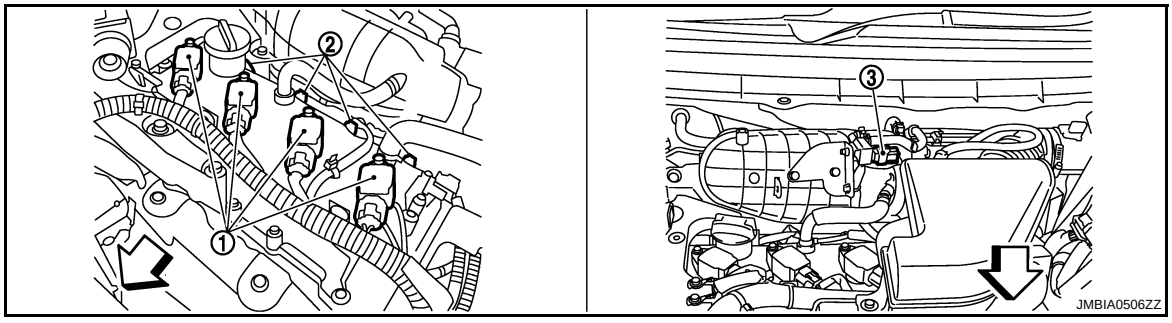
⇦ : Vehicle front





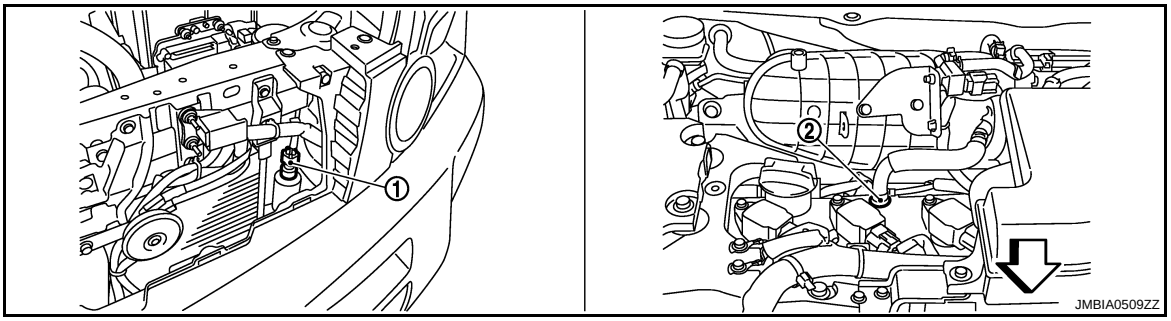
1. Air fuel ratio (A/F) sensor 1
2. Air fuel ratio (A/F) sensor 1 harness connector
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector
5. Three way catalyst (Under floor)

⇦ : Vehicle front



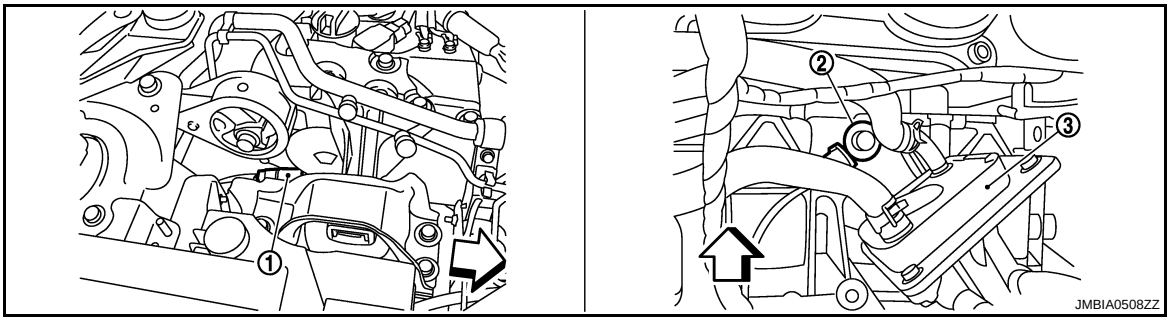
1. Ignition coil (with power transistor) and spark plug
2. Fuel injection
3. EVAP canister purge volume control solenoid valve

⇦ : Vehicle front



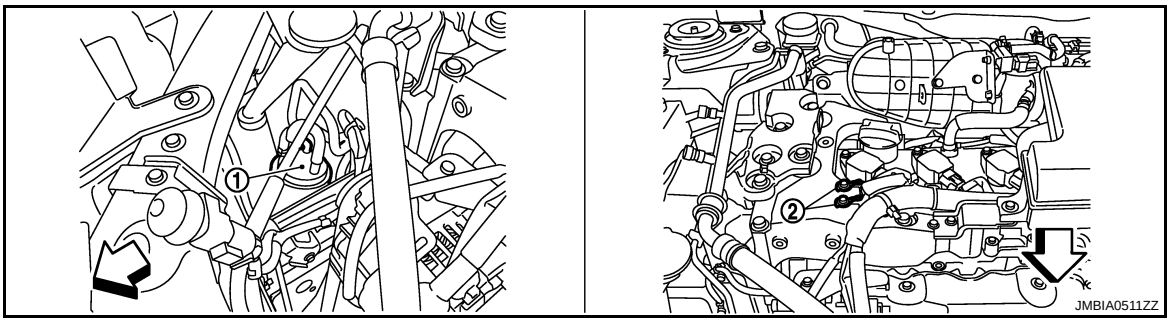
1. Refrigerant pressure sensor 2. PCV valve

⇦ : Vehicle front



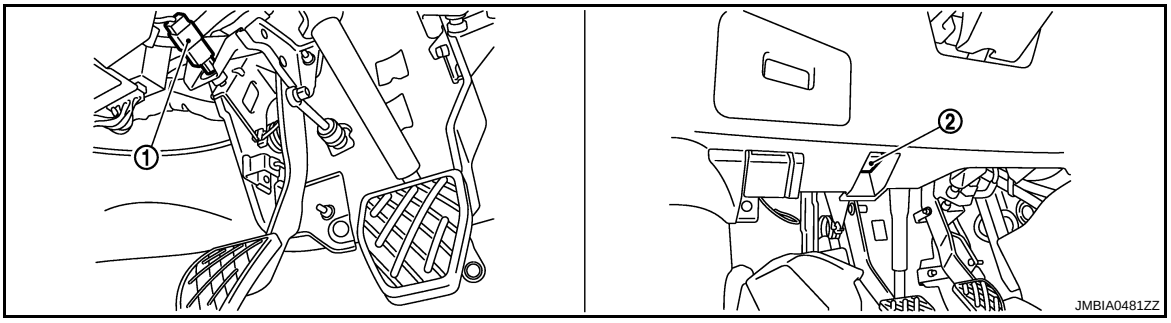
1. Intake valve timing control solenoid valve 2. Knock sensor 3. Engine oil cooler

⇦ : Vehicle front

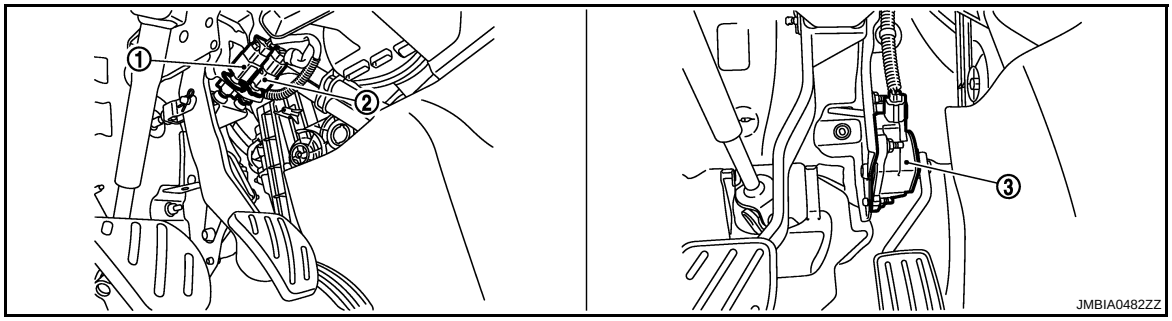


1. EVAP canister 2. Ground

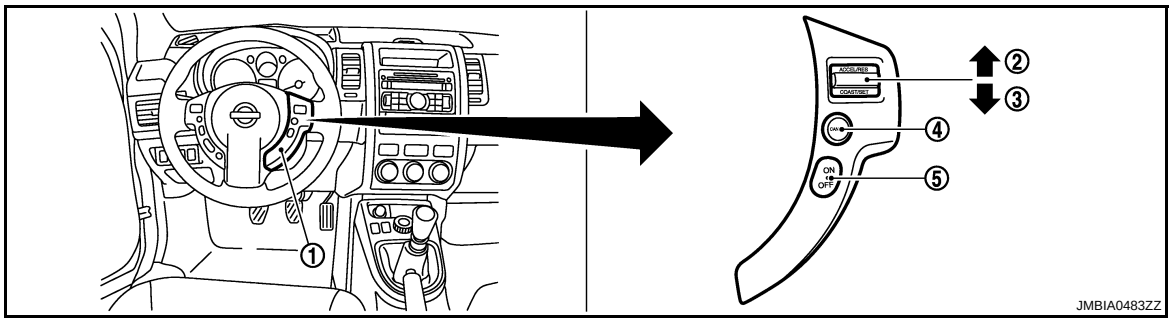
⇦ : Vehicle front



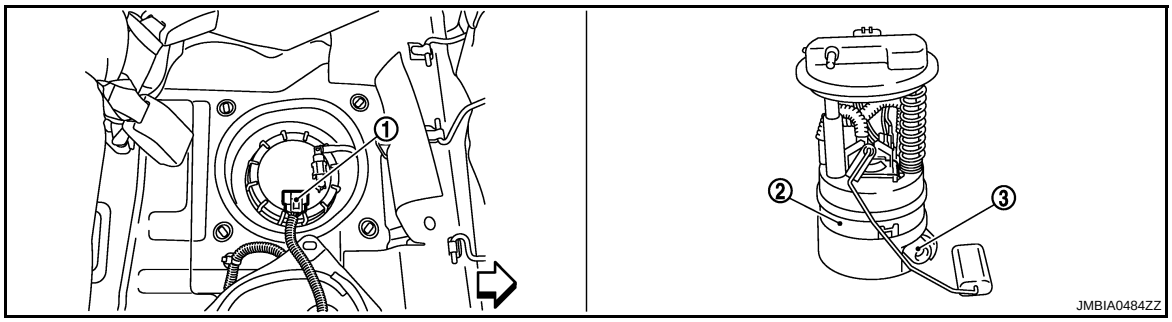
1. ASCD clutch switch 2. Data link connector



1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH



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

⇦ : Vehicle front

Component Description

INFOID:0000000001309651

Component	Reference
ASCD steering switch	ECQ-246, "Description"
ASCD clutch switch	ECQ-249, "Description"
ASCD brake switch	ECQ-249, "Description"
Stop lamp switch	ECQ-263, "Description"
Electric throttle control actuator	ECQ-273, "Description"
ASCD indicator	ECQ-299, "Description"

CAN COMMUNICATION

System Description

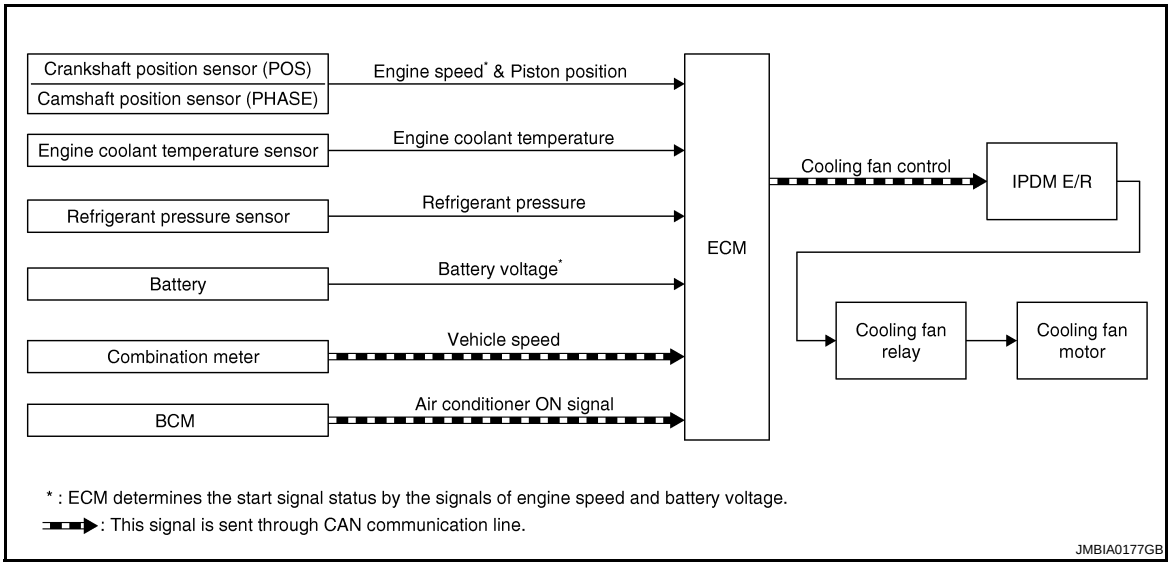
INFOID:0000000001309652

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

COOLING FAN CONTROL

System Diagram

INFOID:0000000001309653



System Description

INFOID:0000000001309654

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		
Combination meter	Vehicle speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
BCM	Air conditioner ON signal*2		
Refrigerant pressure sensor	Refrigerant pressure		

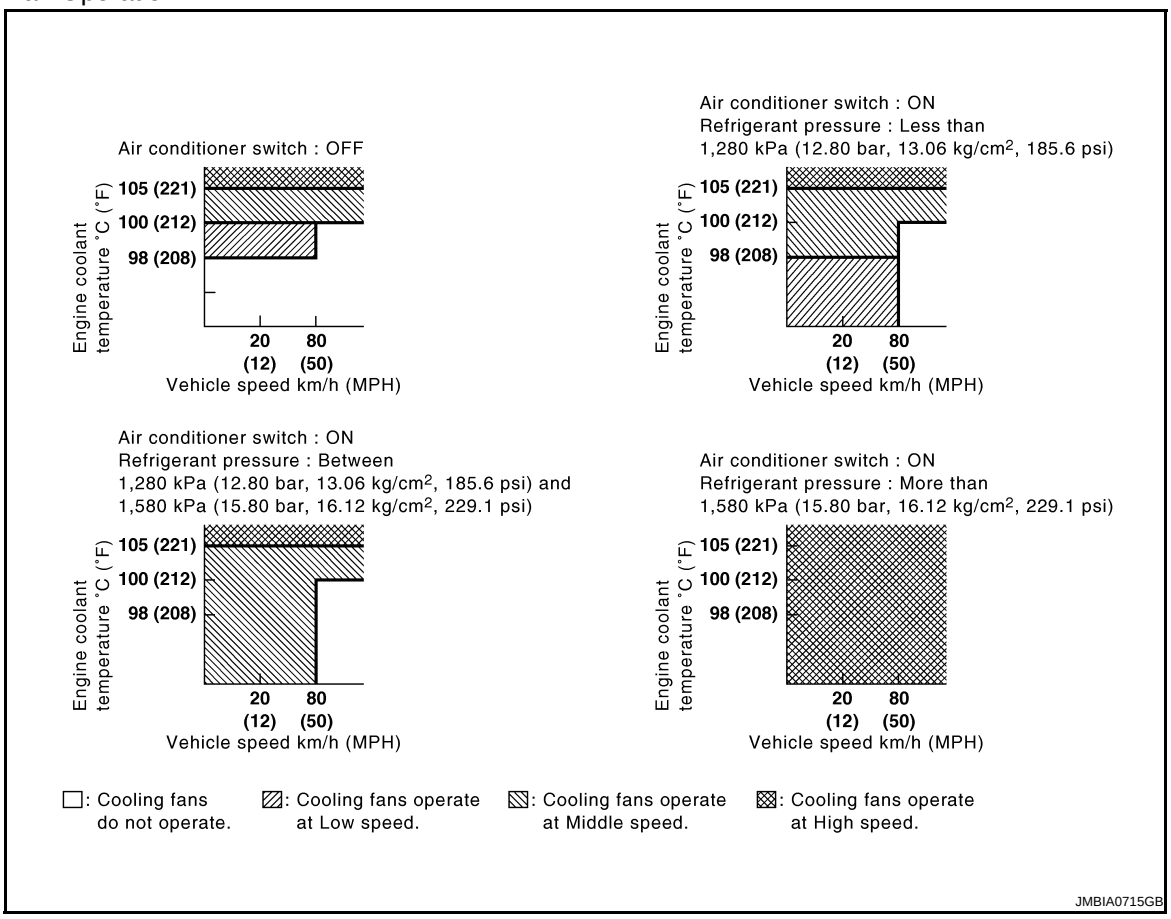
*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

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

SYSTEM DESCRIPTION

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pressure, air conditioner ON signal. Then control system has 4-step control [HIGH/MID/LOW/OFF].

Cooling Fan Operation



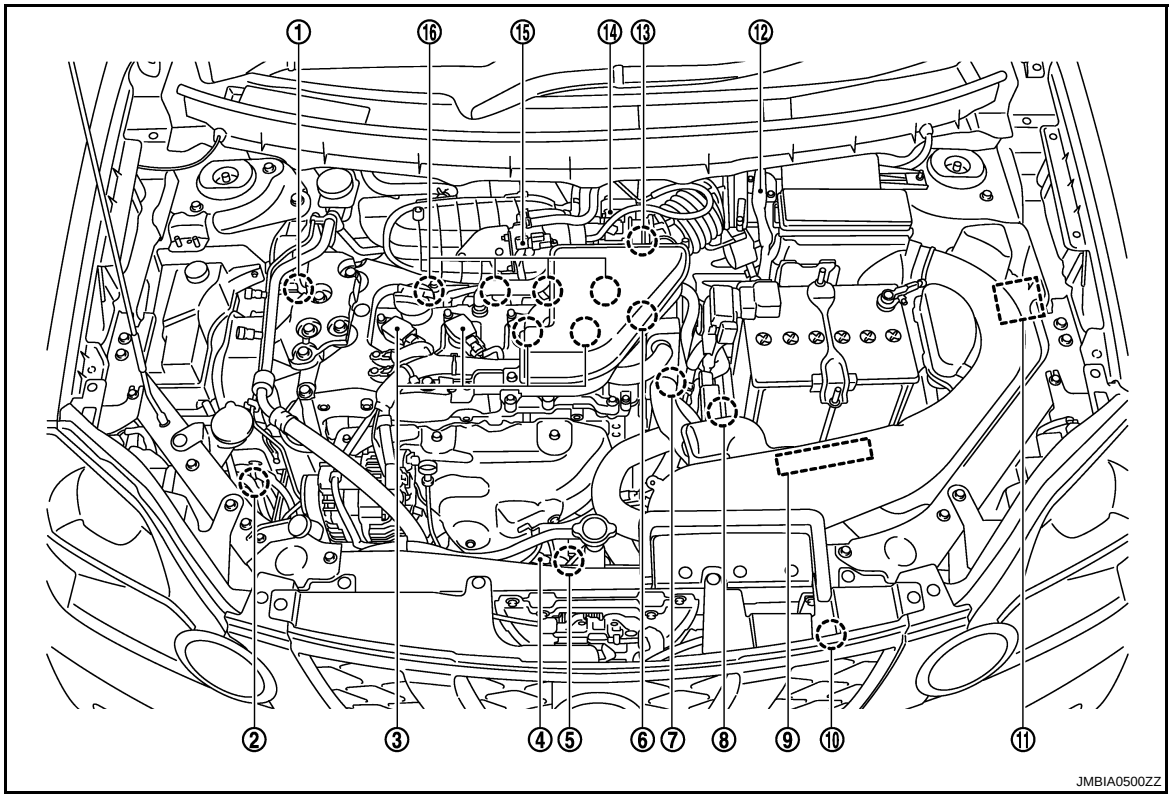
Cooling Fan Relay Operation

The ECM controls cooling fan relays through CAN communication line.

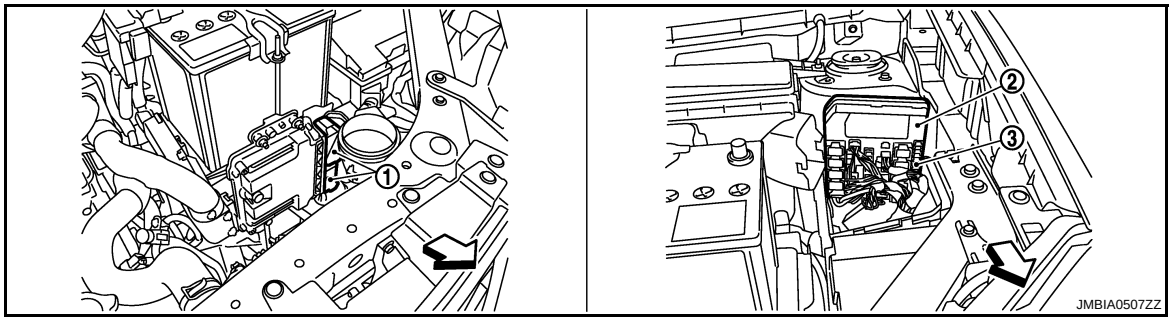
Cooling fan speed	Cooling fan relay				
	1	2	3	4	5
Stop (OFF)	OFF	OFF	OFF	OFF	OFF
Low (LOW)	OFF	OFF	OFF	ON	OFF
Middle (MID)	ON	OFF	OFF	OFF	ON
High (HI)	ON	ON	ON	OFF	ON

Component Parts Location

INFOID:0000000001340258

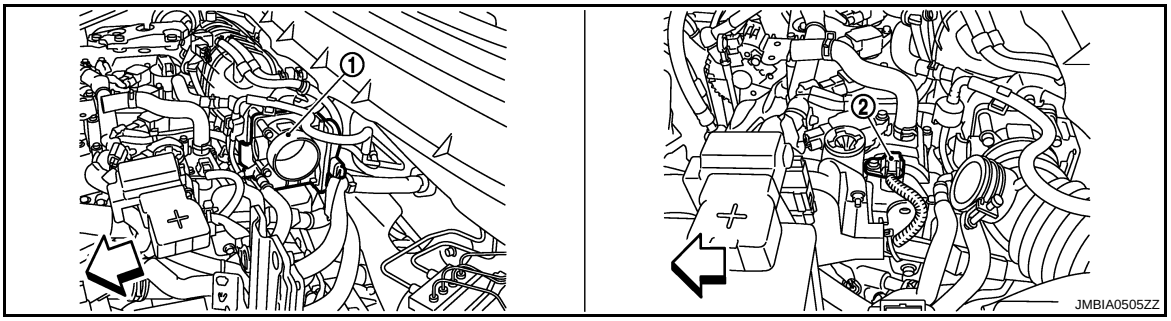


1. Intake valve timing control solenoid valve
2. EVAP canister
3. Ignition coil (with power transistor)
4. Air fuel ratio (A/F) sensor 1
5. Heated oxygen sensor 2
6. Camshaft position sensor (PHASE)
7. Engine coolant temperature sensor
8. Park/neutral position (PNP) switch
9. ECM
10. Refrigerant pressure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



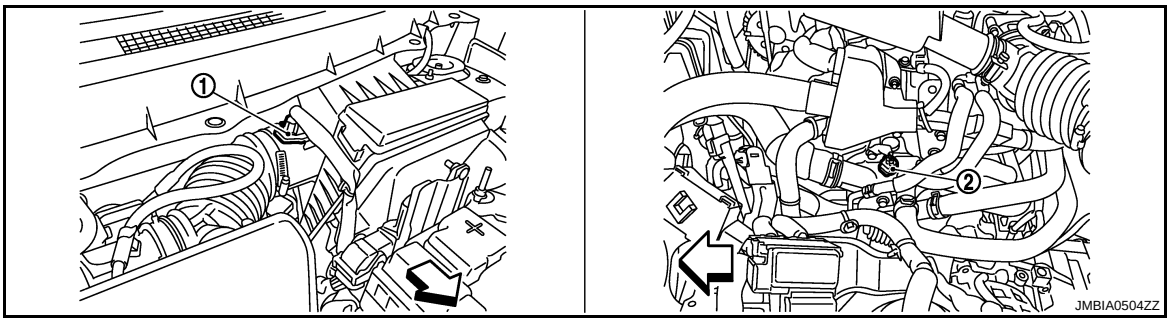
1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

⇦ : Vehicle front



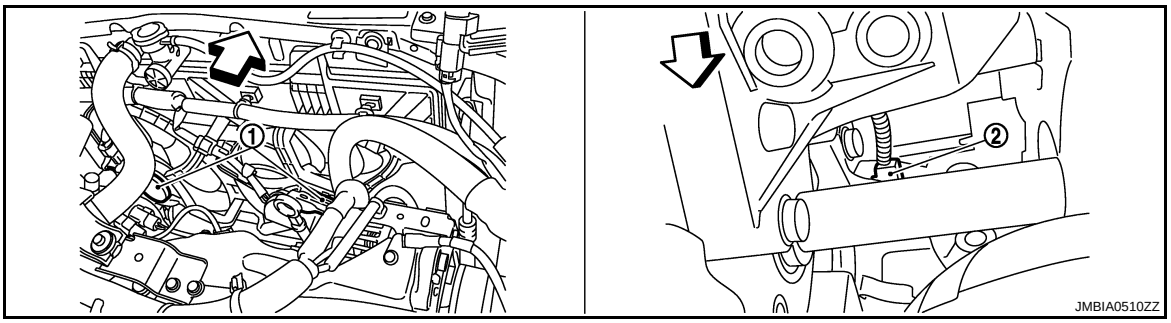
1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Camshaft position sensor (PHASE)

⇦ : Vehicle front



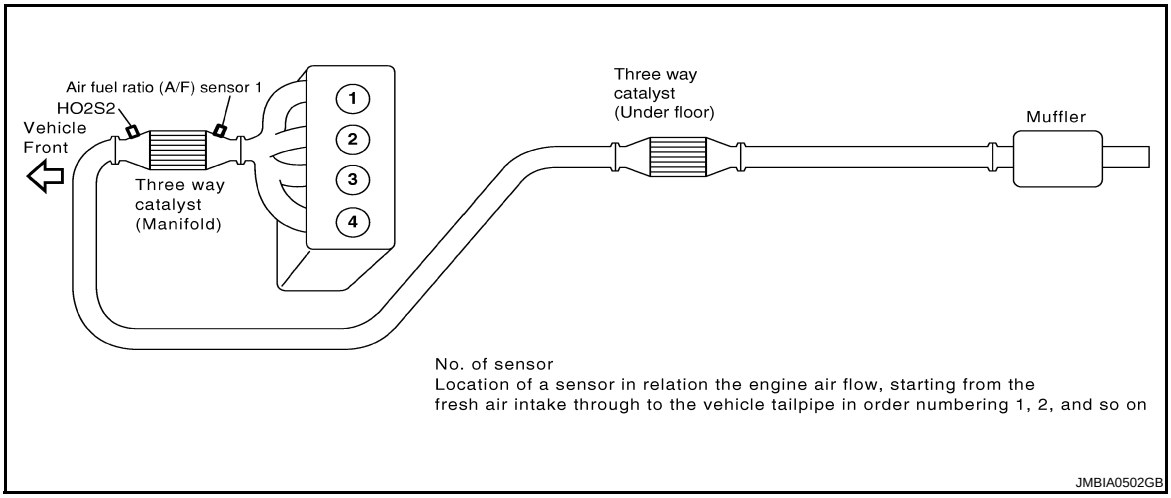
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

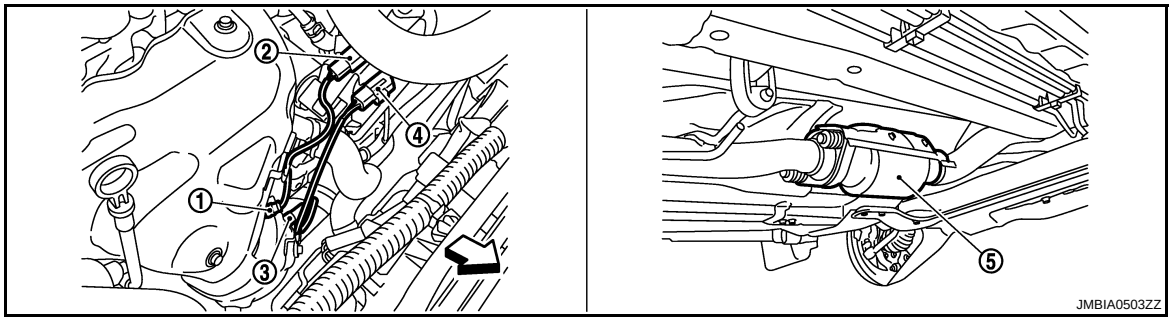
⇦ : Vehicle front



1. Cooling fan motor
2. Crankshaft position sensor (POS)

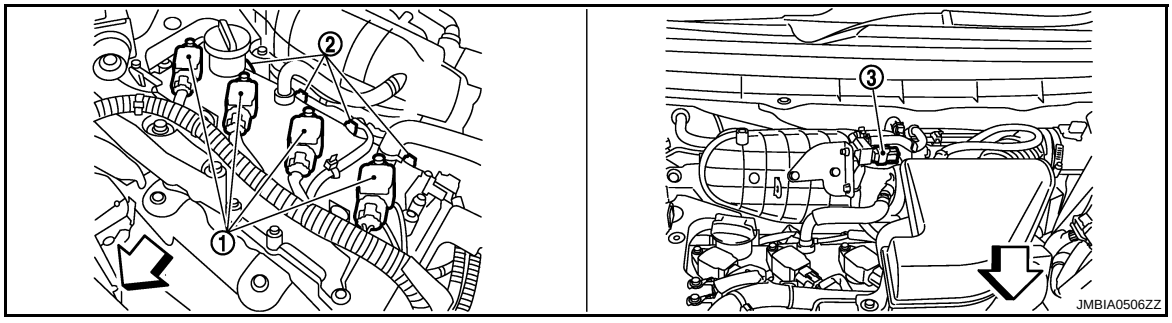
⇦ : Vehicle front





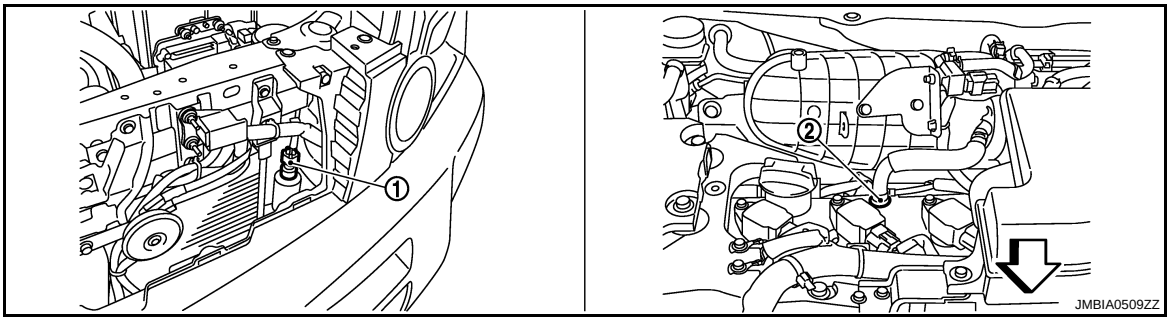
1. Air fuel ratio (A/F) sensor 1
2. Air fuel ratio (A/F) sensor 1 harness connector
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector
5. Three way catalyst (Under floor)

⇦ : Vehicle front



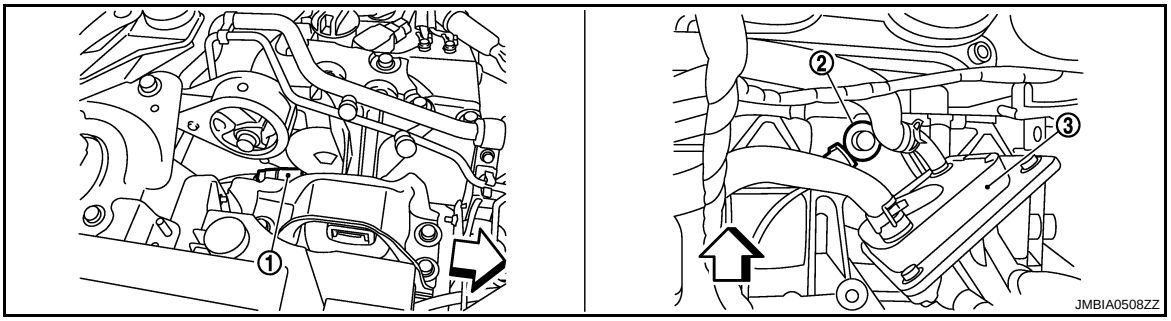
1. Ignition coil (with power transistor) and spark plug
2. Fuel injection
3. EVAP canister purge volume control solenoid valve

⇦ : Vehicle front



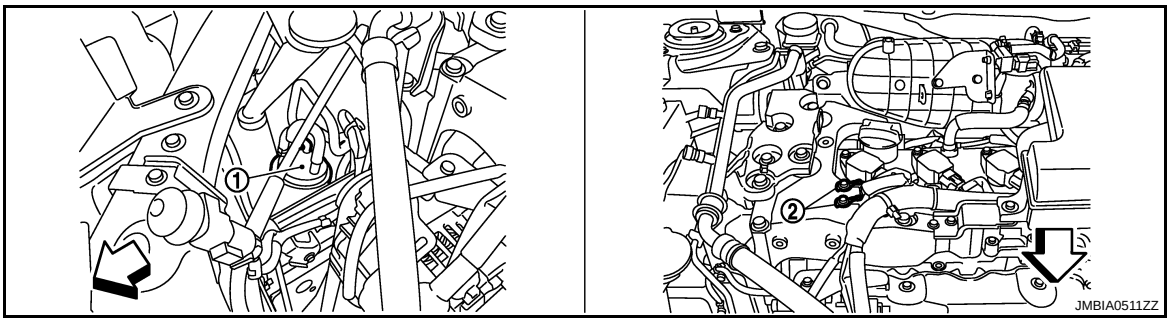
1. Refrigerant pressure sensor 2. PCV valve

⇦ : Vehicle front



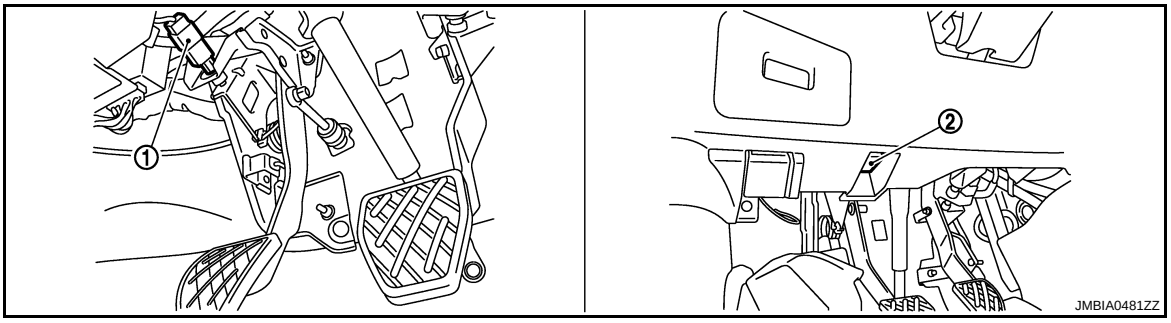
1. Intake valve timing control solenoid valve 2. Knock sensor 3. Engine oil cooler

⇦ : Vehicle front

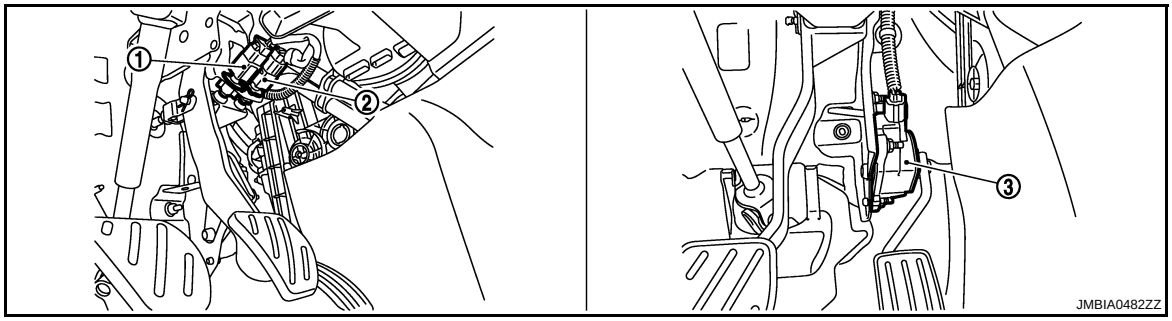


1. EVAP canister 2. Ground

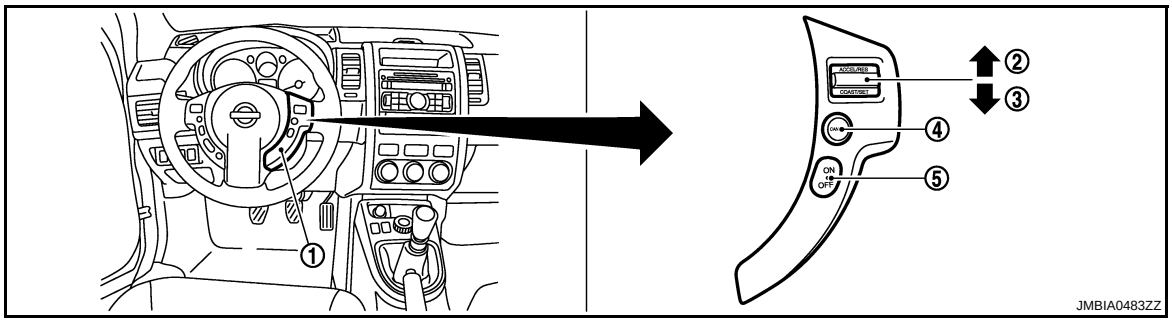
⇦ : Vehicle front



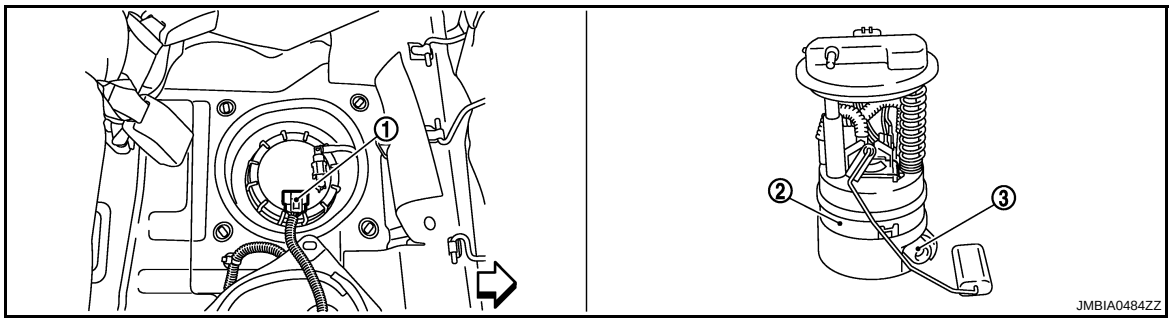
1. ASCD clutch switch 2. Data link connector



1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH



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

⇦ : Vehicle front

Component Description

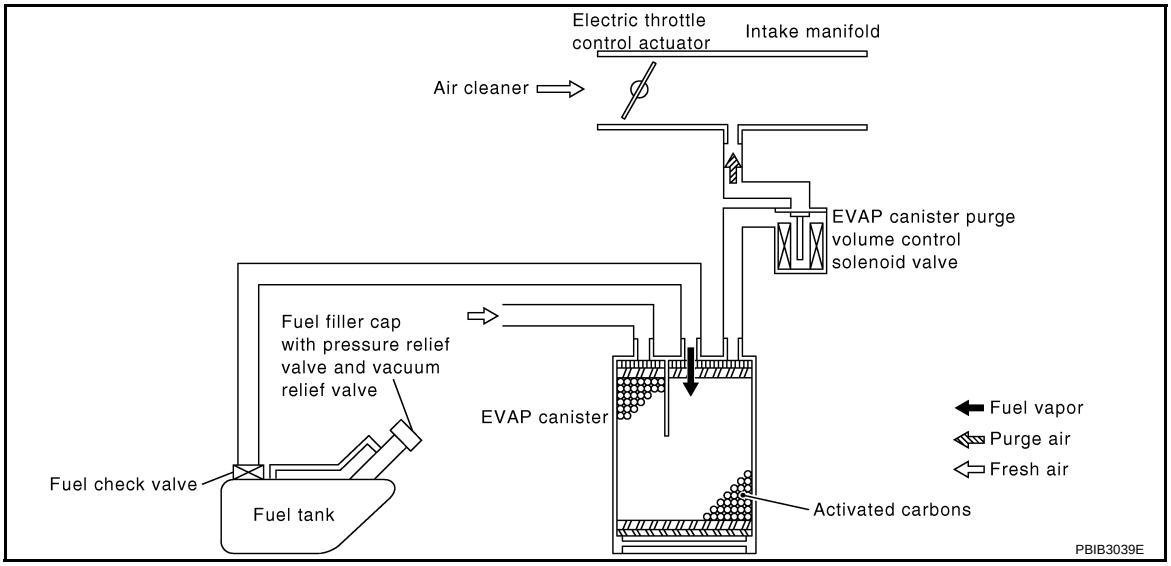
INFOID:0000000001309656

Component	Reference
Camshaft position sensor (PHASE)	ECQ-210, "Description"
Crankshaft position sensor (POS)	ECQ-206, "Description"
Cooling fan motor	ECQ-58, "System Description"
Engine coolant temperature sensor	ECQ-134, "Description"
Refrigerant pressure sensor	ECQ-312, "Description"

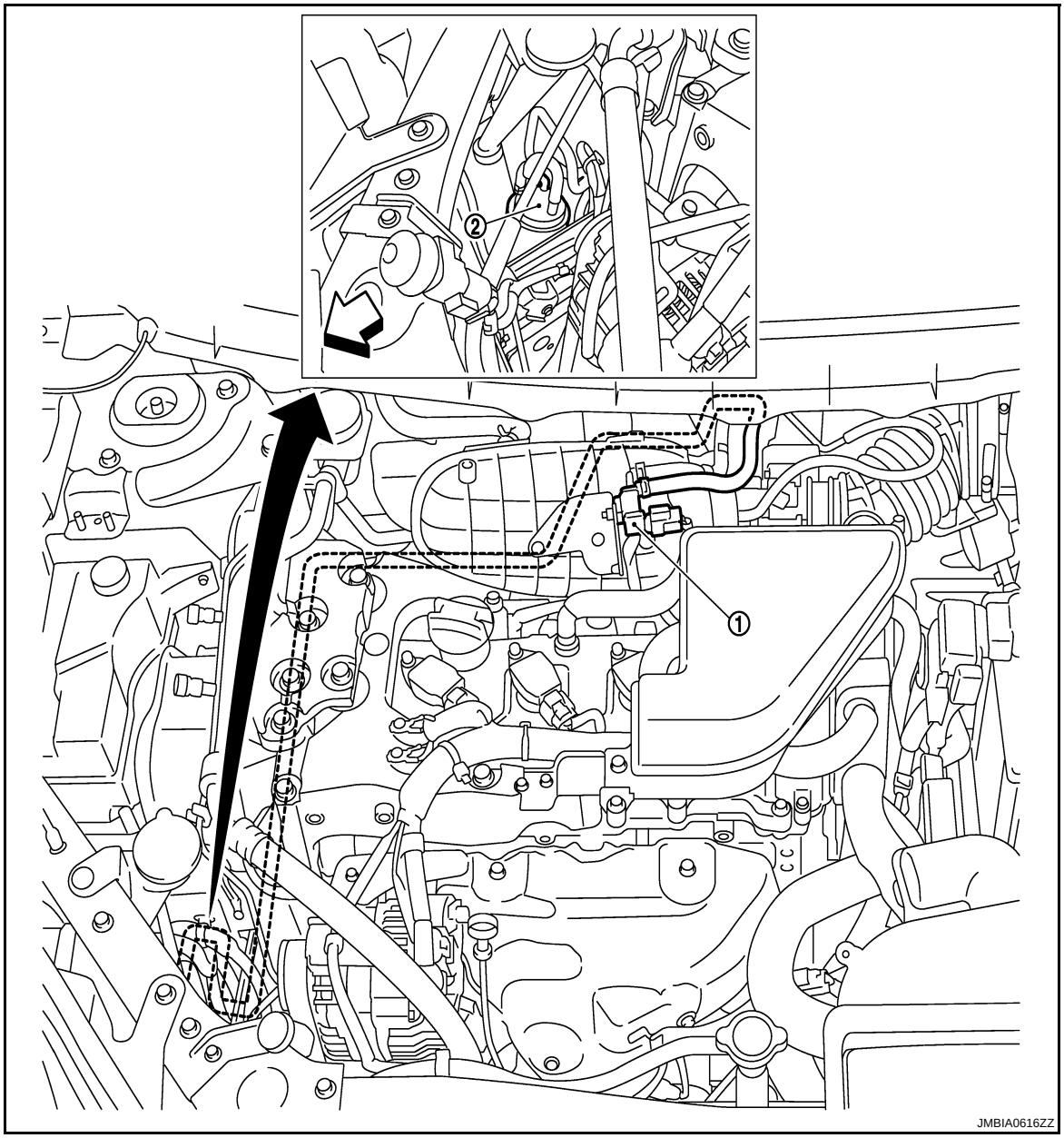
EVAPORATIVE EMISSION SYSTEM

System Diagram

INFOID:0000000001374860



EVAPORATIVE EMISSION LINE DRAWING



1. EVAP canister purge volume control solenoid valve
2. EVAP canister

⇦ : Vehicle front

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

System Description

INFOID:0000000001374861

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*1		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Combination meter*2	Vehicle speed		

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

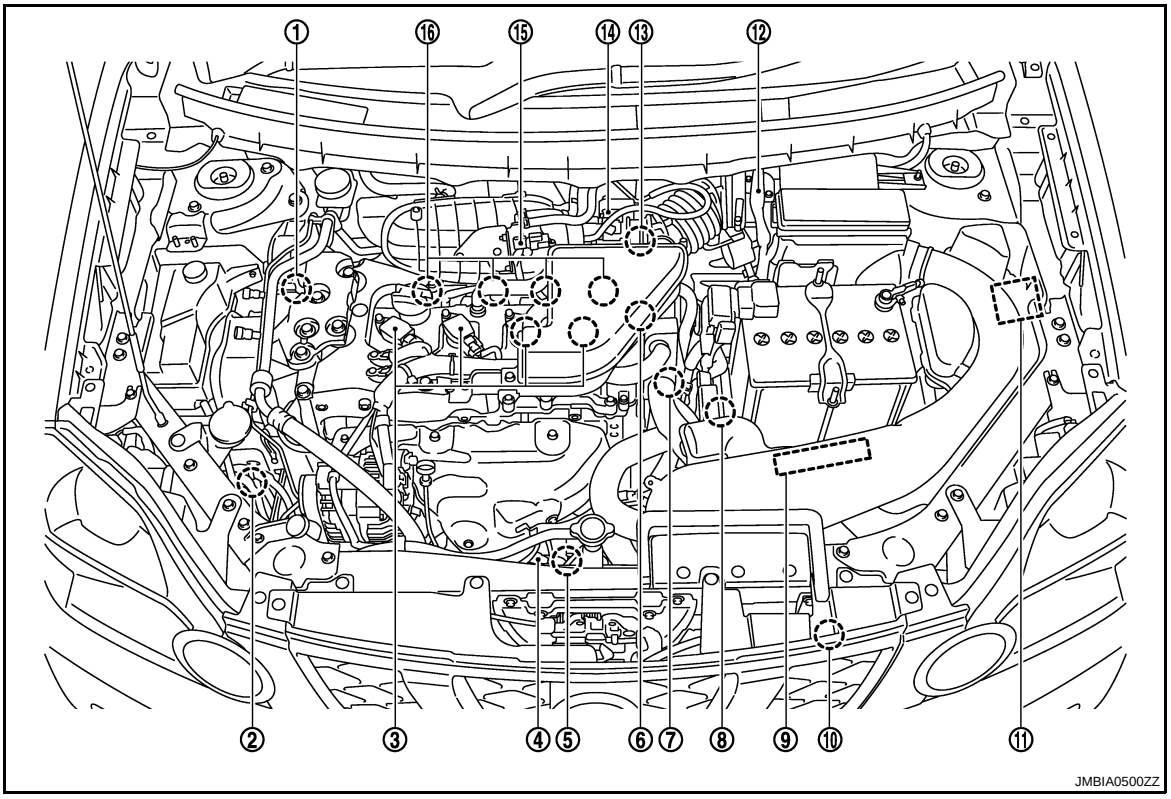
*2: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating.

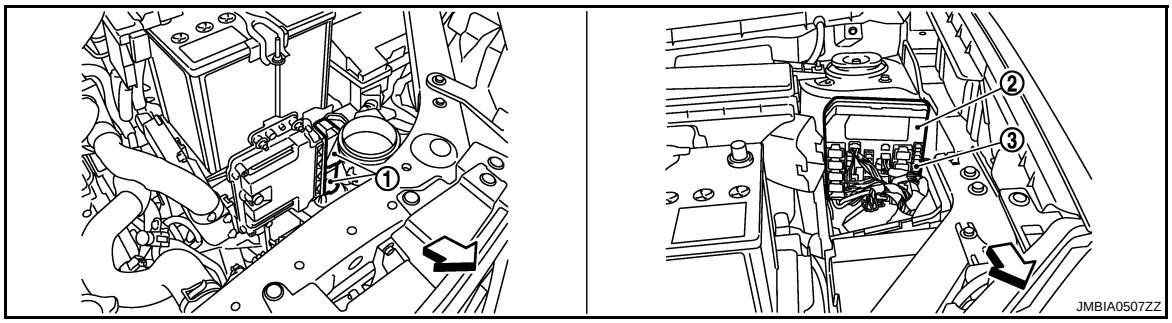
Component Parts Location

INFOID:0000000001374864



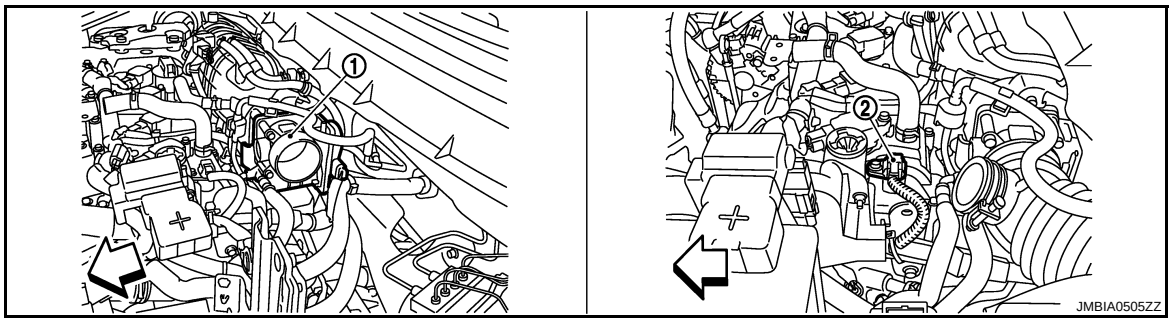
1. Intake valve timing control solenoid valve
2. EVAP canister
3. Ignition coil (with power transistor)
4. Air fuel ratio (A/F) sensor 1
5. Heated oxygen sensor 2
6. Camshaft position sensor (PHASE)

7. Engine coolant temperature sensor
8. Park/neutral position (PNP) switch
9. ECM
10. Refrigerant pressure sensor
11. IPDM E/R
12. Mass air flow sensor (with intake temperature sensor)
13. Crankshaft position sensor (POS)
14. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
15. EVAP canister purge volume control solenoid valve
16. Fuel injector



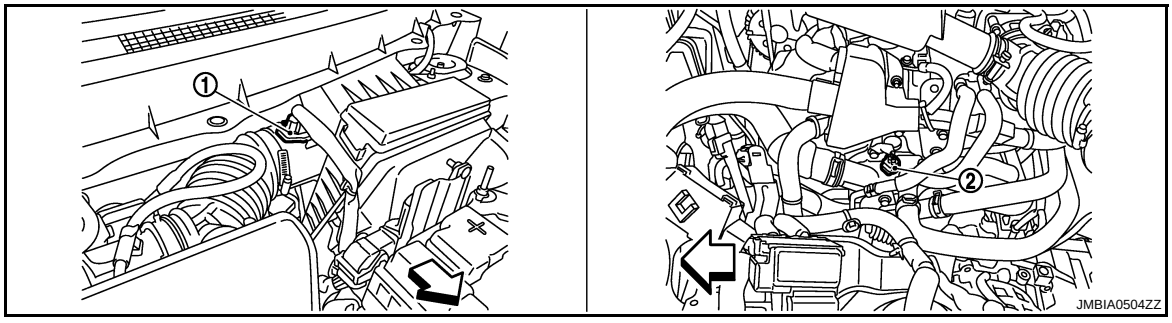
1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

⇦ : Vehicle front



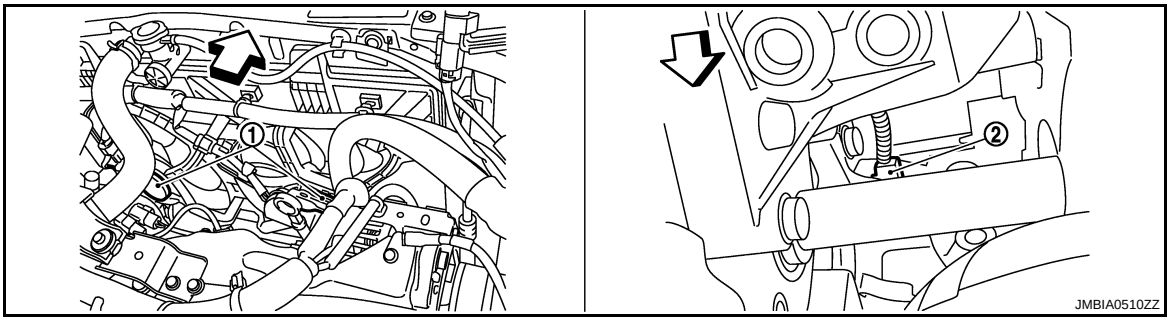
1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Camshaft position sensor (PHASE)

⇦ : Vehicle front



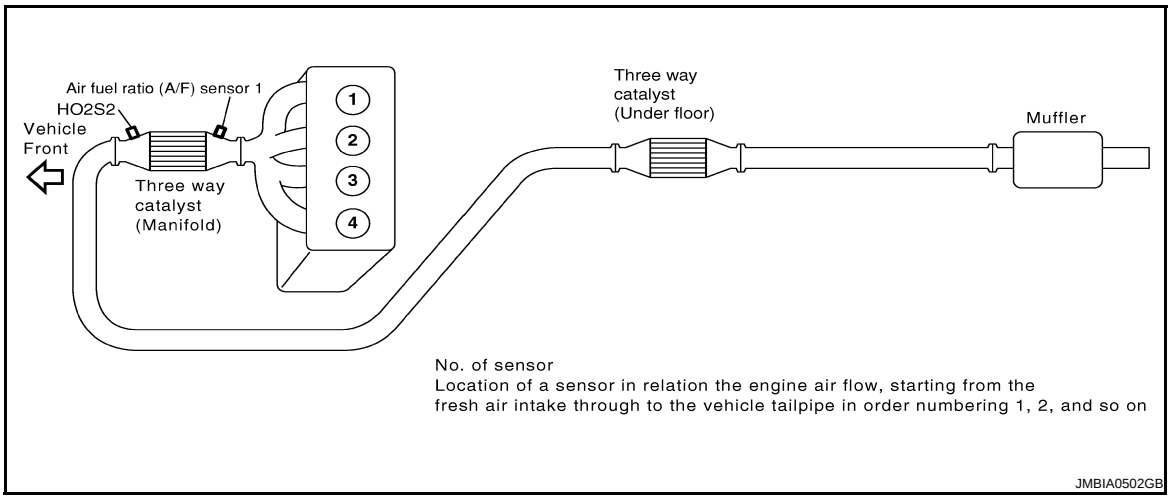
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

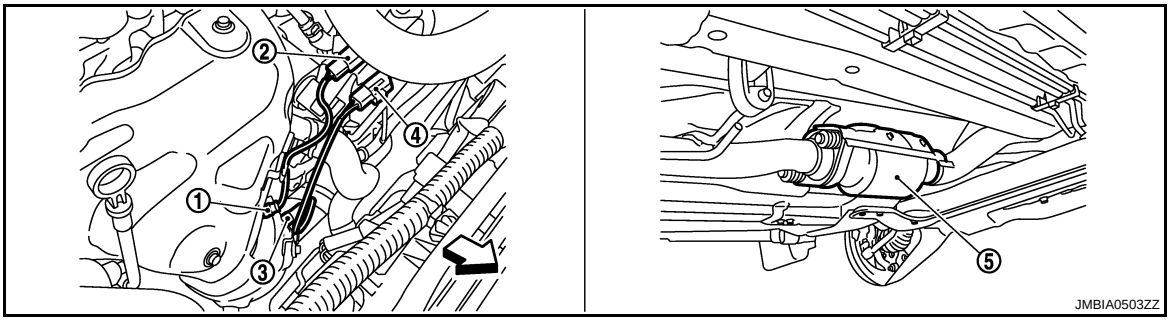
⇦ : Vehicle front



1. Cooling fan motor
2. Crankshaft position sensor (POS)

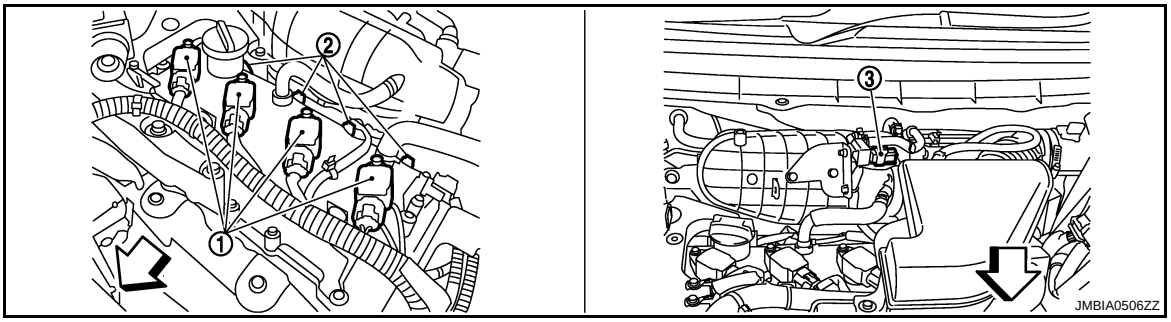
⇦ : Vehicle front





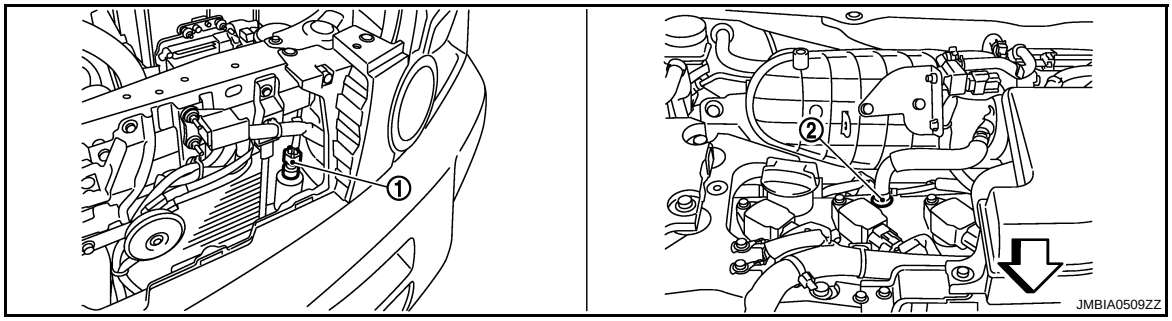
1. Air fuel ratio (A/F) sensor 1
2. Air fuel ratio (A/F) sensor 1 harness connector
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector
5. Three way catalyst (Under floor)

⇦ : Vehicle front



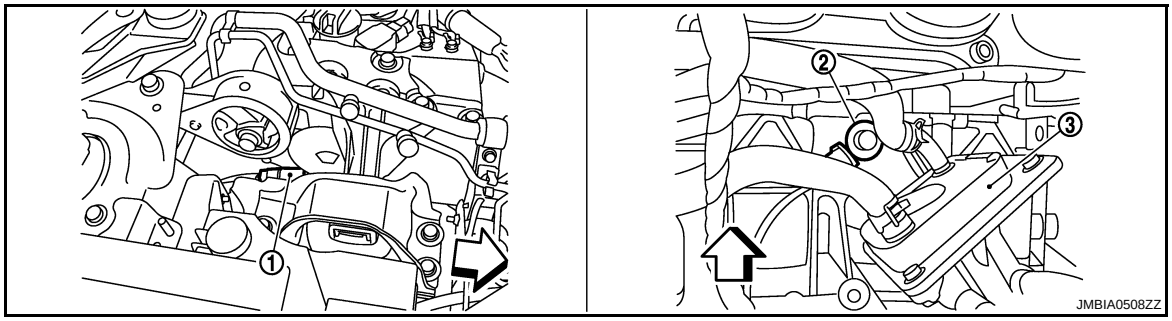
1. Ignition coil (with power transistor) and spark plug
2. Fuel injection
3. EVAP canister purge volume control solenoid valve

⇦ : Vehicle front



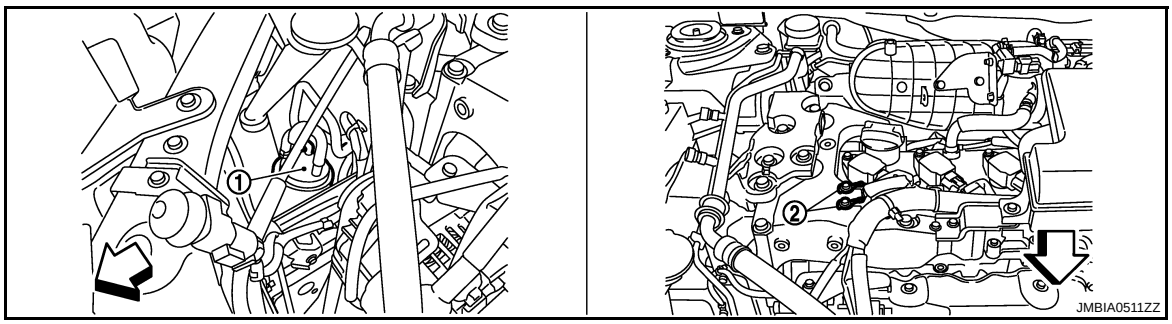
1. Refrigerant pressure sensor
2. PCV valve

⇦ : Vehicle front



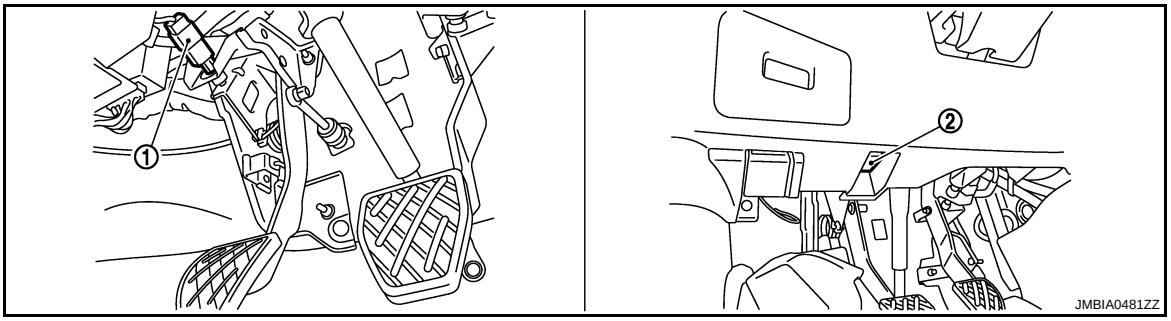
1. Intake valve timing control solenoid valve
2. Knock sensor
3. Engine oil cooler

⇦ : Vehicle front

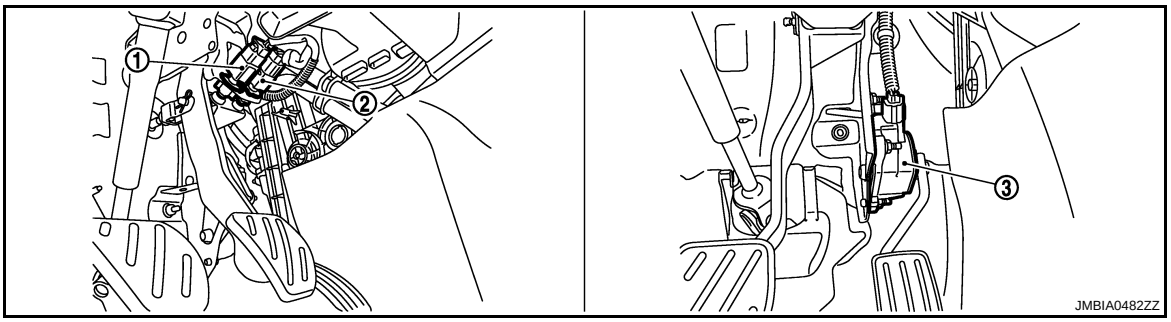


1. EVAP canister
2. Ground

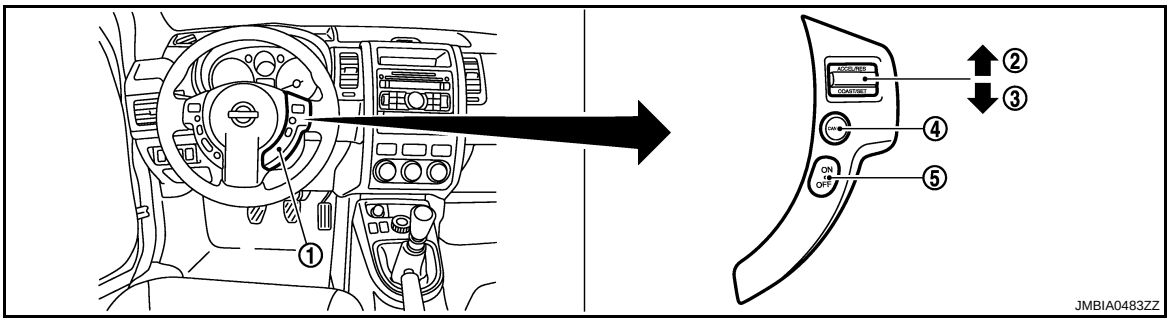
⇦ : Vehicle front



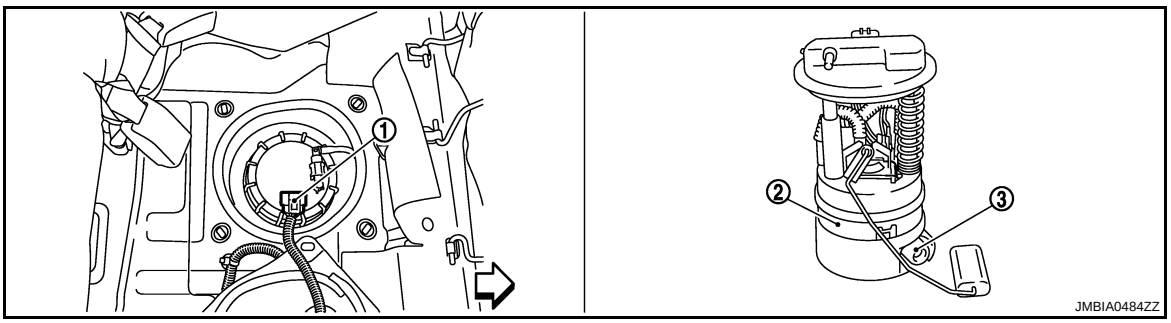
1. ASCD clutch switch
2. Data link connector



1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH



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

⇦ : Vehicle front

Component Description

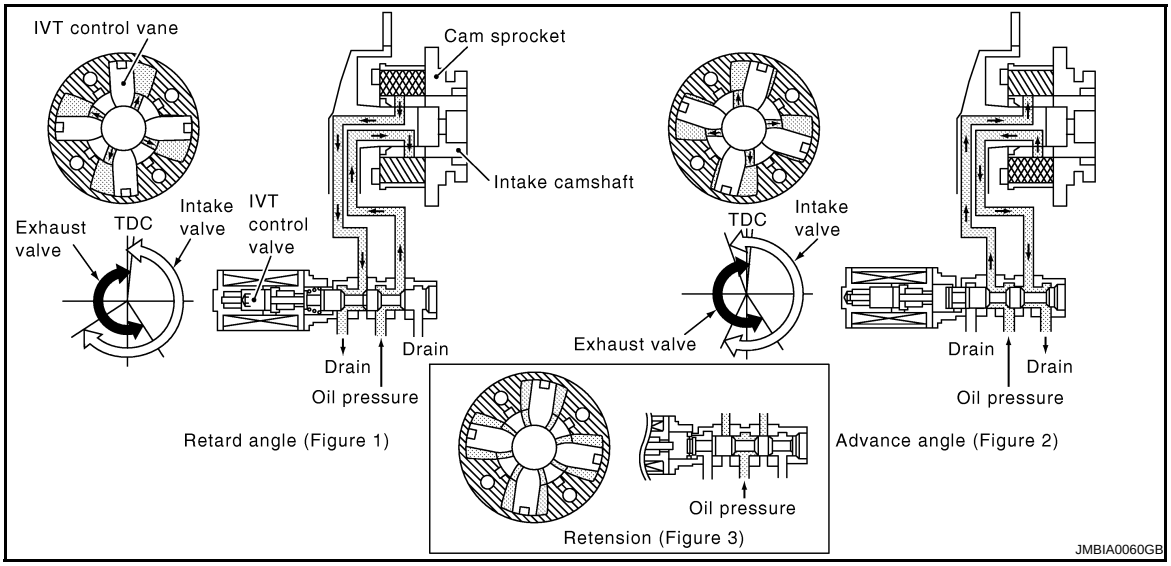
INFOID:0000000001374863

Component	Reference
Accelerator pedal position sensor	ECM-278, "Description"
Camshaft position sensor (PHASE)	ECM-183, "Description"
Crankshaft position sensor (POS)	ECM-179, "Description"
Engine coolant temperature sensor	ECM-122, "Description"
EVAP canister purge volume control solenoid valve	ECM-192, "Description"
Air fuel ratio (A/F) sensor 1	ECM-128, "Description"
Mass air flow sensor	ECM-114, "Description"
Throttle position sensor	ECM-125, "Description"
Vehicle speed sensor	ECM-195, "Description"

INTAKE VALVE TIMING CONTROL

System Diagram

INFOID:0000000001309661



System Description

INFOID:0000000001309662

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 coolant temperature sensor	Engine coolant temperature		

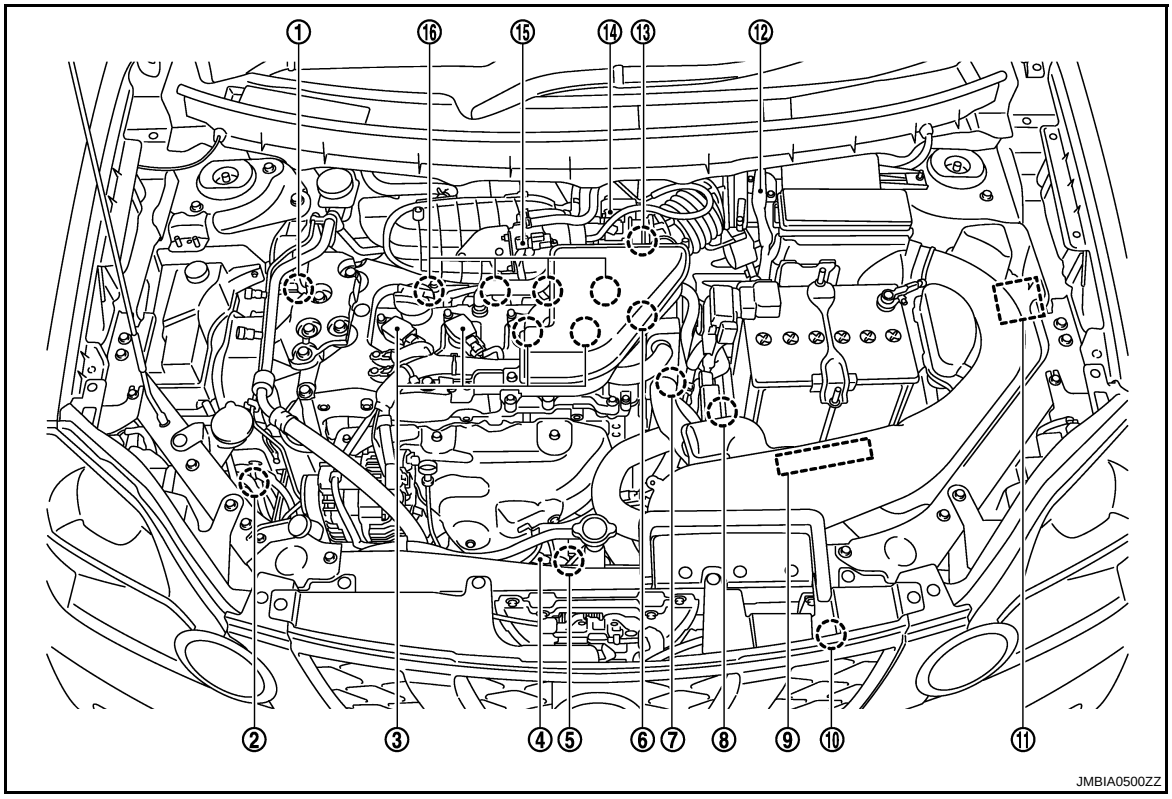
SYSTEM DESCRIPTION

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

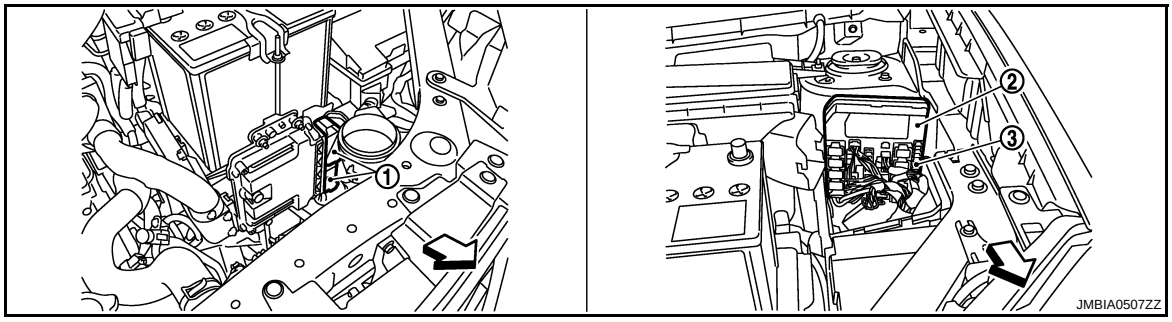
The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing (IVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing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

Component Parts Location

INFOID:0000000001340260

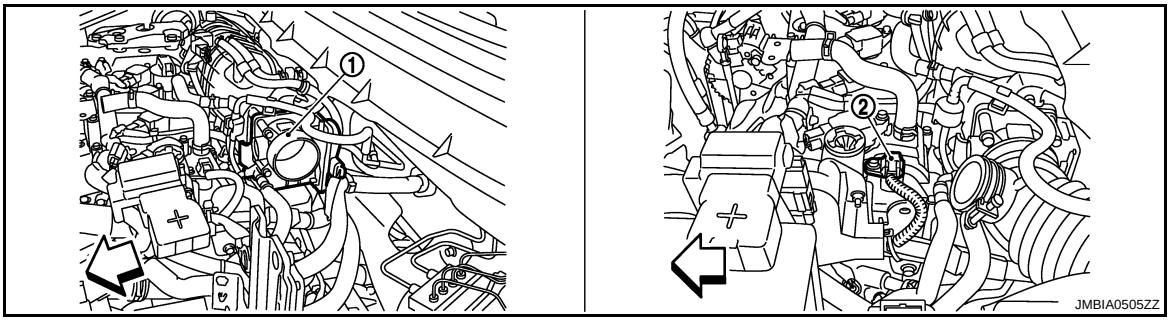


1. Intake valve timing control solenoid valve
2. EVAP canister
3. Ignition coil (with power transistor)
4. Air fuel ratio (A/F) sensor 1
5. Heated oxygen sensor 2
6. Camshaft position sensor (PHASE)
7. Engine coolant temperature sensor
8. Park/neutral position (PNP) switch
9. ECM
10. Refrigerant pressure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



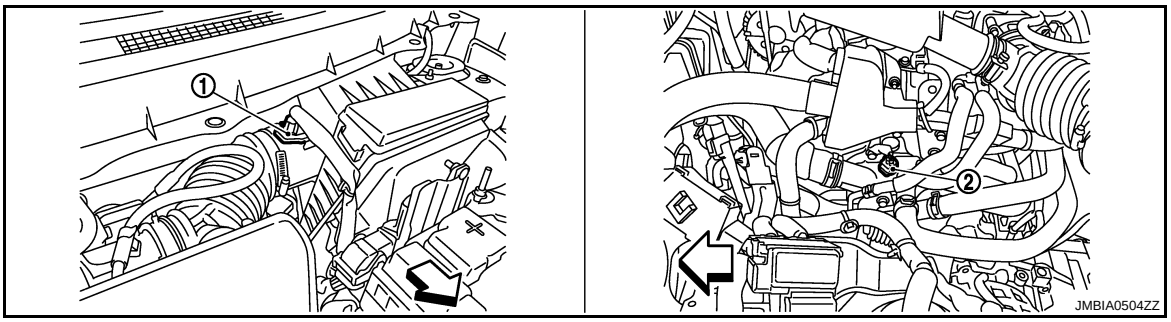
1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

⇦ : Vehicle front



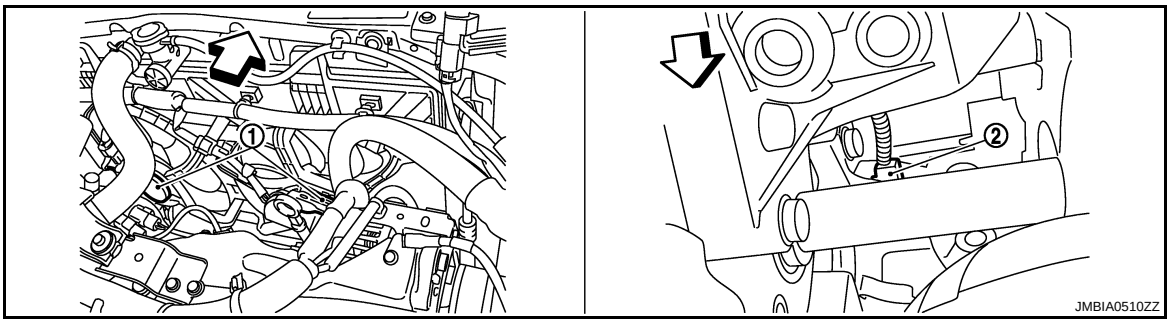
1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Camshaft position sensor (PHASE)

⇦ : Vehicle front



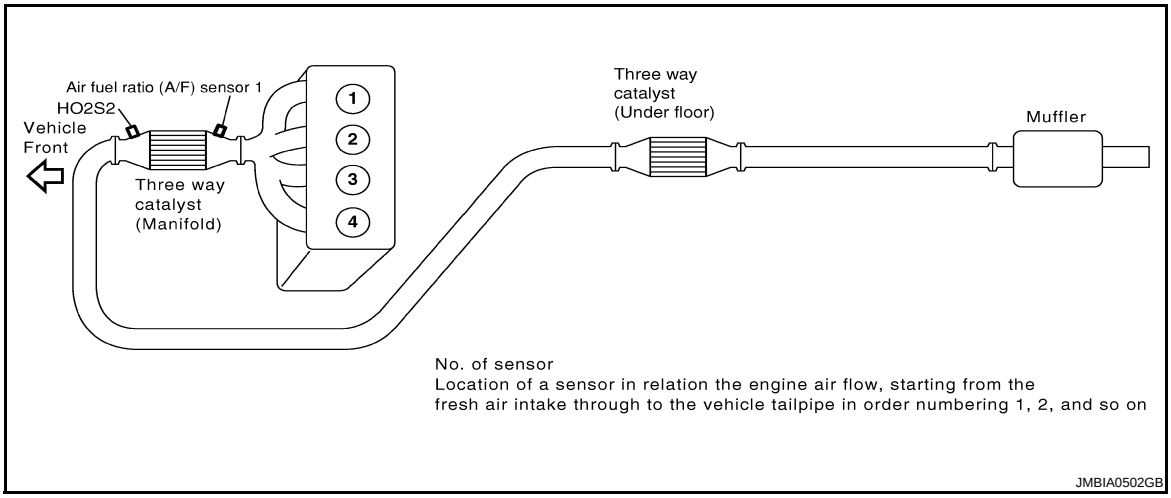
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

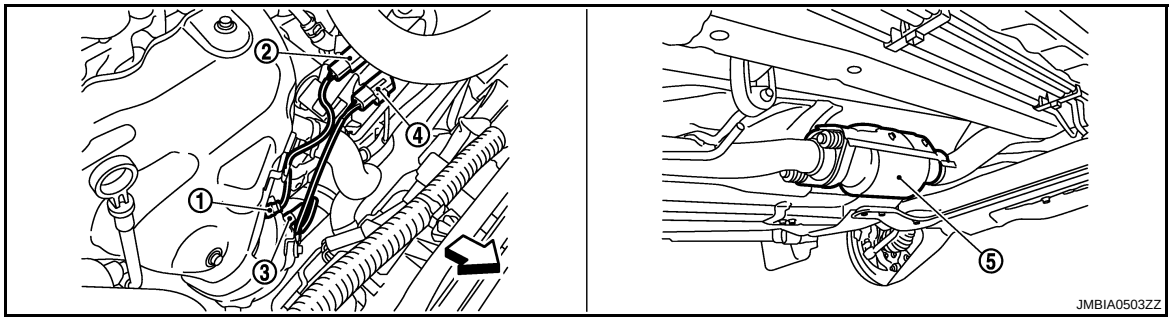
⇦ : Vehicle front



1. Cooling fan motor
2. Crankshaft position sensor (POS)

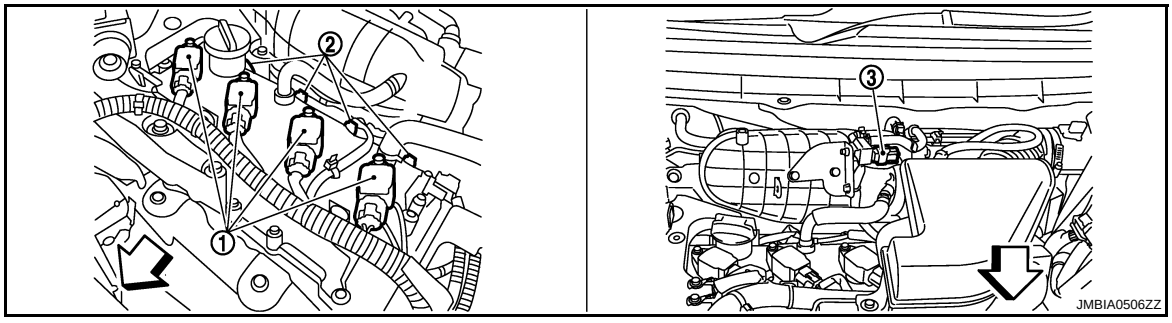
⇦ : Vehicle front





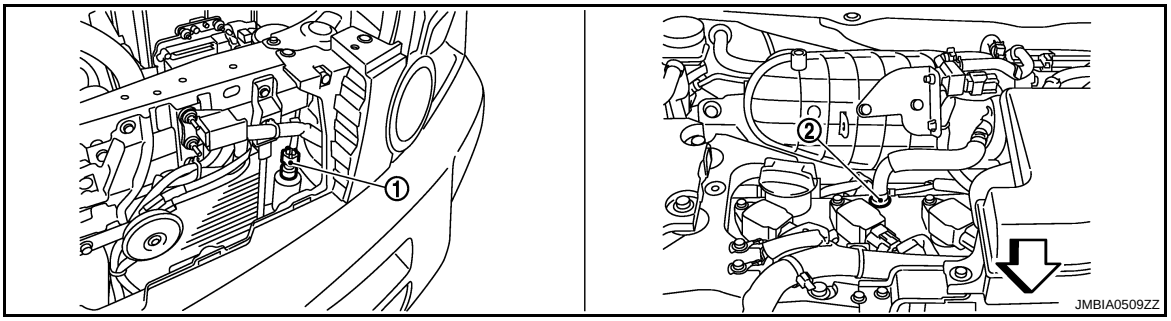
1. Air fuel ratio (A/F) sensor 1
2. Air fuel ratio (A/F) sensor 1 harness connector
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector
5. Three way catalyst (Under floor)

⇦ : Vehicle front



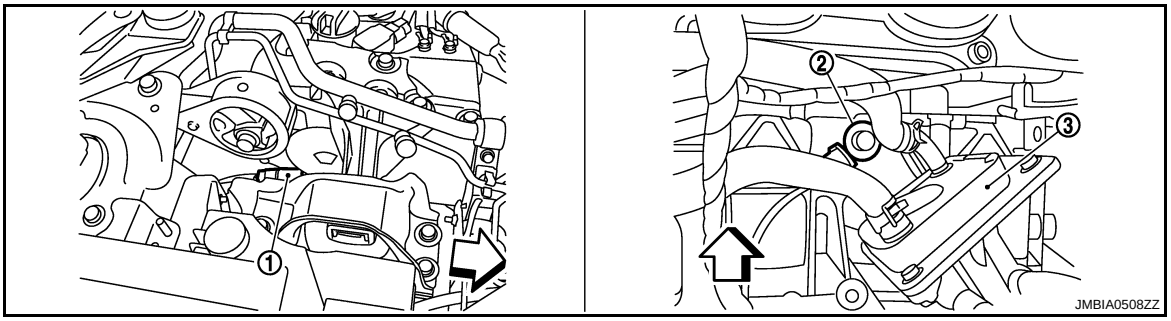
1. Ignition coil (with power transistor) and spark plug
2. Fuel injection
3. EVAP canister purge volume control solenoid valve

⇦ : Vehicle front



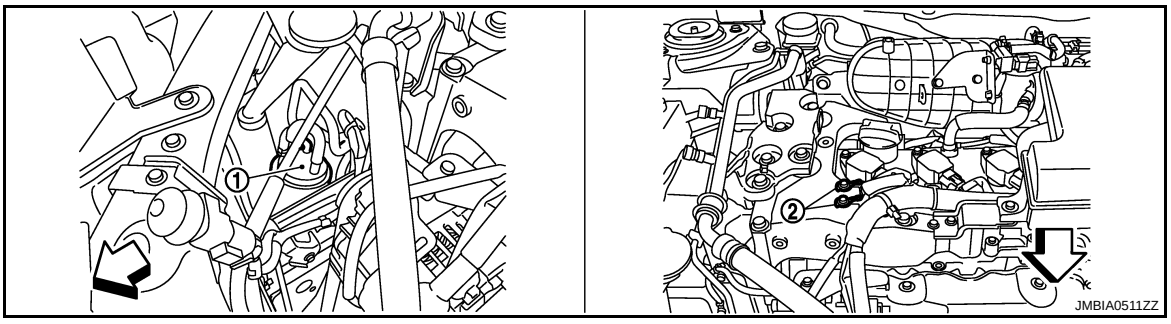
1. Refrigerant pressure sensor 2. PCV valve

⇦ : Vehicle front



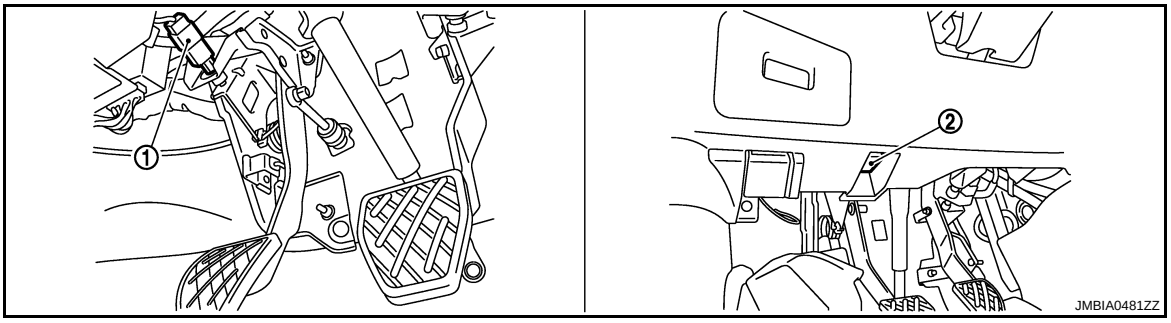
1. Intake valve timing control solenoid valve 2. Knock sensor 3. Engine oil cooler

⇦ : Vehicle front

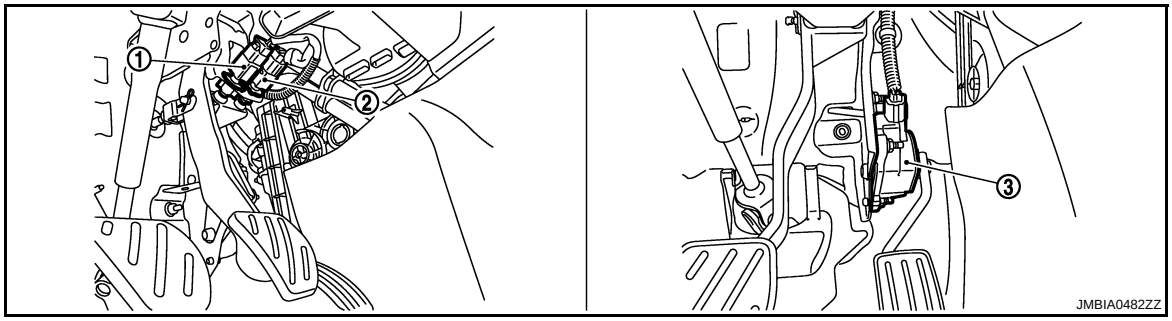


1. EVAP canister 2. Ground

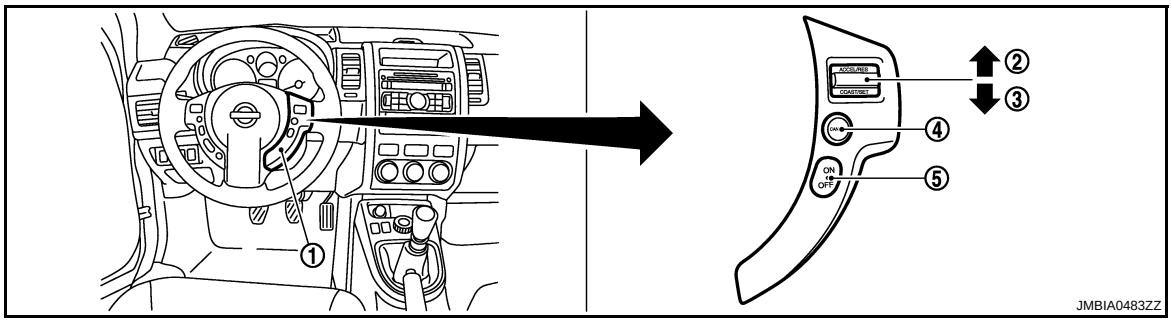
⇦ : Vehicle front



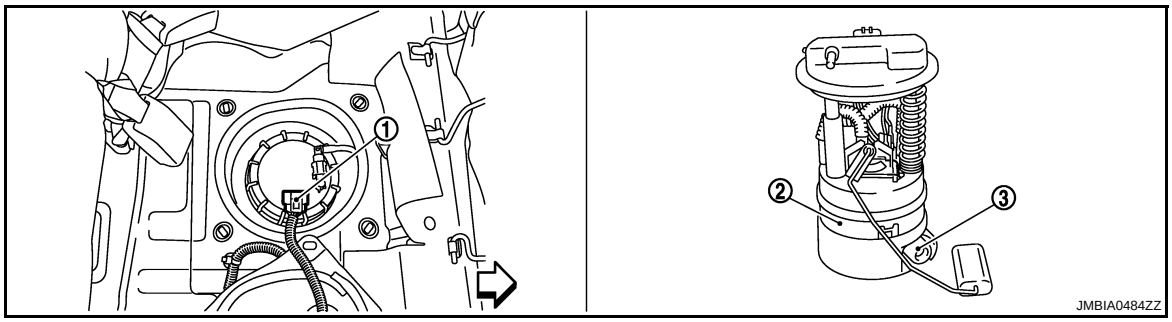
1. ASCD clutch switch 2. Data link connector



1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH



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

⇦ : Vehicle front

Component Description

INFOID:0000000001309664

Component	Reference
Camshaft position sensor (PHASE)	ECQ-210, "Description"
Crankshaft position sensor (POS)	ECQ-206, "Description"
Engine coolant temperature sensor	ECQ-134, "Description"
Intake valve timing control solenoid valve	ECQ-73, "System Description"
Vehicle speed sensor	ECQ-222, "Description"

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000001309669

INTRODUCTION

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

Emission-related diagnostic information	Diagnostic service
Diagnostic Trouble Code (DTC)	Service $03 of ISO 15031-5
Freeze Frame data	Service $02 of ISO 15031-5
System Readiness Test (SRT) code	Service $01 of ISO 15031-5
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Service $07 of ISO 15031-5
1st Trip Freeze Frame data	
Test values and Test limits	Service $06 of ISO 15031-5

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

×: Applicable —: Not applicable

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

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

The malfunction indicator lamp (MI) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to ECQ-336, "Fail Safe".)

TWO TRIP DETECTION LOGIC

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

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MI lights up. The MI lights up at the same time when the DTC is stored. <2nd trip>

The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MI, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

Items	MI				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
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 ECQ-339, "DTC Index".)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

DTC AND FREEZE FRAME DATA

DTC and 1st Trip DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.
If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MI will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MI lights up. In other words, the DTC is stored in the ECM memory and the MI 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 MI during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.
Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”.
For malfunctions in which 1st trip DTCs are displayed, refer to “EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS”. These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-III.
1st trip DTC is specified in Service $07 of ISO 15031-5. 1st trip DTC detection occurs without lighting up the MI and therefore does not warn the driver of a malfunction. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to ECQ-10, "Work Flow". Then perform DTC CONFIRMATION PROCEDURE or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

Freeze Frame Data and 1st Trip Freeze Frame Data

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen, not on the GST.
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. 1st trip freeze frame data is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MI 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 • 1st trip freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items (Includes CVT related items)

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”.

How to Read DTC and 1st Trip DTC

With CONSULT-III

With GST

CONSULT-III or GST (Generic Scan Tool) Examples: P0340, P0850, P1148, etc.
These DTCs are prescribed by ISO 15031-5.
(CONSULT-III also displays the malfunctioning component or system.)

No Tools

The number of blinks of the MI in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0340, 0850, 1148, etc.
These DTCs are controlled by NISSAN.

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

DTC or 1st trip DTC of a malfunction is displayed in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-III. Time data indicates how many times the vehicle was driven after the last detection of a DTC.
If the DTC is being detected currently, the time data will be [0].
If a 1st trip DTC is stored in the ECM, the time data will be [1t].

How to Erase DTC and 1st Trip DTC

With CONSULT-III

The emission related diagnostic information in the ECM can be erased by selecting “All Erase” in the “Description” of “FINAL CHECK” mode with CONSULT-III.

With GST

The emission related diagnostic information in the ECM can be erased by selecting Service $04 with GST.

NOTE:
If the DTC is not for CVT related items (see ECQ-339, "DTC Index"), skip step 2.

1. 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.
2. Perform ECQ-79, "Diagnosis Description". (The DTC in TCM will be erased)
3. Select Service $04 with GST (Generic Scan Tool).

No Tools

NOTE:
If the DTC is not for CVT related items (see ECQ-339, "DTC Index"), skip step 2.

1. 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.
2. Perform ECQ-79, "Diagnosis Description". (The DTC in the TCM will be erased.)
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal.

- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

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

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

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Service $01 of ISO 15031-.
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 MI is ON during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates “CMPLT” for all test items. Therefore, it is important to check SRT (“CMPLT”) and DTC (No DTCs) before the inspection.

SRT Item
The table below shows required self-diagnostic items to set the SRT to “CMPLT”.

SRT item (CONSULT-III indication)	Performance Priority*	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420
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

*: If completion of several SRTs is required, perform driving patterns (DTC CONFIRMATION PROCEDURE), one by one based on the priority for models with CONSULT-III.

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

Self-diagnosis result		Example				
		Diagnosis	Ignition cycle ← ON → OFF ← ON → OFF ← ON → OFF ← ON →			
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“CMPLT”	“CMPLT”	“CMPLT”	“CMPLT”
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“INCMP”	“INCMP”	“CMPLT”	“CMPLT”
NG exists	Case 3	P0400	OK	OK	—	—
		P0402	—	—	—	—
		P1402	NG	—	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MI 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.

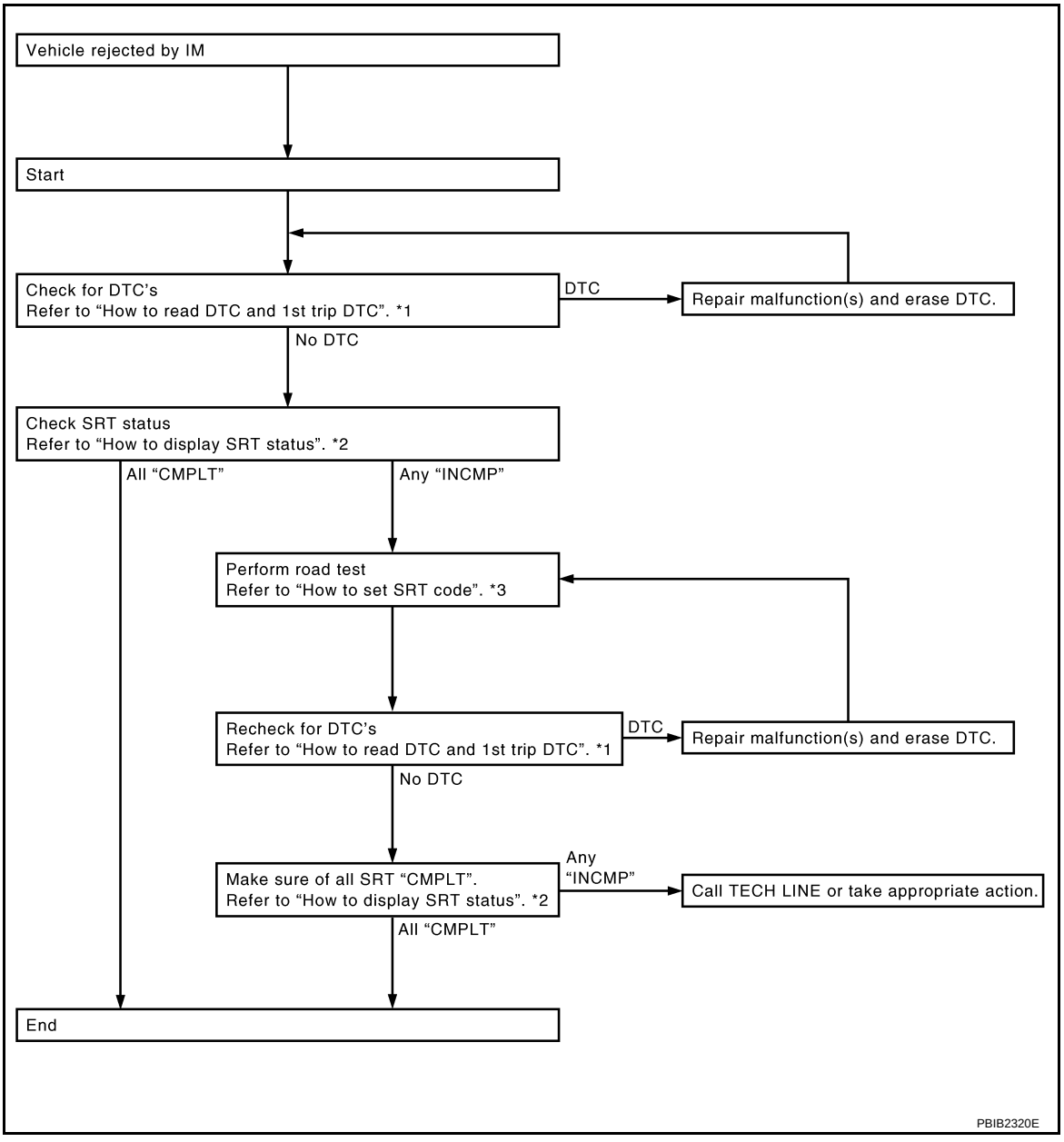
When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above
When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses have at least one OK result. → Case 2 above
If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate “CMPLT”. → Case 3 above
The table above shows that the minimum number of cycles for setting SRT as “INCMP” is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

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

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

SRT Service Procedure

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



*1 “How to Read DTC and 1st Trip DTC” *2 “How to Display SRT Status” *3 “How to Set SRT Code”

How to Display SRT Status

WITH CONSULT-III

Selecting “SRT STATUS” in “DTC CONFIRMATION” mode with CONSULT-III.
For items whose SRT codes are set, a “CMPLT” is displayed on the CONSULT-III screen; for items whose SRT codes are not set, “INCMP” is displayed.

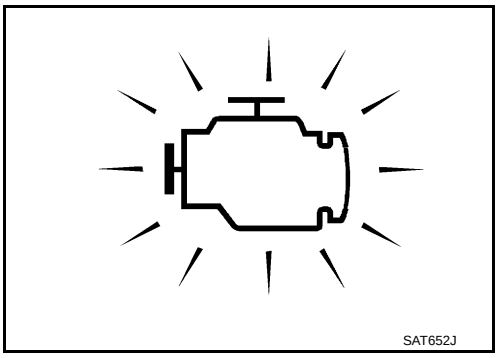
NOTE:
Though displayed on the CONSULT-III screen, “HO2S HTR” is not SRT item.

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

MALFUNCTION INDICATOR LAMP (MI)

Description
The MI is located on the instrument panel.

1. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
   If the MI does not light up, refer to MWI-5, "METER SYSTEM : System Diagram".
2. When the engine is started, the MI should go off.
   If the MI remains on, the on board diagnostic system has detected an engine system malfunction.



On Board Diagnostic System Function
The on board diagnostic system has the following three functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped 	BULB CHECK	This function checks the MI bulb for damage (blown, open circuit, etc.). If the MI does not come on, check MI circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MI will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MI in the 1st trip. • Misfire (Possible three way catalyst damage) • One trip detection diagnoses
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.
	Engine running 	IGNITION TIMING HOLD	Ignition timing will be hold to check ignition timing with a timing light.

Diagnostic Test Mode I — Bulb Check
In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to MWI-5, "METER SYSTEM : System Diagram".

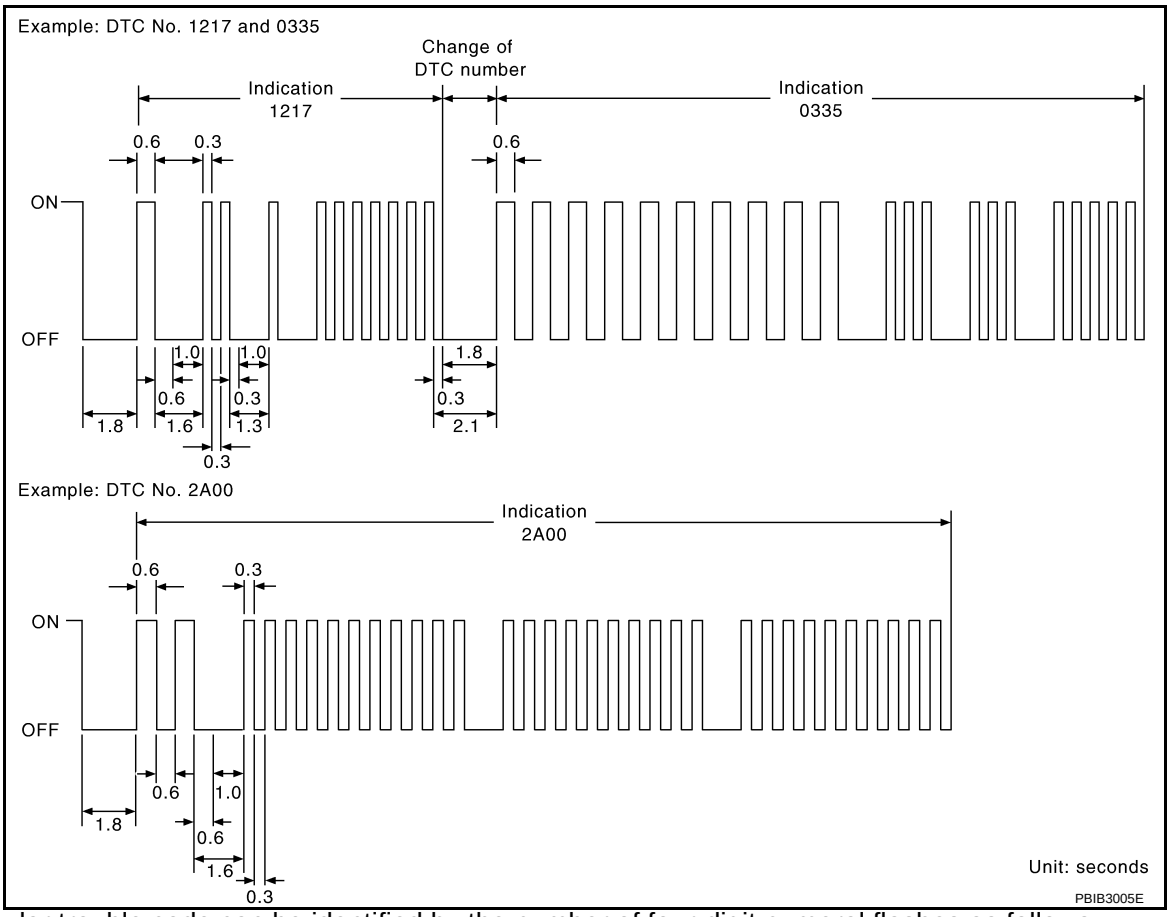
Diagnostic Test Mode I — Malfunction Warning

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

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

Diagnostic Test Mode II — Self-diagnostic Results

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MI as shown below.
The DTC and 1st trip DTC are displayed at the same time. If the MI 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 MI illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT-III or GST. A DTC will be used as an example for how to read a code.



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

Number	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	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-second) - OFF (0.6-second) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-second OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See ECQ-339, "DTC Index")

How to Switch Diagnostic Test Mode

NOTE:

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

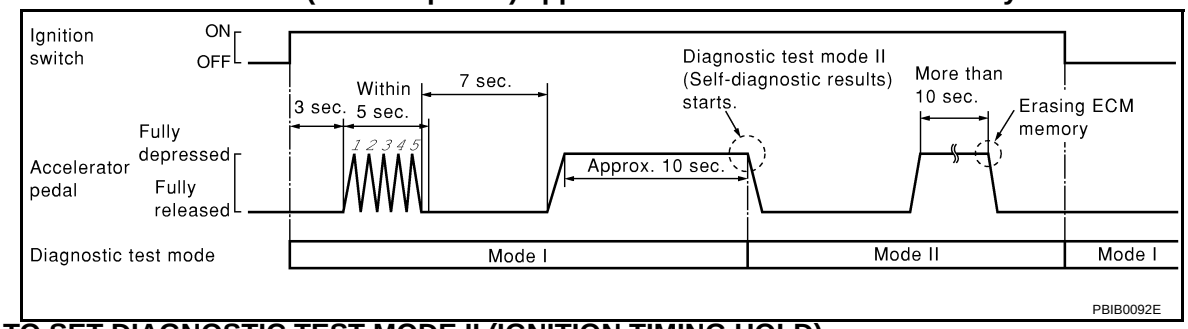
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.**

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

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.

- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MI starts blinking.
   NOTE:
   Do not release the accelerator pedal for 10 seconds if MI may start blinking on the halfway of this 10 seconds. This blinking is displaying SRT status and is continued for another 10 seconds.
4. Fully release the accelerator pedal.
   ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).
   NOTE:
   Wait until the same DTC (or 1st trip DTC) appears to confirm all DTCs certainly.



HOW TO SET DIAGNOSTIC TEST MODE II (IGNITION TIMING HOLD)

1. Set the ECM in Diagnostic Test Mode II (Self-diagnostic results).
   Refer to “How to Set Diagnostic Test Mode II (Self-diagnostic Results)”.
2. Start Engine.
   ECM has entered to Diagnostic Test Mode II (Ignition timing hold).

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

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to “How to Set Diagnostic Test Mode II (Self-diagnostic Results)”.
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
   The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to “How to Erase Diagnostic Test Mode II (Self-diagnostic Results)”.

- **If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

OBD System Operation Chart

Relationship Between MI, 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 MI will come on.
- The MI will go off after the vehicle is driven 3 times (driving pattern B) with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If same 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. The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-III will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

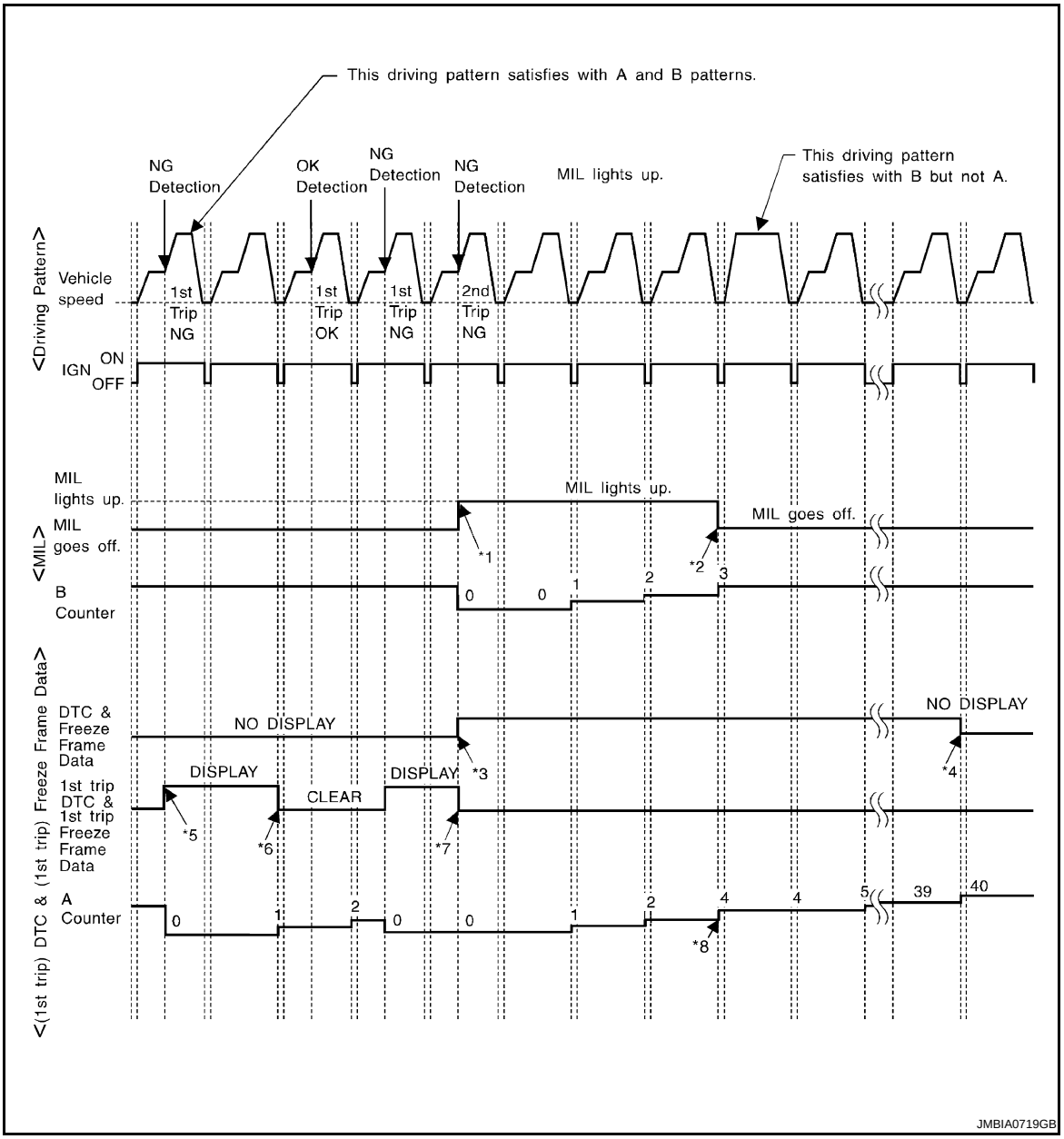
Summary Chart

Items	Fuel Injection System	Misfire	Other
MI (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	40 (pattern A)	40 (pattern A)	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)

*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 MI, DTC, 1st Trip DTC and Driving Patterns



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

*2: MI will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

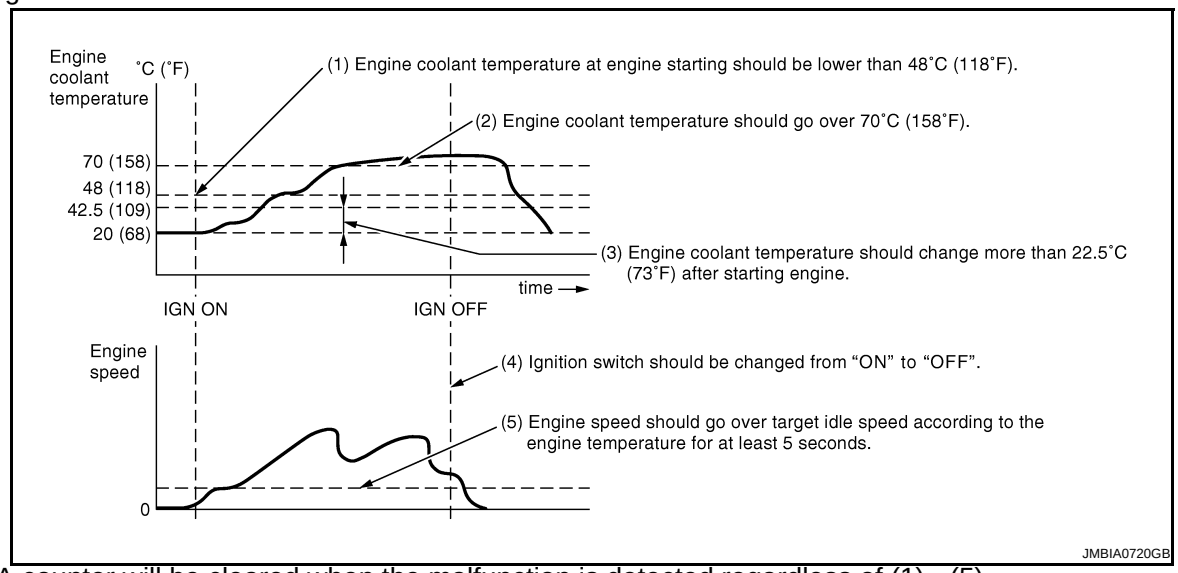
*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: 1st trip DTC will be cleared after vehicle is driven once [pattern C (for Misfire and Fuel Injection System) or pattern B (for others)] without the same malfunction.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

*8 If both pattern A and B satisfied, A counter jumps 2 to 4.

Explanation for Driving Patterns
<Driving Pattern A>



- The A counter will be cleared when the malfunction is detected regardless of (1) - (5).
- The A counter will be counted up when (1) - (5) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>
Driving pattern B means the vehicle operation as follows:
1. Engine sped should go over target idle speed according to the engine coolant temperature for at least 5 seconds.
2. All components and systems should be monitored at least once by the OBD system.

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

<Driving Pattern C>
Driving pattern C means the vehicle operation as follows:
1. Engine sped should go over target idle speed according to the engine coolant temperature for at least 5 seconds.
2. The following conditions should be satisfied at the same time:
   Engine speed: (Engine speed in the freeze frame data) ±375 rpm
   Calculated load value: (Calculated load value in the freeze frame data) x (1±0.2) [%]
   Engine coolant temperature (T) condition:

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

Example:
If the stored freeze frame data is as follows:
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)
To be satisfied with driving pattern C, the vehicle should run under the following conditions:

Engine speed: 475 - 1,225 rpm, Calculated load value: 24 - 36%, Engine coolant temperature: more than 70°C (158°F)

- The C counter will be cleared when the malfunction is detected regardless of vehicle conditions above.
- The C counter will be counted up when vehicle conditions above is satisfied without the same malfunction.
- The DTC will not be displayed after A counter reaches 40.
- The 1st trip DTC will be cleared when A counter is counted once without the same malfunction after DTC is stored in ECM.

CONSULT-III Function

INFOID:0000000001309670

FUNCTION

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

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

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

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

Item			DIAGNOSTIC TEST MODE						
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2			SRT STATUS	DTC WORK SUPPORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		×	×	×			
		Camshaft position sensor (PHASE)		×	×	×			
		Mass air flow sensor		×		×			
		Engine coolant temperature sensor		×	×	×	×		
		Air fuel ratio (A/F) sensor 1		×		×		×	×
		Heated oxygen sensor 2		×		×		×	×
		Vehicle speed sensor		×	×	×			
		Accelerator pedal position sensor		×		×			
		Throttle position sensor		×	×	×			
		Intake air temperature sensor		×	×	×			
		Knock sensor		×					
		Refrigerant pressure sensor				×			
		Closed throttle position switch (accelerator pedal position sensor signal)				×			
		Air conditioner switch				×			
		Park/neutral position (PNP) switch		×		×			
		Stop lamp switch		×		×			
		Battery voltage				×			
		Load signal				×			
		Primary speed sensor		×		×			
		Fuel level sensor		×		×			
		ASCD steering switch		×		×			
		ASCD brake switch		×		×			
ENGINE COTNROL COMPONENT PARTS	OUTPUT	Fuel injector				×	×		
		Power transistor (Ignition timing)				×	×		
		Throttle control motor relay		×		×			
		Throttle control motor		×					
		EVAP canister purge volume control solenoid valve		×		×	×		×
		Air conditioner relay				×			
		Fuel pump relay	×			×	×		
		Cooling fan relay		×		×	×		
		Air fuel ratio (A/F) sensor 1 heater		×		×		×*3	
		Heated oxygen sensor 2 heater		×		×		×*3	
		Intake valve timing control solenoid valve		×		×	×		
		Alternator				×	×		
		Calculated load value			×	×			

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-III screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to ECQ-79, "Diagnosis Description".

*3: Always “CMPLT” is displayed.

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
SELF-LEARNING CONT	• THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing mixture ratio self-learning value
AP POS LEARN CLR*	—	—
TARGET IGN TIM HLD	Ignition timing will be hold to check ignition timing with timing light.	When checking ignition timing
TARGET IDLE RPM ADJ*	• IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	• IDLE CONDITION	When adjusting target ignition timing

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

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to ECQ-339, "DTC Index".)

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	• The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to ECQ-339, "DTC 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) 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.

Freeze frame data item*	Description
FUEL SYS-B2	• Always a certain value is displayed. • These items are not efficient for L32 models.
L-FUEL TRM-B2 [%]	
S-FUEL TRM-B1 [%]	
INT MANI PRES [kPa]	
FTFMCH1	

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

DATA MONITOR MODE

Monitored Item

×: Applicable

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	• Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	• Accuracy becomes poor if engine speed drops below the idle rpm. • If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1	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	msec	• “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	• When engine is running specification range is indicated in “SPEC”.
A/F ALPHA-B1	%	• 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. • When engine is running specification range is indicated in “SPEC”. • This data also includes the data for the air-fuel ratio learning control.
A/F LEARN-B1	%	• The mean value of the air-fuel ratio feedback learning 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.
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 displayed.	• ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2			

Monitored item	Unit	Description	Remarks
TP SEN 1-B1 TP SEN 2-B1	V	• The throttle position sensor signal voltage is displayed.	• TP SEN 2-B1 signal is converted 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 signal.	
AIR COND SIG	ON/OFF	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW	ON/OFF	• Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
LOAD SIGNAL	ON/OFF	• Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW	ON/OFF	• Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW	ON/OFF	• Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW	ON/OFF	• Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1	msec	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
IGN TIMING	BTDC	• Indicates the ignition timing computed by ECM according to the input signals.	• When the engine is stopped, a certain value is indicated.
CAL/LD VALUE	%	• “Calculated load value” indicates the value of the current air flow divided by peak air flow.	
MASS AIRFLOW	g·m/s	• Indicates the mass air flow computed by ECM 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.	

Monitored item	Unit	Description	Remarks
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.	
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 turbine revolution sensor signal.	
VEHICLE SPEED	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
TRVL AFTER MIL	km or mile	• Distance traveled while MI 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.	
AC PRESS SEN	V	• The signal voltage from the refrigerant pressure sensor is displayed.	
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
Voltage	V	• Voltage, frequency, duty cycle or pulse width measured by the probe.	• Only “#” is displayed if item is unable to be measured. • Figures with “#”s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.
Frequency	msec, Hz or %		
DUTY-HI	—		
DUTY-LOW			
PLS WIDTH-HI			
PLS WIDTH-LOW			

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	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Fuel injector • Air fuel ratio (A/F) sensor 1
IGNITION TIMING	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch OFF • Shift lever: P or N (CVT), Neutral (M/T) • Cut off each fuel injector signal one at a time using CONSULT-III.	Engine runs rough or dies.	• Harness and connectors • Compression • Fuel injector • Power transistor • Spark plug • Ignition coil
COOLING FAN*	• Ignition switch: ON • Turn the cooling fan “LOW”, “MID”“HI” and “OFF” CONSULT-III.	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 temperature using CONSULT-III.	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-III and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connectors • Fuel pump relay
PURG VOL CONT/V	• Engine: After warming up, run engine at 1,500 rpm. • Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-III.	Engine speed changes according to the opening percent.	• Harness and connectors • Solenoid valve
FUEL/T TEMP SEN	• Change the fuel tank temperature using CONSULT-III.		
VENT CONTROL/V	• Ignition switch: ON (Engine stopped) • Turn solenoid valve “ON” and “OFF” with the CONSULT-III and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connectors • Solenoid valve
V/T ASSIGN ANGLE	• Engine: Return to the original trouble condition • Change intake valve timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Intake valve timing control solenoid valve
ALTERNATOR DUTY	• Engine: Idle • Change duty ratio using CONSULT-III.	Battery voltage changes.	• Harness and connectors • IPDM E/R • Alternator

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

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to ECQ-79, "Diagnosis Description".

SRT WORK SUPPORT Mode

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

DTC WORK SUPPORT Mode

Test mode	Test item	Corresponding DTC No.	Reference page
A/F SEN1	A/F SEN1(B1) P1278/P1279	P0133	ECQ-154
	A/F SEN1(B1) P1276	P0130	ECQ-144
HO2S2	HO2S2(B1) P1146	P0138	ECQ-171
	HO2S2(B1) P1147	P0137	ECQ-163
	HO2S2(B1) P0139	P0139	ECQ-179

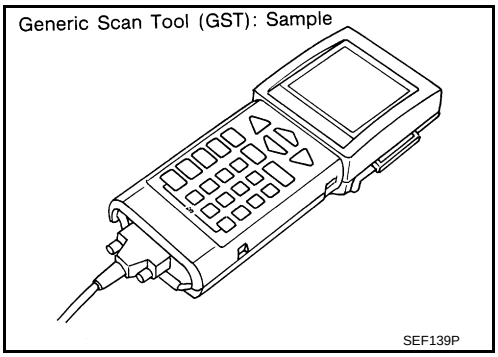
*: DTC P1442 and P1456 does not apply to L32 models but appears in DTC Work Support Mode screens.

Diagnosis Tool Function

INFOID:0000000001309671

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with ISO 15031 has 8 different functions explained below.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.



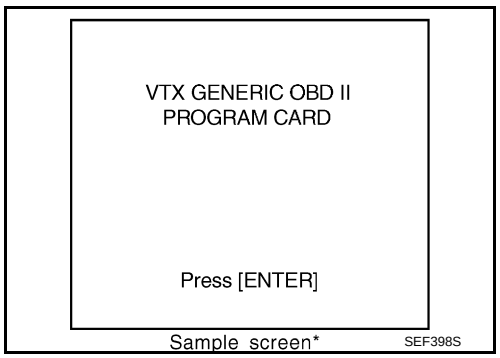
FUNCTION

Diagnostic Service		Function
Service $01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
Service $02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to ECQ-339, "DTC Index".
Service $03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.
Service $04	CLEAR DIAG INFO	This diagnostic service can clear all emission-related diagnostic information. This includes: • Clear number of diagnostic trouble codes (Service $01) • Clear diagnostic trouble codes (Service $03) • Clear trouble code for freeze frame data (Service $01) • Clear freeze frame data (Service $02) • Reset status of system monitoring test (Service $01) • Clear on board monitoring test results (Service $06 and $07)
Service $06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
Service $07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
Service $08	—	This diagnostic service is not applicable on this vehicle.
Service $09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

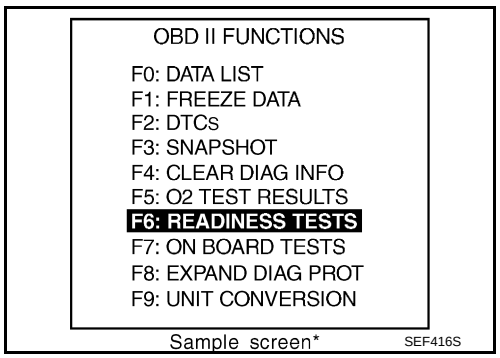
INSPECTION PROCEDURE

1. Turn ignition switch OFF.
2. Connect “GST” to data link connector, which is located under LH dash panel near the hood opener handle.

3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.
   (*: Regarding GST screens in this section, sample screens are shown.)



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



COMPONENT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000001309672

The specification (SP) value indicates the tolerance of the value that is displayed in “SPEC” of “DATA MONITOR” mode of CONSULT-III during normal operation of the Engine Control System. When the value in “SPEC” of “DATA MONITOR” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “SPEC” of “DATA MONITOR” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MI.
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:0000000001309673

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/cm^2, 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*
- Engine speed: Idle

*: Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

>> GO TO 2.

2. PERFORM “SPEC” OF “DATA MONITOR” MODE

With CONSULT-III
NOTE:
Perform “SPEC” in “DATA MONITOR” mode in maximum scale display.
1. Perform ECQ-20, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Perform ECQ-14, "BASIC INSPECTION : Special Repair Requirement".
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR”
4. Make sure that monitor items are within the SP value.

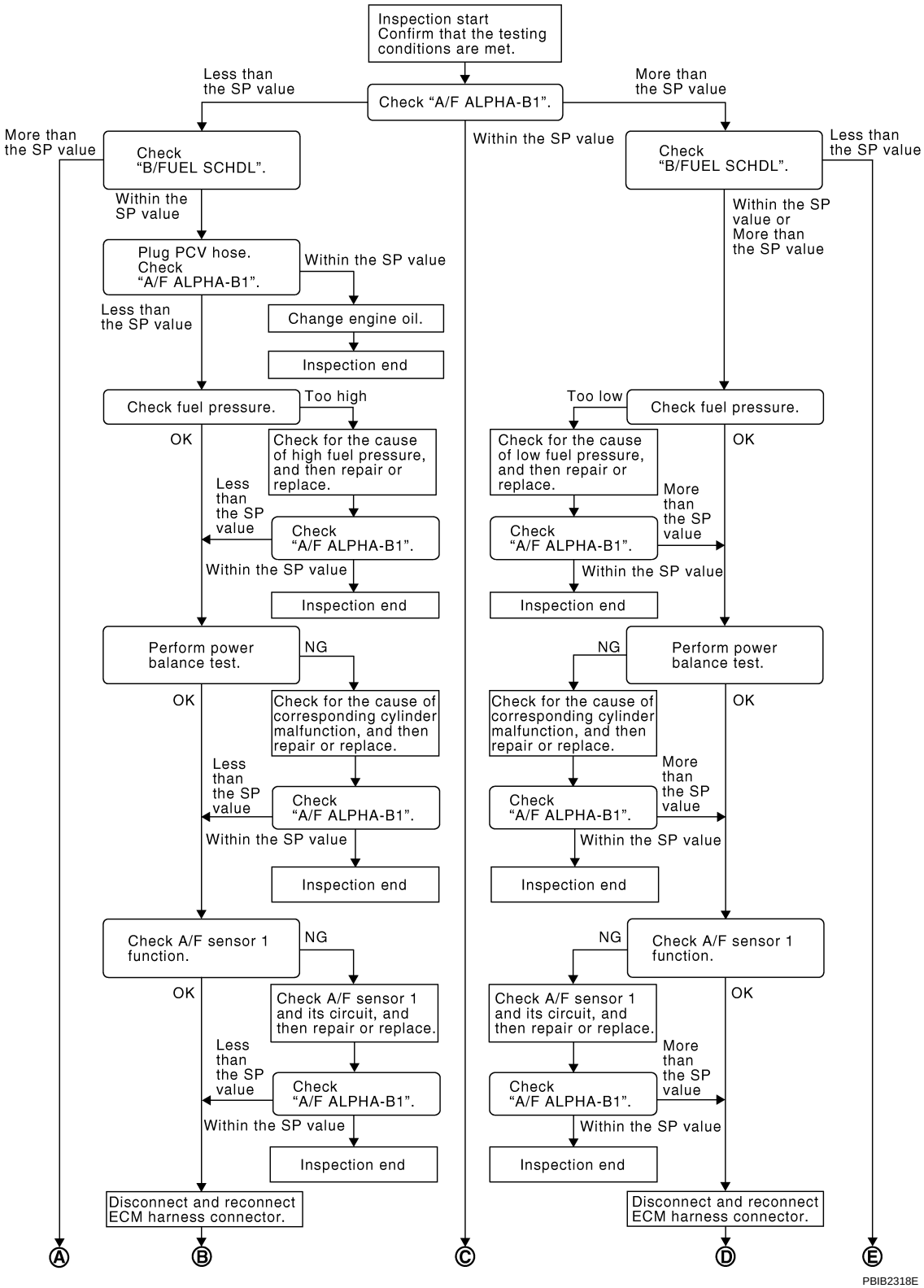
Is the inspection result normal?

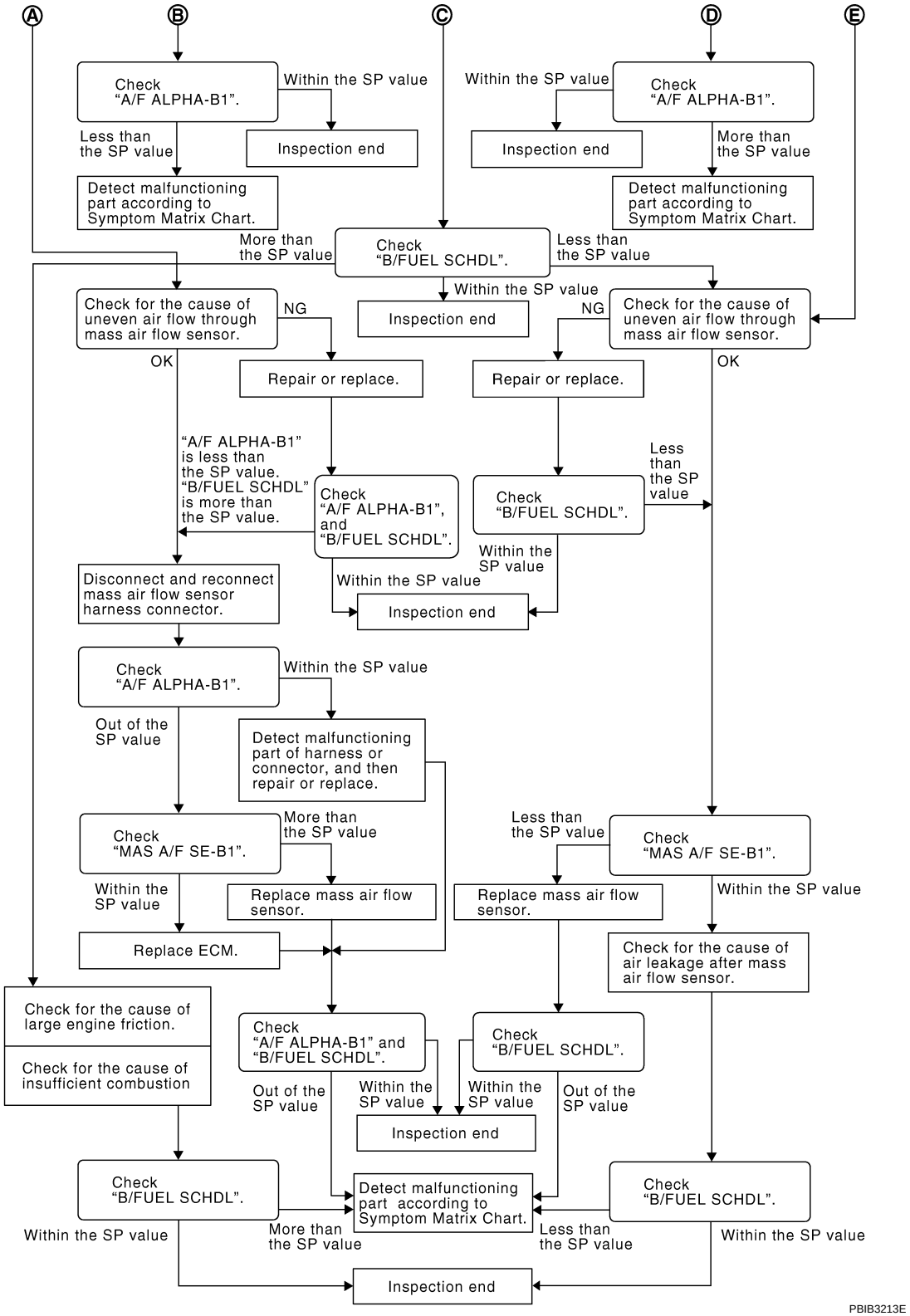
YES >> END
NO >> Go to ECQ-99, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001309674

OVERALL SEQUENCE





DETAILED PROCEDURE

1. CHECK “A/F ALPHA-B1”

With CONSULT-III

1. Start engine.
2. Confirm that the testing conditions are met. Refer to ECQ-98, "Component Function Check".
3. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the each indication is within the SP value.

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

Is the measurement value within the SP value?

YES >> GO TO 17.
NO-1 >> Less than the SP value: GO TO 2.
NO-2 >> More than the SP value: GO TO 3.

2. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is 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”

1. Stop the engine.
2. Disconnect PCV hose, and then plug it.
3. Start engine.
4. 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.
2. Change engine oil.

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

>> **INSPECTION END**

6. CHECK FUEL PRESSURE

Check fuel pressure. (Refer to ECQ-356, "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”

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 >> GO TO 9.

9. PERFORM POWER BALANCE TEST

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

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.
1. Ignition coil and its circuit (Refer to ECQ-241, "Component Function Check".)
2. Fuel injector and its circuit (Refer to ECQ-192, "Component Inspection".)
3. Intake air leakage
4. Low compression pressure (Refer to EM-146, "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”

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 >> 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 ECQ-144, "DTC Logic".
- For DTC P0131, refer to ECQ-148, "DTC Logic".
- For DTC P0132, refer to ECQ-151, "DTC Logic".
- For DTC P0133, refer to ECQ-154, "DTC Logic".
- For DTC P2A00, refer to ECQ-291, "DTC Logic".

Is any DTC detected?

YES >> GO TO 15.
NO >> GO TO 13.

13. CHECK A/F SENSOR 1 CIRCUIT

Perform DIAGNOSTIC PROCEDURE according to corresponding DTC.

>> GO TO 14.

14. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 15.

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Stop the engine.

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

>> GO TO 16.

16. CHECK “A/F ALPHA-B1”

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 ECQ-345, "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 the each indication is within the SP value.

Is the measurement value within the SP value?

YES >> **INSPECTION END**
NO >> “B/FUEL SCHDL” is more, “A/F ALPHA-B1” is less than the SP value: GO TO 21.

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

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

>> GO TO 22.

22. 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 >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to ECQ-121, "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.
2. Go to ECQ-17, "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

- 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 the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to ECQ-345, "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 ECQ-345, "Symptom Table".

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000001309675

1.INSPECTION START

Start engine.

Is engine running?

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

2.CHECK GROUND CONNECTION-I

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace ground connection.

3.CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF and then ON.
2. Check the voltage between ECM connector terminals as follows.

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
E19	89	F43	5	Battery voltage
		E19	118	
			119	
			120	
			121	

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 4.

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

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

ECM		Ground	Continuity
Connector	Terminal		
F43	5	Ground	Existed
E19	118		
	119		
	120		
	121		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 6.

5.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R harness connector E15
- 20A 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.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F121, E7
- Harness for open or short between ECM and ground

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

7. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connectors.
2. Turn ignition switch ON.
3. Check the voltage between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Voltage
Connector	Terminal		
E15	48	Ground	Battery voltage

Is the inspection result normal?

YES >> Go to ECQ-242, "Diagnosis Procedure".
NO >> GO TO 8.

8. CHECK ECM POWER SUPPLY CIRCUIT-III

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

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
E19	115	E19	121	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.

Is the inspection result normal?

YES >> GO TO 14.
NO-1 >> Battery voltage does not exist: GO TO 9.
NO-2 >> Battery voltage exists for more than a few seconds: GO TO 12.

9. CHECK ECM POWER SUPPLY CIRCUIT-IV

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

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F43	20	F19	121	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 12.

10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E15.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E19	115	E15	48	Existed

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

Is the inspection result normal?

YES >> GO TO 17.
NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connectors E7, F121
- Harness for open or short between ECM and IPDM E/R

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

12. CHECK ECM POWER SUPPLY CIRCUIT-VI

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E15.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F43	20	E15	51	Existed

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

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair open circuit or short to ground or short power in harness or connectors.

13. CHECK 20A FUSE

1. Disconnect 20A fuse (No. 62) from IPDM E/R.
2. Check 20A fuse.

Is the inspection result normal?

YES >> GO TO 17.
NO >> Replace 20A fuse.

14. CHECK GROUND CONNECTION-II

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair or replace ground connection.

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

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

ECM		Ground	Continuity
Connector	Terminal		
F43	12	Ground	Existed
E19	118		
	119		
	120		
	121		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 17.
NO >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors F121, E7
- Harness for open or short between ECM and ground

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

17. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair open circuit or short to power in harness or connectors.

U1000, U1001 CAN COMM CIRCUIT

Description

INFOID:0000000001309676

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:0000000001309677

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000	CAN communication line	When ECM is not transmitting or receiving CAN communication signal of OBD (emission related diagnosis) for 2 seconds or more.	• Harness or connectors (CAN communication line is open or shorted)
U1001		When ECM is not transmitting or receiving CAN communication signal other than OBD (emission related diagnosis) for 2 seconds or more.	

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> ECQ-110, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309678

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

U1010 CONTROL UNIT (CAN)

Description

INFOID:0000000001309679

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:0000000001309680

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1010	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 ECQ-111, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309681

1.INSPECTION START

With CONSULT-III

1. Turn ignition switch ON.
2. Select “SELF-DIAG RESULTS” mode with CONSULT-III.
3. Touch “ERASE”.
4. Perform DTC CONFIRMATION PROCEDURE.
   See ECQ-111, "DTC Logic".
5. Check DTC.

With GST

1. Turn ignition switch ON.
2. Select “Service $04” with GST.
3. Perform DTC CONFIRMATION PROCEDURE.
   See ECQ-111, "DTC Logic".
4. Check DTC.

Is the DTC U1010 displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to ECQ-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

P0011 IVT CONTROL

DTC Logic

INFOID:0000000001309682

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	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.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Let it idle for 1 minute.
4. Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	More than 1,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 3.5 msec

5. Repeat the following procedure more than 6 times.
   -Slightly depressed the accelerator pedal for 5 seconds.
   -Fully released the accelerator pedal for 5 seconds.
6. Stop vehicle with engine running and let engine idle for 10 seconds.
7. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Go to ECQ-113, "Diagnosis Procedure"
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT-III

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

ENG SPEED	More than 3,600 rpm
COOLAN TEMP/S	More than 70°C (221°F)
Shift lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:
Always drive at a safe speed.

2. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

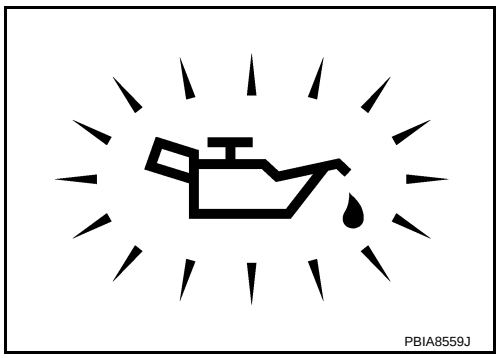
YES >> Go to ECQ-113, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309683

1. CHECK OIL PRESSURE WARNING LAMP

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



Is oil pressure warning lamp illuminated?

YES >> Go to LU-16, "Inspection".
NO >> GO TO 2.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to ECQ-114, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace intake valve timing control solenoid valve.

3. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to ECQ-209, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace crankshaft position sensor (POS).

4. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to ECQ-213, "Component Inspection".

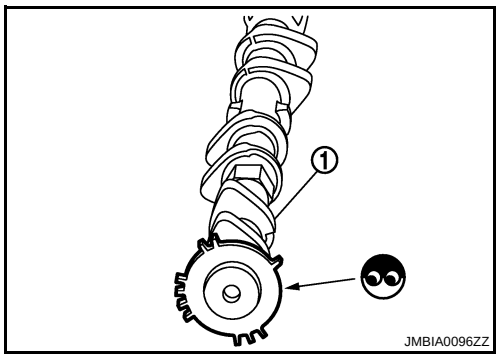
Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace camshaft position sensor (PHASE).

5. CHECK CAMSHAFT (INTAKE)

Check the following.

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



Is the inspection result normal?

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

6. CHECK TIMING CHAIN INSTALLATION

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

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

YES >> Check timing chain installation. Refer to EM-148, "Removal and Installation".
NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to EM-175, "Inspection".

Is the inspection result normal?

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

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001309684

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

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

Terminals	Resistance
1 and 2	7.0 - 7.5Ω [at 20°C (68°F)]
1 or 2 and ground	∞Ω (Continuity should not exist)

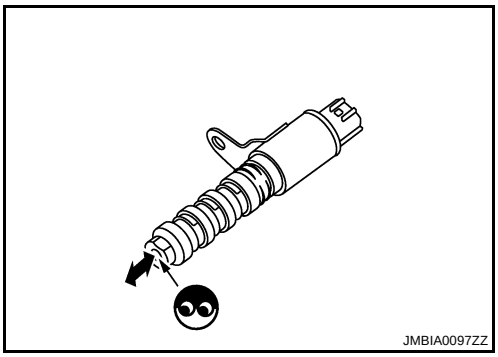
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace intake valve timing control solenoid valve.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

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

CAUTION:
Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.
NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace intake valve timing control solenoid valve.

P0031 A/F SENSOR 1 HEATER

Description

INFOID:0000000001309685

SYSTEM DESCRIPTION

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

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:0000000001309686

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

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 11V 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 ECQ-115, "Diagnosis Procedure".
NG >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309687

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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.
3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F27	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 E6,F123
- IPDM E/R harness connector E14
- 15A fuse (No. 63)
- 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	
F27	3	F43	4	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 A/F SENSOR 1 HEATER

Refer to ECQ-116, "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 air fuel ratio (A/F) sensor 1.

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

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Perform GI-39, "Intermittent Incident".

>> Repair or replace.

Component Inspection

INFOID:0000000001309688

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

1. Turn ignition switch OFF.

2. Disconnect A/F sensor 1 harness connector.
3. Check resistance between A/F sensor 1 terminals as follows.

Terminals	Resistance
3 and 4	1.98 - 2.66 Ω [at 25°C (77°F)]
3 and 1, 2	∞Ω (Continuity should not exist)
4 and 1, 2	

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

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

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

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

P0036, P0037, P0038 HO2S2 HEATER

Description

INFOID:0000000001309689

SYSTEM DESCRIPTION

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

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

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
For 2 minutes after starting engine	OFF
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

INFOID:0000000001309690

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0036	Heated oxygen sensor 2 heater control circuit	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An improper 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.) • Heated oxygen sensor 2 heater
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 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 11V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. 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-III” above.

Is 1st tip DTC detected?

YES >> Go to ECQ-119, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309691

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

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

2. CHECK HO2S2 POWER SUPPLY CIRCUIT

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

HO2S2		Ground	Voltage
Connector	Terminal		
F31	2	Ground	Battery voltage

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R connector E14
- 15A fuse (No. 63)
- Harness for open or short between heated oxygen sensor 2 and fuse

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

4. CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	3	F43	39	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 ECQ-120, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001309692

1.CHECK HEATED OXYGEN SENSOR 2 HEATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Check resistance between HO2S2 terminals as follows.

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

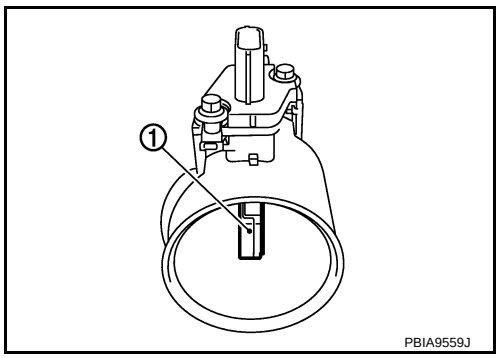
>> INSPECTION END

P0101 MAF SENSOR

Description

INFOID:0000000001309701

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



DTC Logic

INFOID:0000000001309702

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0101	Mass air flow sensor circuit range/performance	The sensor voltage is out of the range calcurated by the ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow 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.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

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

Is DTC detected?

YES >> Go to ECQ-121, "Diagnosis Procedure".
NO >> INSPECTION END.

Diagnosis Procedure

INFOID:0000000001309704

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 E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace ground connection.

3.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		
E18	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 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.

5.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	4	F43	51	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.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	3	F43	73	Existed

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

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK INTAKE AIR TEMPERATURE SENSOR

Check intake air temperature sensor.
Refer to ECQ-132, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace mass air flow sensor (with intake air temperature sensor).

8.CHECK MASS AIR FLOW SENSOR

Refer to ECQ-123, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace mass air flow sensor.

9.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001309705

1.CHECK MASS AIR FLOW SENSOR-I

With CONSULT-III

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

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.2V
	Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

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

Without CONSULT-III

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

(+)		(–)		Condition	Voltage
Connec-tor	Terminal	Connec-tor	Terminal		
F43	73 (MAF sensor signal)	F43	51	Ignition switch ON (Engine stopped.)	Approx. 0.4V
				Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.2V
				Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*

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

Is the inspection result normal?

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

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

1. Turn ignition switch OFF.
2. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.

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

Is the inspection result normal?

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

3. CHECK MASS AIR FLOW SENSOR-II

With CONSULT-III

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

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.2V
	Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*

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

Without CONSULT-III

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

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	73 (MAF sensor signal)	F43	51	Ignition switch ON (Engine stopped.)	Approx. 0.4V
				Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
				Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

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

Is the inspection result normal?

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

4. CHECK MASS AIR FLOW SENSOR-III

With CONSULT-III

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

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.7V
	Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

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

Without CONSULT-III

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

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	73 (MAF sensor signal)	F43	51	Ignition switch ON (Engine stopped.)	Approx. 0.4V
				Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.2V
				Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

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

Is the inspection result normal?

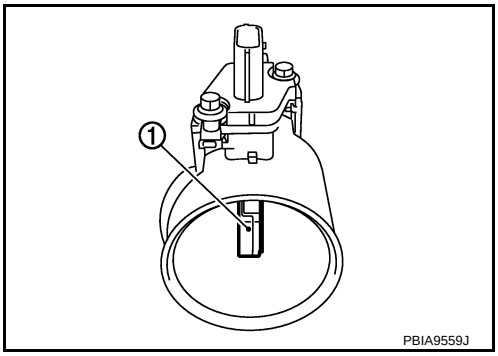
YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor.

P0102, P0103 MAF SENSOR

Description

INFOID:0000000001309706

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



DTC Logic

INFOID:0000000001309707

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

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

Is DTC detected?

YES >> Go to ECQ-126, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309708

1.INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

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

2.CHECK INTAKE SYSTEM

Check the following for connection.
• Air duct

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

Is the inspection result normal?

YES >> GO TO 3.
NO >> Reconnect the parts.

3. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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		
E18	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 for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and IPDM E/R

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

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	4	F43	51	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

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	3	F43	73	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 ECQ-128, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace mass air flow sensor.

9.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001309709

1.CHECK MASS AIR FLOW SENSOR-I

With CONSULT-III

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

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.2V
	Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*

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

Without CONSULT-III

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

(+)		(–)		Condition	Voltage
Connec-tor	Terminal	Connec-tor	Terminal		
F43	73 (MAF sensor signal)	F43	51	Ignition switch ON (Engine stopped.)	Approx. 0.4V
				Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.2V
				Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*

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

Is the inspection result normal?

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

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

1. Turn ignition switch OFF.
2. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. CHECK MASS AIR FLOW SENSOR-II

With CONSULT-III

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

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.2V
	Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*

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

Without CONSULT-III

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

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	73 (MAF sensor signal)	F43	51	Ignition switch ON (Engine stopped.)	Approx. 0.4V
				Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.2V
				Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*

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

Is the inspection result normal?

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

4. CHECK MASS AIR FLOW SENSOR-III

With CONSULT-III

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

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.2V
	Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*

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

Without CONSULT-III

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

(+)		(–)		Condition	Voltage
Connec-tor	Terminal	Connec-tor	Terminal		
F43	73 (MAF sensor signal)	F43	51	Ignition switch ON (Engine stopped.)	Approx. 0.4V
				Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
				Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*

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

Is the inspection result normal?

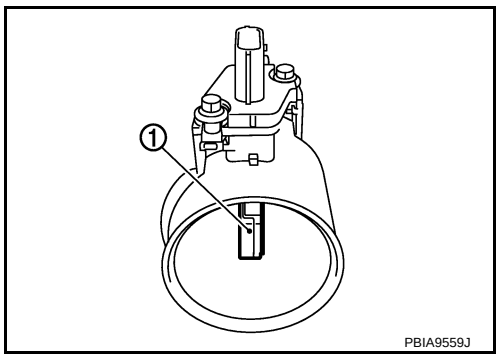
YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor.

P0112, P0113 IAT SENSOR

Description

INFOID:0000000001309710

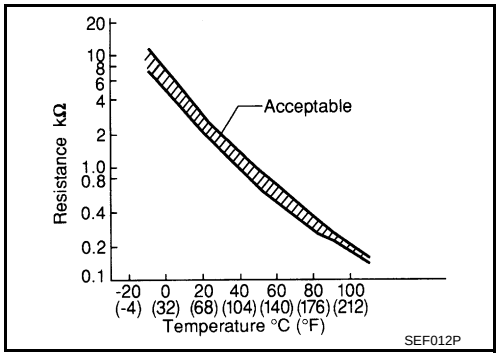
The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

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

*: These data are reference values and are measured between ECM terminals 67 (Intake air temperature sensor) and 48.



DTC Logic

INFOID:0000000001309711

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.) • Intake air temperature sensor
P0113	Intake air 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

1. Start engine and run it for 5 minutes at idle speed.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-132, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309712

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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

MAF sensor		Ground	Voltage
Connector	Terminal		
E18	2	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

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

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	1	F43	48	Existed

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to ECQ-132, "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-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001309713

1.CHECK INTAKE AIR TEMPERATURE SENSOR

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

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

Is the inspection result normal?

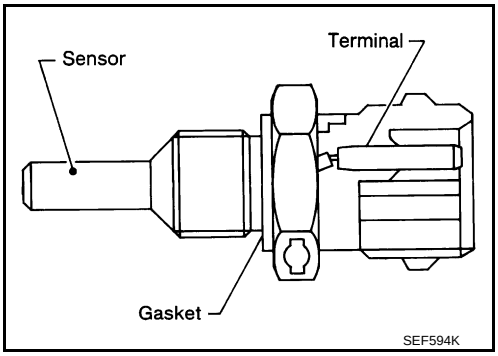
YES >> INSPECTION END
NO >> Replace mass air flow sensor (with intake air temperature sensor).

P0117, P0118 ECT SENSOR

Description

INFOID:0000000001309714

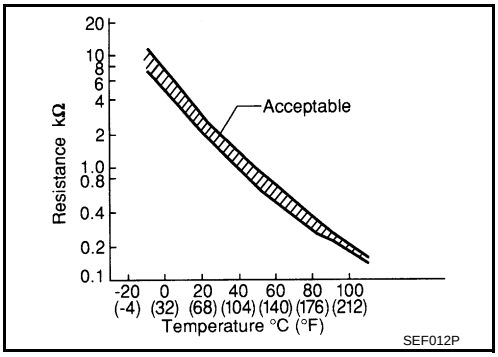
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

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

*: These data are reference values and are measured between ECM terminals 75 (Engine coolant temperature sensor) and 56.



DTC Logic

INFOID:0000000001309715

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.) • Engine coolant temperature sensor
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

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Turn ignition switch ON and wait at least 5 seconds.
4. Check DTC.

Is DTC detected?

YES >> Go to ECQ-135, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309716

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT

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

ECT sensor		Ground	Voltage
Connector	Terminal		
F80	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

ECT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F80	2	F43	56	Existed

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to ECQ-135, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace engine coolant temperature sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

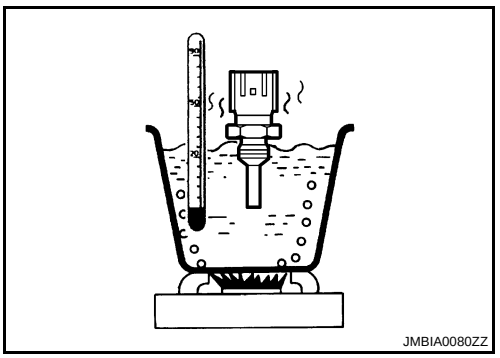
Component Inspection

INFOID:0000000001309717

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Remove engine coolant temperature sensor.

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



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

Is the inspection result normal?

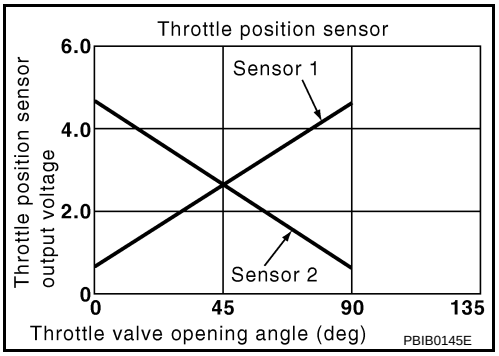
YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor.

P0122, P0123 TP SENSOR

Description

INFOID:0000000001309718

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001309719

DTC DETECTION 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.) (APP sensor 1 circuit is open or shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) • Electric throttle control actuator (TP sensor 2) • Accelerator pedal position sensor (APP sensor 1) • Camshaft position sensor (PHASE) • Refrigerant pressure sensor
P0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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 8V 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 ECQ-137, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309720

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-I

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

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-II

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F43	15	Refrigerant pressure sensor	E49	3
	33	CMP sensor (PHASE)	F26	1
	34	TP sensor	F29	1
E19	113	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.
- Refrigerant pressure sensor (Refer to ECQ-312, "Diagnosis Procedure".)
- Camshaft position sensor (PHASE) (Refer to ECQ-213, "Component Inspection".)
- Accelerator pedal position sensor(APP sensor) (Refer to ECQ-277, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning component.

5.CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F43	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 THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	3	F43	72	Existed

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

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK THROTTLE POSITION SENSOR

Refer to ECQ-139, "Component Inspection".

Is the inspection result normal?

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

8.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to ECQ-140, "Special Repair Requirement".

>> INSPECTION END

9.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001309721

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform ECQ-19, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift 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				
F29	71 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	72 (TP sensor 2 signal)			Fully released	Less than 4.75V
				Fully depressed	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. Go to ECQ-140, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001309722

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-19, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

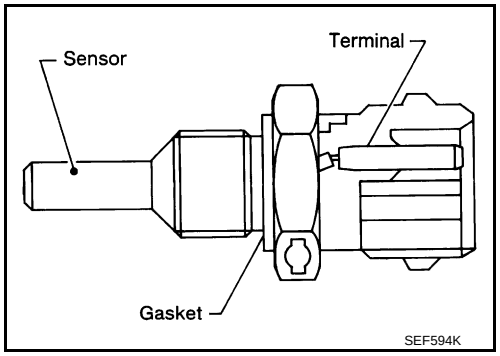
>> END

P0125 ECT SENSOR

Description

INFOID:0000000001309723

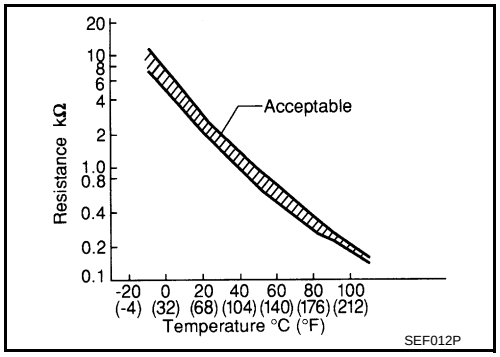
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

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

*: These data are reference values and are measured between ECM terminals 75 (Engine coolant temperature sensor) and 56.



DTC Logic

INFOID:0000000001309724

DTC DETECTION LOGIC

NOTE:
If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to ECQ-134, "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.	• 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

With CONSULT-III
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Check that “COOLAN TEMP/S” is above 21°C (70°F).

With GST
Follow the procedure “With CONSULT-III” above.

Is it above 21°C (70°F)?

YES >> INSPECTION END
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Start engine and run it for 65 minutes at idle speed.
2. Check 1st tip DTC.

If “COOLAN TEMP/S” increases to more than 10°C (50°F) within 20 minutes, stop engine because the test result will be OK.

CAUTION:

Be careful not to overheat engine.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> ECQ-142, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309725

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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 ECQ-142, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace engine coolant temperature sensor.

3. CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace thermostat. Refer to CO-58, "Removal and Installation".

4. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

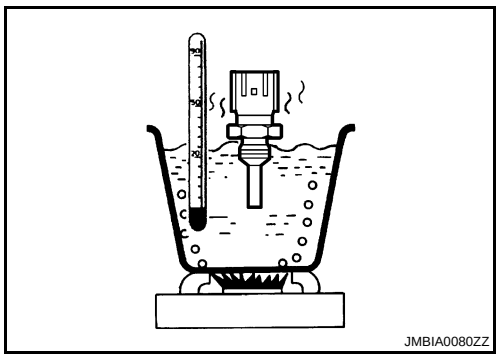
Component Inspection

INFOID:0000000001309726

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Remove engine coolant temperature sensor.

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



Terminals	Condition		Resistance
1 and 2	Temperature °C (°F)	20 (68)	2.37 - 2.63 kΩ
		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.

P0130 A/F SENSOR 1

Description

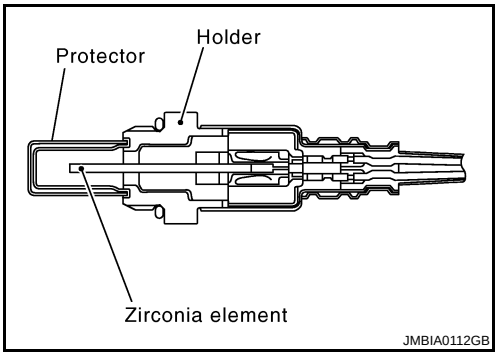
INFOID:0000000001309734

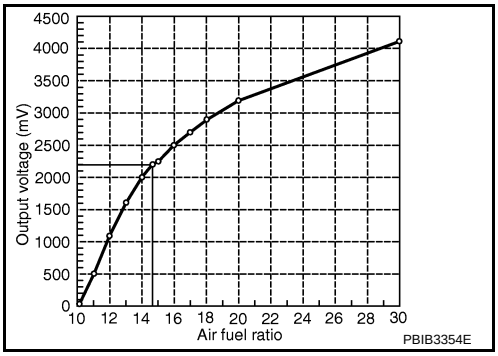
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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:0000000001309735

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 circuit	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2V.	• 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 11V at idle.

Do you have CONSULT-III ?

YES >> GO TO 2.
NO >> GO TO 6.

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

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-III.
3. Check “A/F SEN1 (B1)”indication.

Does the indication fluctuates around 2.2V?

YES >> GO TO 3.
NO >> Go to ECQ-146, "Diagnosis Procedure".

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-I

1. Select “A/F SEN1 (B1) P1276” of “A/F SEN1” in “DTC WORK SUPPORT” mode with CONSULT-III.
2. Touch “START”.
3. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen.

ENG SPEED	1,750 - 2,600 rpm
VHCL SPEED SE	More than 64 km/h (40 mph)
B/FUEL SCHDL	1.0 - 8.0 msec
Shift 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-III screen?

YES >> GO TO 4.
NO >> Check A/F sensor 1 function again. GO TO 2.

4. 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 5.
OUT OF CONDITION>>Retry DTC CONFIRMATION PROCEDURE. GO TO 3.

5. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-III

Touch “SELF-DIAG RESULT”

Which is displayed on CONSULT-III screen?

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

6. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform Component Function Check. Refer to ECQ-145, "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 ECQ-146, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001309736

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.
3. Set D (CVT) or 1st (M/T) position, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

   CAUTION:

   Always drive vehicle at a safe speed.

   NOTE:

   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 for five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 for five times.

8. Stop the vehicle and connect GST to the vehicle.
9. Check 1st trip DTC.

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000001309737

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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 sensor 1		Ground	Voltage
Connector	Terminal		
F27	4	Ground	Battery voltage

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R harness connector E14
- 15A 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

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	
F27	1	F43	54	Existed
	2		53	

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

A/F sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F27	1	F43	54	Ground	Not existed
	2		53		

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-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

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

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

CAUTION:

- **Discard any 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 tool and approved anti-seize lubricant.**

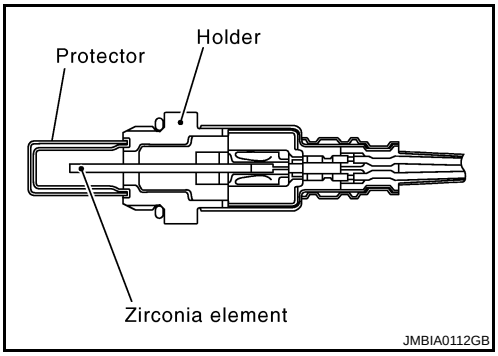
>> INSPECTION END

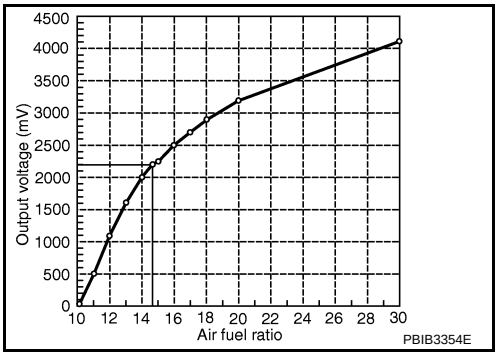
P0131 A/F SENSOR 1

Description

INFOID:0000000001309738

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:0000000001309739

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. 0V.	• 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 10.5V at idle.

>> GO TO 2.

2.CHECK A/F SENSOR FUNCTION

With CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-III.
3. Check “A/F SEN1 (B1)” indication.

With GST
Follow the procedure “With CONSULT-III” above.

Is the indication constantly approx. 0V?

YES >> Go to ECQ-149, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
   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
Shift 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-III” above.

Is 1st trip DTC detected?

YES >> Go to ECQ-149, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309740

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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 sensor 1		Ground	Voltage
Connector	Terminal		
F27	4	Ground	Battery voltage

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

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

>> Repair or replace harness or connectors.

4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F27	1	F43	54	Existed
	2		53	

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

A/F sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F27	1	F43	54	Ground	Not existed
	2		53		

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-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

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

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

CAUTION:

- **Discard any 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 tool and approved anti-seize lubricant.**

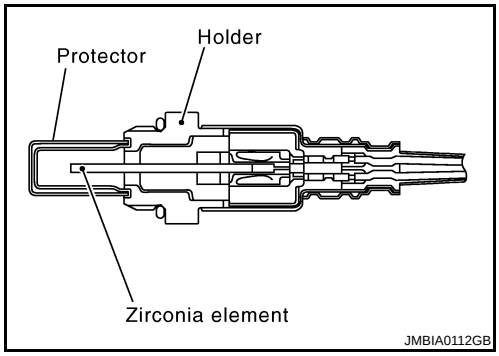
>> INSPECTION END

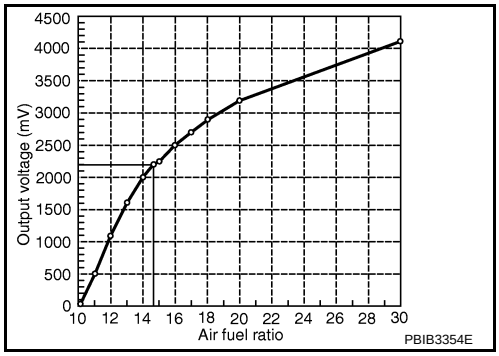
P0132 A/F SENSOR 1

Description

INFOID:0000000001309741

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:0000000001309742

DTC DETECTION LOGIC

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	Air fuel ratio (A/F) sensor 1 circuit high voltage	• The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5V.	• 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 10.5V at idle.

>> GO TO 2.

2.CHECK A/F SENSOR FUNCTION

With CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-III.
3. Check “A/F SEN1 (B1)” indication.

With GST
Follow the procedure “With CONSULT-IIII” above.

Is the indication constantly approx. 5V?

YES >> Go to ECQ-152, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
   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
Shift 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-III” above.

Is 1st trip DTC is detected?

YES >> Go to ECQ-152, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309743

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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 sensor 1		Ground	Voltage
Connector	Terminal		
F27	4	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R harness connector E14
- 15A fuse (No. 63)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F27	1	F43	54	Existed
	2		53	

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

A/F sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F27	1	F43	54	Ground	Not existed
	2		53		

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-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

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

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

CAUTION:

- **Discard any 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 tool and approved anti-seize lubricant.**

>> INSPECTION END

P0133 A/F SENSOR 1

Description

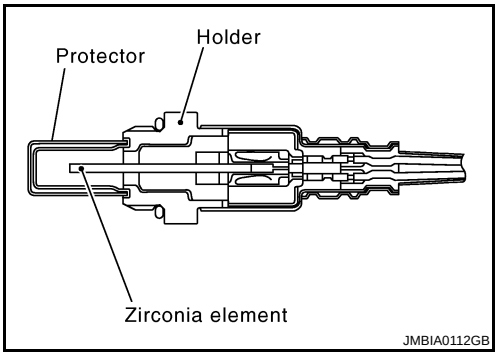
INFOID:0000000001309744

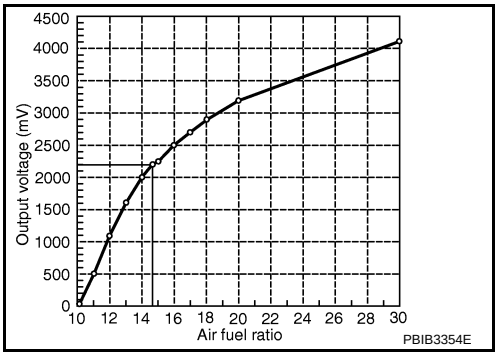
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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:0000000001309745

DTC DETECTION LOGIC

To judge the malfunction of A/F sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the A/F sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the A/F sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0133	Air fuel ratio (A/F) sensor 1 circuit slow response	• The response of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • A/F sensor 1 • A/F sensor 1 heater • Fuel pressure • Fuel injector • Intake air leaks • Exhaust gas leaks • PCV • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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 11V at idle.

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 5.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
4. Let engine idle for 1 minute.
5. Select “A/F SEN1(B1) P1278/P1279” of “A/F SEN1” in “DTC WORK SUPPORT” mode with CONSULT-III.
6. Touch “START”.

Is “COMPLETED” displayed on COUSULT-III?

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

3. PERFORM DTC CONFIRMATION PROCEDURE-II

Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT-III?

OK >> INSPECTION END
NG >> Go to ECQ-156, "Diagnosis Procedure".

4. PERFORM DTC CONFIRMATION PROCEDURE

1. After perform the following procedure, “TESTING” will be displayed on the CONSULT-III screen.
- Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
- Fully release accelerator pedal and then let engine idle for about 10 seconds.

If “TESTING” is not displayed after 10 seconds, refer to ECQ-98, "Component Function Check".

2. Wait for about 20 seconds at idle at under the condition that “TESTING” is displayed on the CONSULT-III screen.
3. Make sure that “TESTING” changes to “COMPLETED”.

If “TESTING” changed to “OUT OF CONDITION”, refer to ECQ-98, "Component Function Check".

4. Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT-III?

OK >> INSPECTION END
NG >> Go to ECQ-156, "Diagnosis Procedure".

5. CHECK AIR-FUEL RATIO SELF-LEARNING VALUE

With GST

1. Start engine and warm it up to normal operating temperature.
2. Select Service $01 with GST.
3. Calculate the total value of “Short term fuel trim” and “Long term fuel trim” indications.

Is the total percentage within ±12%?

YES >> GO TO 7.
NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Intake air leaks
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Fuel injector
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor

>> Repair or replace malfunctioning part.

7. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.

3. Let engine idle for 1 minute.
4. Drive vehicle at a speed of 80 km/h (50 MPH) or more at least 10 consecutive minutes.
   CAUTION:
   Always drive vehicle at a safe speed.
5. Check 1st trip DTC detected?.

Is 1st trip DTC detected?

YES >> Go to ECQ-156, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309746

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

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

2.RETIGHTEN A/F SENSOR 1

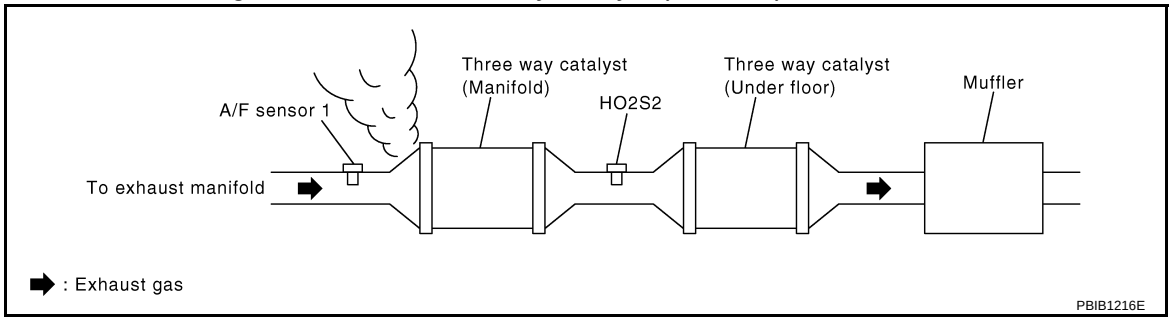
Loosen and retighten the A/F sensor 1.

Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> 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.

4.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.
NO >> GO TO 5.

5.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to ECQ-20, "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 P172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to ECQ-183, "DTC Logic" or ECQ-187, "DTC Logic".
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 sensor 1		Ground	Voltage
Connector	Terminal		
F27	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R harness connector E14
- 15A fuse (No. 63)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F27	1	F43	54	Existed
	2		53	

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

A/F sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F27	1	F43	54	Ground	Not existed
	2		53		

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 ECQ-116, "Component Inspection".

Is the inspection result normal?

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

10. CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor.
Refer to ECQ-123, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace mass air flow sensor.

11. CHECK PCV VALVE

Refer to ECQ-311, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair or replace PCV valve.

12. CHECK INTERMITTENT INCIDENT

Perform GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair or replace.

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

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

CAUTION:

- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

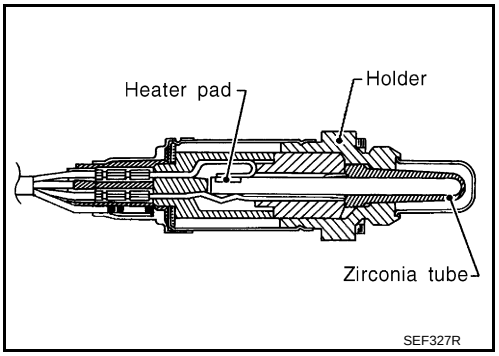
>> INSPECTION END

P0136 HO2S2

Description

INFOID:0000000001348555

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 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



DTC Logic

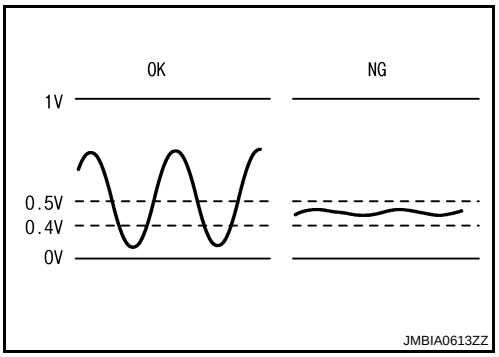
INFOID:0000000001348556

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

Under the condition in which the heated oxygen sensor 2 signal is not input, the ECM circuits will read a continuous approximately 0.4 - 0.5V. Therefore, for this diagnosis, the time that output voltage is within 400 - 500 mV range is monitored, and the diagnosis checks that this time is not inordinately long.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0136	Heated oxygen sensor 2 circuit	The voltage from the sensor is constantly approx.0.4 - 0.5V.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen 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.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 12 minute under no load.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-160, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001348558

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	1	F43	46	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.

3.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	4	F43	65	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F31	4	F43	65	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 2

Refer to ECQ-161, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001348559

1. INSPECTION START

Do you have CONSULT-III?

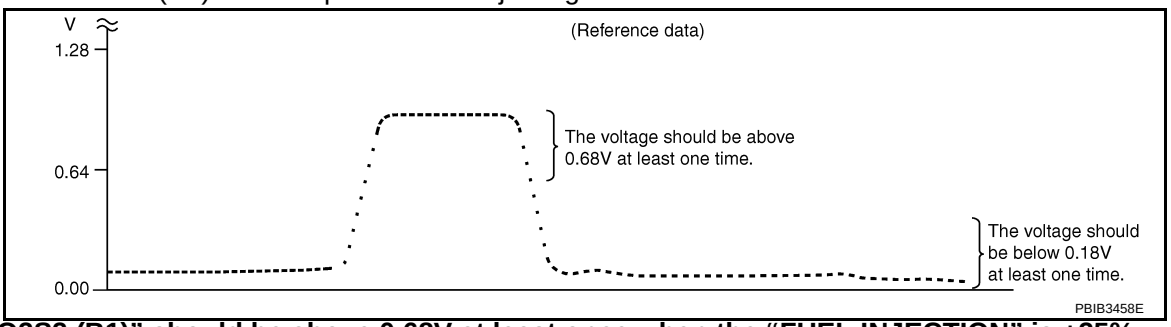
Do you have CONSULT-III?

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

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.18V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F43	65 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.18V 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			
F43	65 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.18V 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			
F43	65 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.18V 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.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

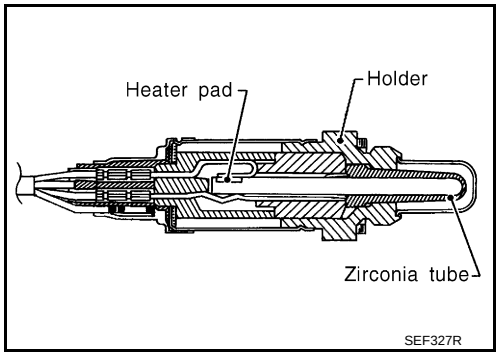
>> INSPECTION END

P0137 HO2S2

Description

INFOID:0000000001309747

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 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



DTC Logic

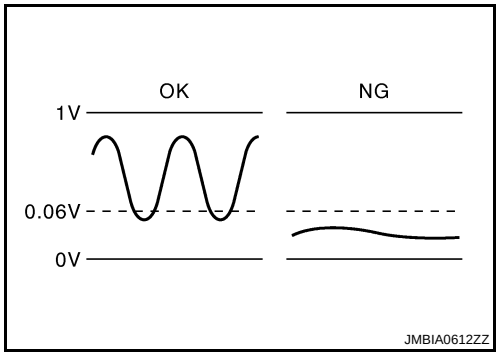
INFOID:0000000001309748

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.

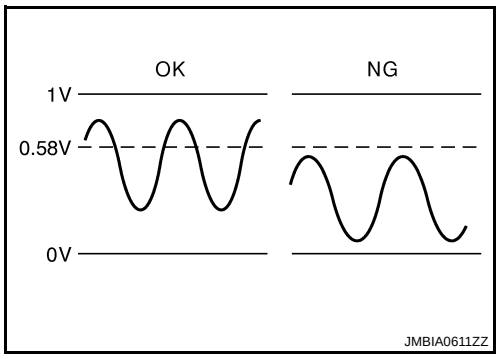
MALFUNCTION A

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually low during the various driving condition such as fuel-cut.



MALFUNCTION B

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	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
		B)	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.FOR MALFUNCTION A

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. Make sure that fuel tank is not empty.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 12 minute under no load.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-174, "Diagnosis Procedure".
NO-1 >> With CONSULT-III: GO TO 3.
NO-2 >> Without CONSULT-III: GO TO 12.

3.FOR MALFUNCTION B

“COMPLETED” will appear on CONSULT-III screen when all tests “COND1”, “COND2” and “COND3” are completed.

TESTING CONDITION:

- **For the best results, perform ″DTC WORK SUPPORT″ at a temperature of 0 to 30°C (32 to 86°F).**
- **Never stop engine during this procedure. If the engine is stopped, retry this procedure from step 2 in Procedure for COND1.**

CAUTION:

Always drive at safe speed.

>> GO TO 4.

4.PERFORM PROCEDURE FOR COND1-I

Start engine and warm it up to normal operating temperature.

>> GO TO 5.

5.PERFORM PROCEDURE FOR COND1-II

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 6.

6.PERFORM PROCEDURE FOR COND1-IV

1. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
2. Let engine idle 1 minute.
3. Select “HO2S2 (B1) P1146” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.

5. Start engine and let it idle for at least 30 seconds.
6. Rev engine up to 2,000 rpm two or three times quickly under no load.

Is “CONPLETED” appears on CONSULT-III screen?

YES >> GO TO 10.
NO >> GO TO 7.

7. PERFORM PROCEDURE FOR COND1-I

When the following conditions are met, “TESTING” will be displayed at “COND1” on the CONSULT-III screen. Maintain the condition continuously until “TESTING” changes to “COMPLETED” (It will take approximately 60 seconds.)

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	More than 70°C (158°F)
Shift level	Suitable position

Which displayed on CONSULT-III screen?

COND1: OUT OF CONDITION>>GO TO 5.
COND1: COMPLETED COND2: INCOMPLETED>>GO TO 8.
COND1: COMPLETED COND2: COMPLETED>>GO TO 9.

8. PERFORM PROCEDURE FOR COND2

While driving, release accelerator pedal completely from the above condition until “INCOMPLETED” at “COND2” on CONSULT-III screen has turned to “COMPLETED”. (It will take approximately 4 seconds.)

Which displayed on CONSULT-III screen?

COND2: COMPLETED COND3: INCOMPLETED>>GO TO 9.
COND2: COMPLETED COND3: COMPLETED>>GO TO 10.

9. PERFORM PROCEDURE FOR COND3

Stop vehicle and let it idle until “INCOMPLETED” of “COND3” on CONSULT-III screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)

>> GO TO 10.

10. PERFORM PROCEDURE FOR COND3-I

Touch “SELF DIAGRESULTS”.

Which displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to ECM-233, "Diagnosis Procedure".
CAN NOT BE DIAGNOSED>>GO TO 11.

11. PERFORM PROCEDURE FOR COND3-II

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-III.
3. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT-III.
4. When “COOLAN TEMP/S” indication reaches to 70°C (158°F).

>> GO TO 5.

12. PREFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to ECM-225, "Component Function Check".

NOTE:
Use component function 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 ECM-233, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001309749

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connectors terminals under the following conditions.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	65 (HO2S2 signal)	F43	46	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.58V 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 connectors terminals under the following conditions.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	65 (HO2S2 signal)	F43	46	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.58V 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 connectors terminals under the following conditions.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	65 (HO2S2 signal)	F43	46	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.58V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-166, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001309750

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to ECQ-171, "DTC Logic".

Which malfunction is detected?

A >> GO TO 2.
B >> GO TO 9.

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	1	F43	46	Existed

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	4	F43	65	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F31	4	F43	65	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness or connectors.

6. CHECK HEATED OXYGEN SENSOR 2

Refer to ECQ-177, "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.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

9. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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

1. Clear the mixture ratio self-learning value. Refer to ECQ-20, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0172. Refer to ECQ-187, "DTC Logic".
NO >> GO TO 11.

11. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	1	F43	46	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.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	4	F43	65	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F31	4	F43	65	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 ECQ-177, "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.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

15. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001309751

1. INSPECTION START

Do you have CONSULT-III?

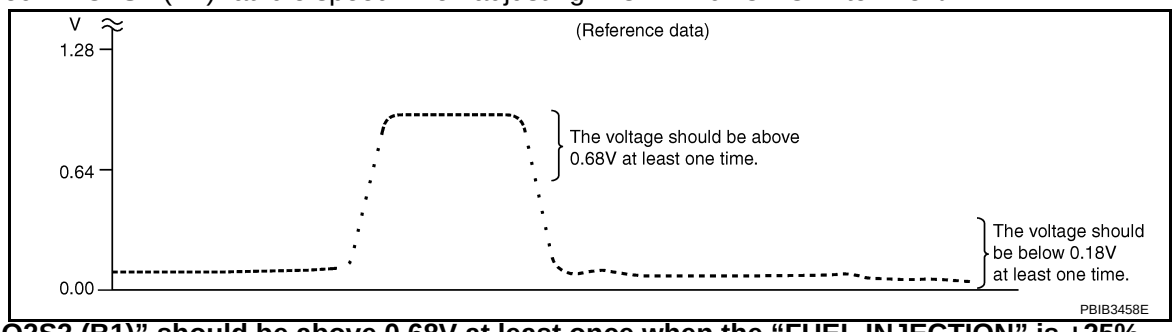
Do you have CONSULT-III?

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

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.18V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.

4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connectors terminals under the following conditions.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	65 (HO2S2 signal)	F43	46	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.18V 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 connectors terminals under the following conditions.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	65 (HO2S2 signal)	F43	46	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.18V 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 connectors terminals under the following conditions.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	65 (HO2S2 signal)	F43	46	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.18V 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.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

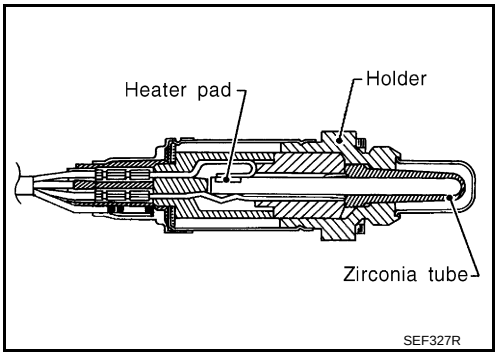
>> INSPECTION END

P0138 HO2S2

Description

INFOID:0000000001309752

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 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



DTC Logic

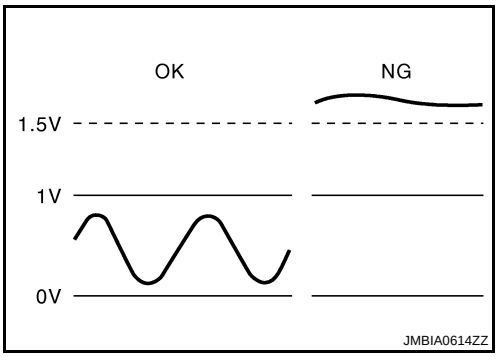
INFOID:0000000001309753

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.

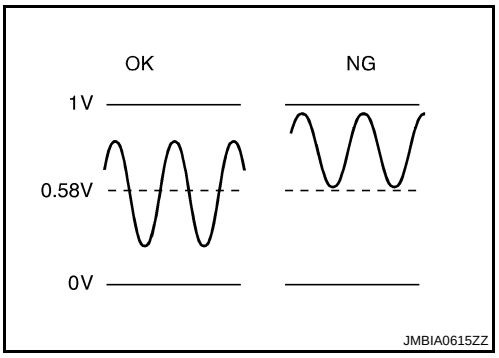
MALFUNCTION A

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
P0138	Heated oxygen sensor 2 circuit high voltage	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
		B)	The minimum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector

DTC CONFIRMATION PROCEDURE

1.FOR MALFUNCTION A

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 11V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 12 minute under no load.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-174, "Diagnosis Procedure".
NO-1 >> With CONSULT-III: GO TO 3.
NO-2 >> Without CONSULT-III: GO TO 5.

3.FOR MALFUNCTION B

“COMPLETED” will appear on CONSULT-III screen when all tests “COND1”, “COND2” and “COND3” are completed.

TESTING CONDITION:

- **For the best results, perform ″DTC WORK SUPPORT″ at a temperature of 0 to 30°C (32 to 86°F).**
- **Never stop engine during this procedure. If the engine is stopped, retry this procedure from step 2 in Procedure for COND1.**

CAUTION:

Always drive at safe speed.

>> GO TO 4.

4.PERFORM PROCEDURE FOR COND1-I

Start engine and warm it up to normal operating temperature.

>> GO TO 5.

5.PERFORM PROCEDURE FOR COND1-II

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 6.

6.PERFORM PROCEDURE FOR COND1-IV

1. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
2. Let engine idle 1 minute.
3. Select “HO2S2 (B1) P1146” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 30 seconds.
6. Rev engine up to 2,000 rpm two or three times quickly under no load.

Is “CONPLETED” appears on CONSULT-III screen?

YES >> GO TO 10.
NO >> GO TO 7.

7.PERFORM PROCEDURE FOR COND1-I

When the following conditions are met, “TESTING” will be displayed at “COND1” on the CONSULT-III screen. Maintain the condition continuously until “TESTING” changes to “COMPLETED” (It will take approximately 60 seconds.)

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	More than 70°C (158°F)
Shift level	Suitable position

Which displayed on CONSULT-III screen?

COND1: OUT OF CONDITION>>GO TO 5.
COND1: COMPLETED COND2: INCOMPLETED>>GO TO 8.
COND1: COMPLETED COND2: COMPLETED>>GO TO 9.

8.PERFORM PROCEDURE FOR COND2

While driving, release accelerator pedal completely from the above condition until “INCOMPLETED” at “COND2” on CONSULT-III screen has turned to “COMPLETED”. (It will take approximately 4 seconds.)

Which displayed on CONSULT-III screen?

COND2: COMPLETED COND3: INCOMPLETED>>GO TO 9.
COND2: COMPLETED COND3: COMPLETED>>GO TO 10.

9.PERFORM PROCEDURE FOR COND3

Stop vehicle and let it idle until “INCOMPLETED” of “COND3” on CONSULT-III screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)

>> GO TO 10.

10.PERFORM PROCEDURE FOR COND3-I

Touch “SELF DIAGRESULTS”.

Which displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to ECM-226, "Diagnosis Procedure".
CAN NOT BE DIAGNOSED>>GO TO 11.

11.PERFORM PROCEDURE FOR COND3-II

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-III.
3. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT-III.
4. When “COOLAN TEMP/S” indication reaches to 70°C (158°F).

>> GO TO 6.

12.PREFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to ECM-225, "Component Function Check".

NOTE:
Use component function 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 ECM-226, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001309754

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connectors terminals under the following conditions.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	65 (HO2S2 signal)	F43	46	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.58V 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 connectors terminals under the following conditions.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	65 (HO2S2 signal)	F43	46	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.58V 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 connectors terminals under the following conditions.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	65 (HO2S2 signal)	F43	46	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.58V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-174, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001309755

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to ECQ-171, "DTC Logic".

Which malfunction is detected?

A >> GO TO 2.
B >> GO TO 9.

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace ground connection.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	1	F43	46	Existed

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	4	F43	65	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F31	4	F43	65	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness or connectors.

6.CHECK HEATED OXYGEN SENSOR 2

Refer to ECQ-177, "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.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

9. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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

1. Clear the mixture ratio self-learning value. Refer to ECQ-20, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0172. Refer to ECQ-187, "DTC Logic".
NO >> GO TO 11.

11. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	1	F43	46	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.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	4	F43	65	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F31	4	F43	65	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 ECQ-177, "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.

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

15. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001309756

1. INSPECTION START

Do you have CONSULT-III?

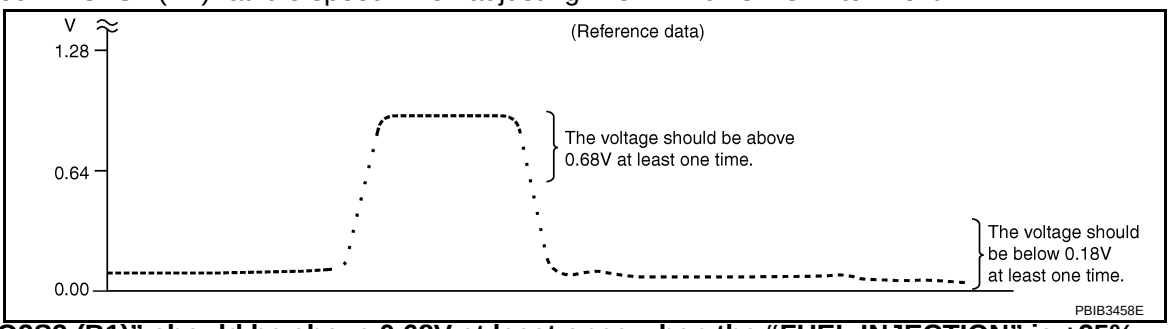
Do you have CONSULT-III?

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

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.18V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connectors terminals under the following conditions.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	65 (HO2S2 signal)	F43	46	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.18V 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 connectors terminals under the following conditions.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	65 (HO2S2 signal)	F43	46	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.18V 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 connectors terminals under the following conditions.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	65 (HO2S2 signal)	F43	46	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.18V 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.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

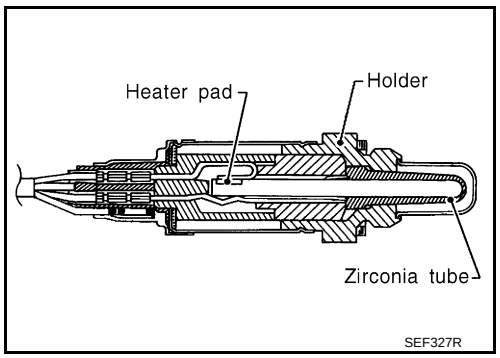
>> INSPECTION END

P0139 HO2S2

Description

INFOID:0000000001309757

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 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

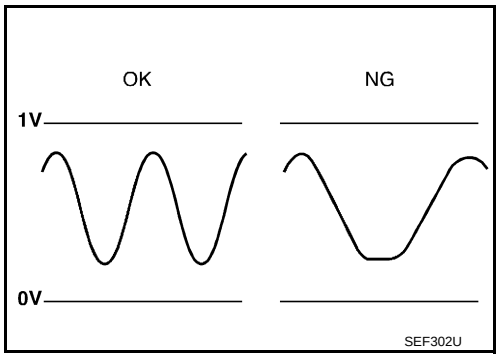


DTC Logic

INFOID:0000000001309758

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 (mamifold) 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 fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	• 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.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 select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Rev up engine to 4,000rpm and release accelerator pedal.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

OK >> INSPECTION END
NG >> Go to ECQ-180, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001309760

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

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

2.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to ECQ-20, "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 ECQ-183, "DTC Logic" or ECQ-187, "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 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	
F31	1	F43	46	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		Continuity
Connector	Terminal	Connector	Terminal	
F31	4	F43	65	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F31	4	F43	65	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 ECQ-181, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001309761

1. INSPECTION START

Do you have CONSULT-III?

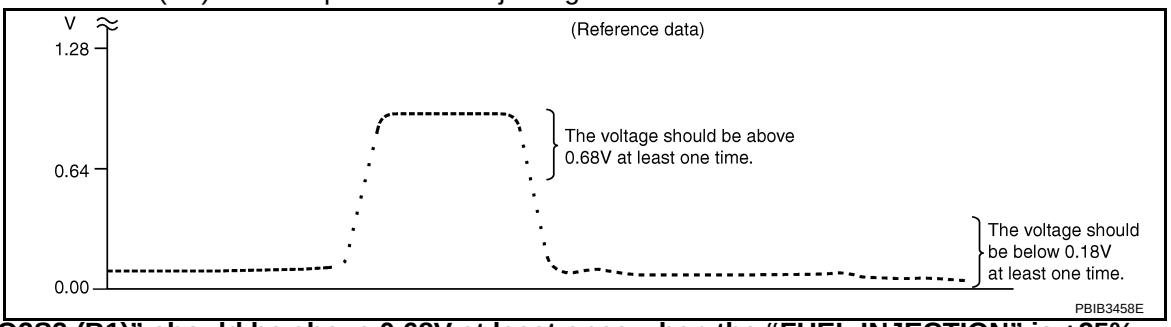
Do you have CONSULT-III?

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

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.18V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connectors terminals under the following conditions.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	65 (HO2S2 signal)	F43	46	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.18V 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 connectors terminals under the following conditions.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	65 (HO2S2 signal)	F43	46	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.18V 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 connectors terminals under the following conditions.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	65 (HO2S2 signal)	F43	46	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.18V 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.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000001309778

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 MI (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 ECQ-20, "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.

Does engine start?

YES >> Go to ECQ-184, "Diagnosis Procedure".
NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Start engine and warm it up to normal operating temperature.
2. Drive vehicle at a speed of 80 km/h (50 MPH) or more at least 10 consecutive minutes.
   CAUTION:
   Always drive vehicle at a safe speed.
3. Let engine idle at least 10 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-184, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. 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.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

3. Check 1st trip DTC.

Is 1st trip DTC detected?

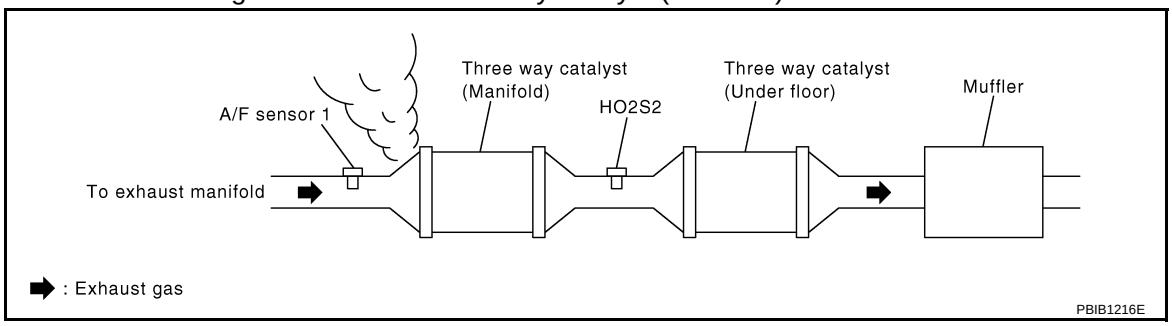
YES >> Go to ECQ-184, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309779

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

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.

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 sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F27	1	F43	54	Existed
	2		53	

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

A/F sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F27	1	F43	54	Ground	Not existed
	2		53		

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. Release fuel pressure to zero. Refer to ECQ-356, "Inspection".
2. Install fuel pressure gauge and check fuel pressure. Refer to ECQ-356, "Inspection".

At idling: Approximately 350 kPa (3.5bar, 3.57 kg/cm^2, 51 psi)

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”.
NO >> Repair or replace

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-III.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10.0 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10.0 g·m/sec: at 2,500 rpm

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 ECQ-121, "DTC Logic".

7. CHECK FUNCTION OF FUEL INJECTOR

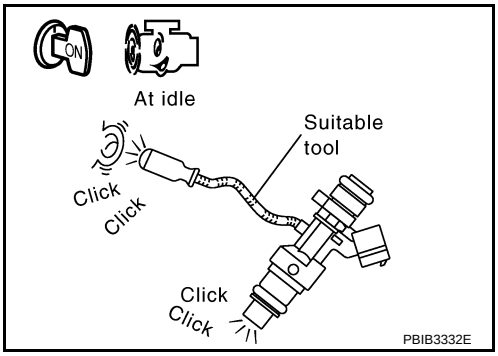
With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-III

1. Let engine idle.

2. Listen to each fuel injector operating sound.



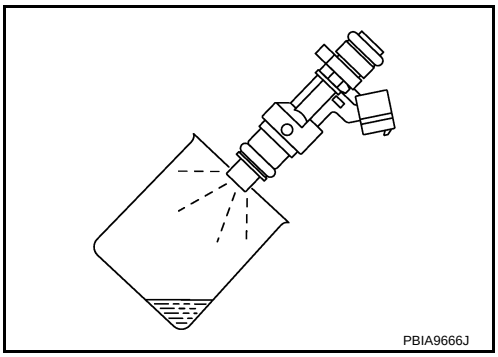
Clicking noise should be heard.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to ECQ-191, "Diagnosis Procedure".

8. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Remove fuel tube assembly. Refer to EM-166, "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.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000001309780

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 MI (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

1. Clear the mixture ratio self-learning value. Refer to ECQ-20, "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.

Does engine start?

YES >> Go to ECQ-188, "Diagnosis Procedure".
NO >> Remove spark plugs and check for fouling, etc.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Start engine and warm it up to normal operating temperature.
2. Drive vehicle at a speed of 80 km/h (50 MPH) or more at least 10 consecutive minutes.
   CAUTION:
   Always drive vehicle at a safe speed.
3. Let engine idle at least 10 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-188, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-III

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

2. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. 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.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

3. Check 1st trip DTC.

Is 1st trip DTC detected?

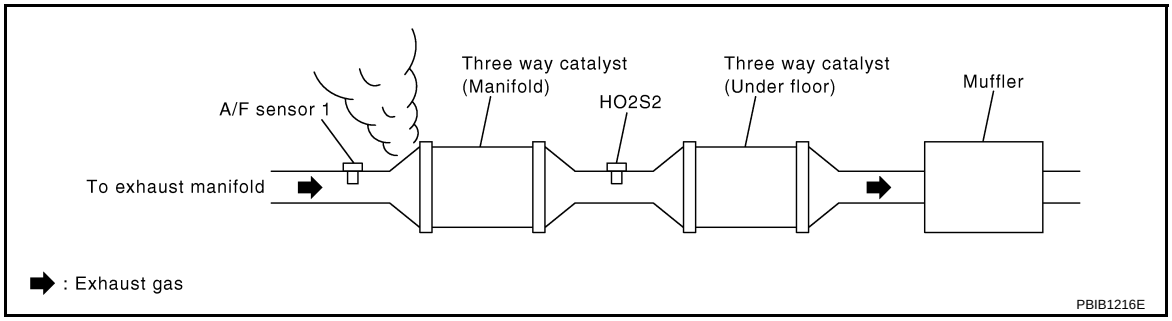
YES >> Go to ECQ-188, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309781

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 sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F27	1	F43	54	Existed
	2		53	

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

A/F sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F27	1	F43	54	Ground	Not existed
	2		53		

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. Release fuel pressure to zero. Refer to ECQ-356, "Inspection".
2. Install fuel pressure gauge and check fuel pressure. Refer to ECQ-356, "Inspection".

At idling: Approximately 350 kPa (3.5bar, 3.57 kg/cm^2, 51 psi)

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”.
NO >> Repair or replace

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-III.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10.0 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in “Service $01” with GST.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10.0 g·m/sec: at 2,500 rpm

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 ECQ-121, "DTC Logic".

7. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT-III

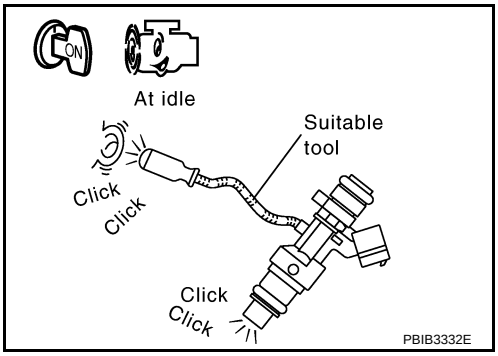
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-III

1. 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.
NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to ECQ-191, "Diagnosis Procedure".

8. CHECK FUELINJECTOR

1. Remove fuel injector assembly. Refer to EM-166, "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.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

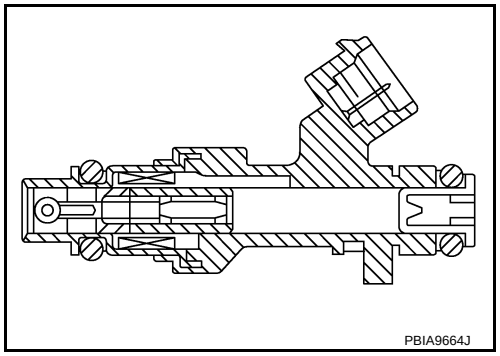
>> INSPECTION END

P0201, P0202, P0203, P0204 FUEL INJECTOR

Description

INFOID:0000000001316770

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.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DTC Logic

INFOID:0000000001316771

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0201	No. 1 cylinder fuel injector circuit	An excessively low or high voltage signal is sent to ECM through the No. 1 fuel injector	• Harness or connectors (No. 1 fuel injector circuit is open or shorted.) • No. 1 fuel injector
P0202	No. 2 cylinder fuel injector circuit	An excessively low or high voltage signal is sent to ECM through the No. 2 fuel injector	• Harness or connectors (No. 2 fuel injector circuit is open or shorted.) • No. 2 fuel injector
P0203	No. 3 cylinder fuel injector circuit	An excessively low or high voltage signal is sent to ECM through the No. 3 fuel injector	• Harness or connectors (No. 3 fuel injector circuit is open or shorted.) • No. 3 fuel injector
P0204	No. 4 cylinder fuel injector circuit	An excessively low or high voltage signal is sent to ECM through the No. 4 fuel injector	• Harness or connectors (No. 4 fuel injector circuit is open or shorted.) • No. 4 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

1. Start engine and wait at least 1 second.
2. 1st trip Check DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-191, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001316772

1.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel injector harness connector and ground.

DTC	Fuel injector			Ground	Voltage
	Cylinder	Connector	Terminal		
P0201	1	F37	1	Ground	Battery voltage
P0202	2	F38	1		
P0203	3	F39	1		
P0204	4	F40	1		

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
- 15A fuse (No. 64)
- 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

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

DTC	Fuel injector			ECM		Continuity
	Cylinder	Connector	Terminal	Connector	Terminal	
P0201	1	F37	2	F14	59	Existed
P0202	2	F38	2		23	
P0203	3	F39	2		60	
P0204	4	F40	2		21	

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 ECQ-192, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning fuel injector.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

Component Inspection

INFOID:0000000001316773

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as follows.

Terminals	Resistance
1 and 2	11.1 - 14.3Ω [at 10 -60°C (50 - 140°F)]

Is the inspection result normal?

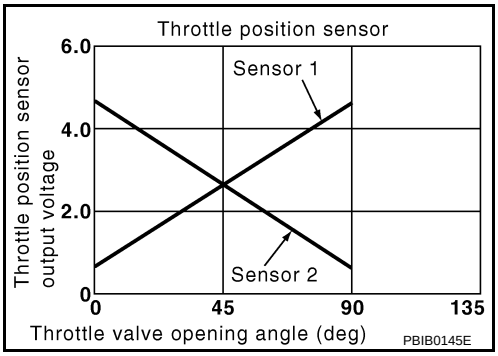
YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector.

P0222, P0223 TP SENSOR

Description

INFOID:0000000001309790

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001309791

DTC DETECTION 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.) (APP sensor 1 circuit is open or shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) • Electric throttle control actuator (TP sensor 1) • Accelerator pedal position sensor (APP sensor 1) • Camshaft position sensor (PHASE) • Refrigerant pressure sensor
P0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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 8V 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 ECQ-194, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309792

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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-II

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

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-II

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F43	15	Refrigerant pressure sensor	E49	3
	33	CMP sensor (PHASE)	F26	1
	34	TP sensor	F29	1
E19	113	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.
- Refrigerant pressure sensor (Refer to ECQ-312, "Diagnosis Procedure".)
- Camshaft position sensor (PHASE) (Refer to ECQ-213, "Component Inspection".)
- Accelerator pedal position sensor(APP sensor) (Refer to ECQ-277, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning component.

5. CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F43	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 THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	2	F43	71	Existed

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

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK THROTTLE POSITION SENSOR

Refer to ECQ-196, "Component Inspection".

Is the inspection result normal?

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

8.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to ECQ-197, "Special Repair Requirement".

>> INSPECTION END

9.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001309793

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform ECQ-19, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector terminals as follows.

(–)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
F43	71 (TP sensor 1 signal)	F43	52	Accelerator pedal	Fully released	More than 0.36V
					Fully depressed	Less than 4.75V
	72 (TP sensor 2 signal)				Fully released	Less than 4.75V
					Fully depressed	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. Go to ECQ-197, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001309794

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-19, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> END

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

INFOID:0000000001309795

DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the 1st trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MI 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 MI will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MI will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MI will remain on.
   If another misfire condition occurs that can damage the TWC, the MI 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 MI will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • The fuel injector circuit is open or shorted • Fuel injector • Intake air leak • The ignition signal circuit is open or shorted • Lack of fuel • Signal plate • A/F sensor 1 • Incorrect PCV hose connection
P0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	

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.
3. Rev engine up to more than 3,000 rpm then release the accelerator pedal completely.
4. Repeat step 3 again.
5. Let engine idle for about 15 minutes.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-199, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Turn ignition switch OFF and wait at least 10 seconds.
2. 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 ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

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

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-199, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309796

1.CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
3. Check PCV hose connection.

Is intake air leak detected?

YES >> Discover air leak location and repair.
NO >> GO TO 2.

2.CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 3.
YES-2 >> Without CONSULT-III: GO TO 4.
NO >> Repair or replace it.

3.PERFORM POWER BALANCE TEST

With CONSULT-III

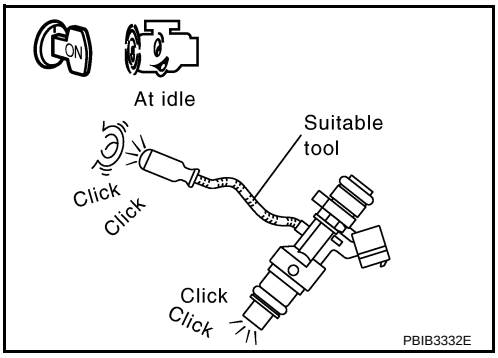
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 4.

4. CHECK FUNCTION OF FUEL INJECTOR

1. Start engine and let engine idle.
2. Listen to each fuel injector operating sound.



Clicking noise should be heard.

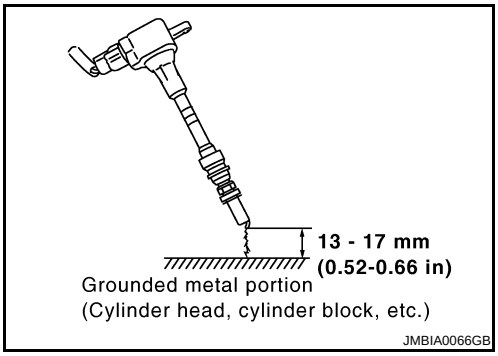
Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to ECQ-192, "Component Inspection".

5. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 6.

6. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

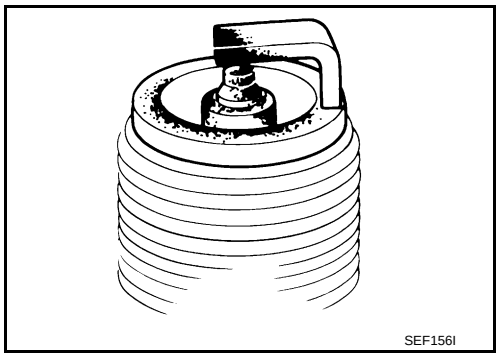
Spark should be generated.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Check ignition coil, power transistor and their circuits. Refer to ECQ-241, "Component Function Check".

7. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.



Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-141, "Removal and Installation".
NO >> Repair or clean spark plug. Then GO TO 8.

8. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-141, "Removal and Installation".

9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-146, "Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to ECQ-356, "Inspection".
3. Install fuel pressure gauge and check fuel pressure. Refer to ECQ-356, "Inspection".

At idling: Approximately 350 kPa (3.5bar, 3.57 kg/cm^2, 51 psi)

Is the inspection result normal?

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

11. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”.
NO >> Repair or replace.

12. CHECK IGNITION TIMING

For procedure, refer to ECQ-14, "BASIC INSPECTION : Special Repair Requirement".For specification, refer toECQ-358, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Follow the ECQ-14, "BASIC INSPECTION : Special Repair Requirement".

13. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F27	1	F43	54	Existed
	2		53	

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

A/F sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F27	1	F43	54	Ground	Not existed
	2		53		

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 ECQ-116, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace A/F sensor 1.

15. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-III.

1.0 - 4.0 g·m/sec : at idling
4.0 - 10.0 g·m/sec : at 2,500 rpm

With GST

Check mass air flow sensor signal in Service $01 with GST.

1.0 - 4.0 g·m/sec : at idling
4.0 - 10.0 g·m/sec : at 2,500 rpm

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 ECQ-121, "DTC Logic".

16. CHECK SYMPTOM TABLE

Check items on the rough idle symptom in ECQ-345, "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 ECQ-79, "Diagnosis Description".

>> GO TO 18.

18. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

P0327 KS

Description

INFOID:0000000001309797

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

DTC Logic

INFOID:0000000001309798

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.) • 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 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Maintain the following conditions for 1 consecutive minute.

Engine speed	More than 1,240 rpm (CVT) More than 2,500 rpm (M/T)
Vehicle speed	More than 70 km/h (43 MPH) (CVT) More than 100 km/h (62 MPH) (M/T)
Shift lever	Suitable position

Is 1st trip DTC detected?

YES >> Go to ECQ-204, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309799

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

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

2.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	
F16	1	F43	63	Existed
	2		44	

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

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK KNOCK SENSOR

Refer to ECQ-205, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace knock sensor.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001309800

1.CHECK KNOCK SENSOR

1. Turn ignition switch OFF.
2. Disconnect knock sensor harness connector.
3. Check resistance between knock sensor terminals as follows.
   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

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?

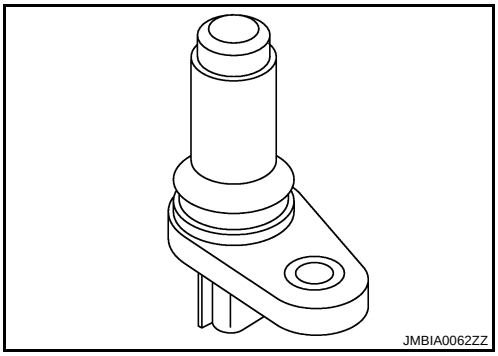
YES >> INSPECTION END
NO >> Replace knock sensor.

P0335 CKP SENSOR (POS)

Description

INFOID:0000000001309801

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.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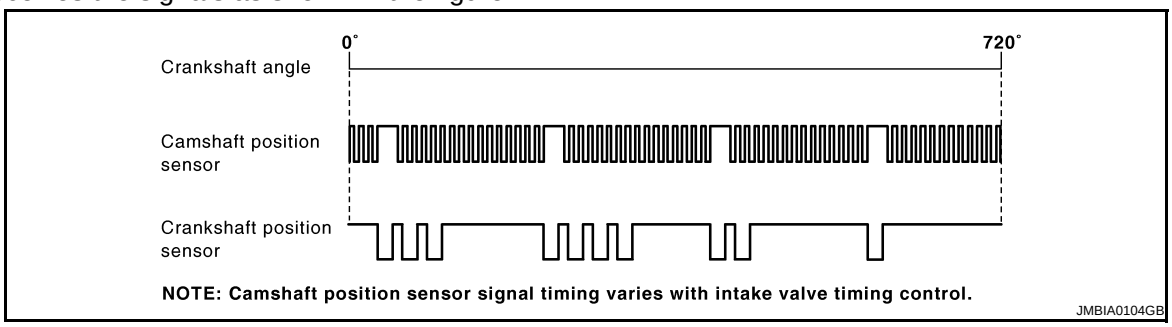

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DTC Logic

INFOID:0000000001309802

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.] (Accelerator pedal position sensor 2 circuit is shorted.) • Crankshaft position sensor (POS) • Accelerator pedal position sensor 2 • Signal plate

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 10.5V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-207, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309803

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

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

2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-I

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CKP sensor (POS) harness connector and ground.

CKP sensor (POS)		Ground	Voltage
Connector	Terminal		
F20	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-II

1. Turn ignition switch ON.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	1	F43	12	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit.

4. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F43	12	CKP sensor (POS)	F20	1
E19	105	APP sensor	E40	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.
- Accelerator pedal position sensor(APP sensor) (Refer to ECQ-277, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace malfunctioning components.

6. CHECK APP SENSOR

Refer to ECQ-281, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 7.

7. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to ECQ-282, "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 sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	2	F43	11	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.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	3	F43	6	Existed

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 CRANKSHAFT POSITION SENSOR (POS)

Refer to ECQ-209, "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.
NO >> Replace the signal plate.

12. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

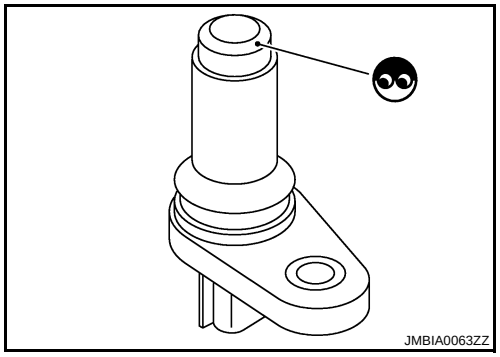
>> INSPECTION END

Component Inspection

INFOID:0000000001309804

1. CHECK CRANKSHAFT POSITION SENSOR (POS)-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect crankshaft position sensor (POS) harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.



Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace crankshaft position sensor (POS).

2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as follows.

Terminals (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

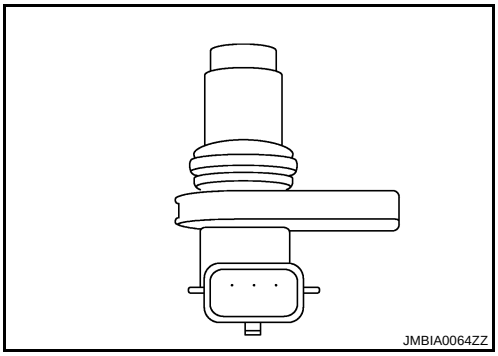
YES >> INSPECTION END
NO >> Replace crankshaft position sensor (POS).

P0340 CMP SENSOR (PHASE)

Description

INFOID:0000000001309805

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.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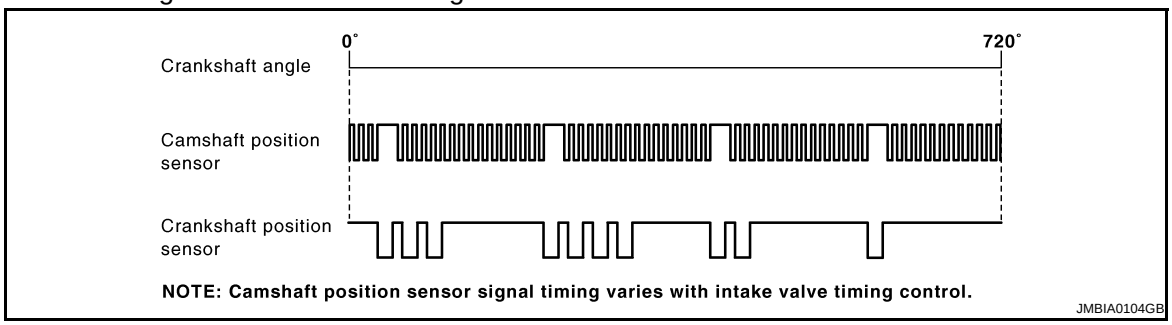


DTC Logic

INFOID:0000000001309806

DTC DETECTION 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 (TP sensor circuit is open or shorted.) (APP sensor 1 circuit is open or shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) • Camshaft position sensor (PHASE) • Electric throttle control actuator (TP sensor) • Accelerator pedal position sensor (APP sensor 1) • Refrigerant pressure sensor • Camshaft (INT) • Starter motor (Refer to STR-5, "System Diagram".) • Starting system circuit (Refer to STR-5, "System Diagram".) • 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 10.5V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-211, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309807

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.

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace ground connection.

3.CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT-I

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CMP sensor (PHASE) harness connector and ground.

CMP sensor (PHASE)		Ground	Voltage
Connector	Terminal		
F26	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT-II

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F43	15	Refrigerant pressure sensor	E49	3
	33	CMP sensor (PHASE)	F26	1
	34	TP sensor	F29	1
E19	113	APP sensor	E110	4

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.
- Refrigerant pressure sensor (Refer to ECQ-312, "Diagnosis Procedure".)
- Electric throttle control actuator(TP sensor) (Refer to ECQ-196, "Component Inspection".)
- Accelerator pedal position sensor(APP sensor) (Refer to ECQ-277, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace malfunctioning component.

6. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F26	2	F43	30	Existed

3. Also check harness for 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 CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F26	3	F43	25	Existed

3. 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 CAMSHAFT POSITION SENSOR (PHASE)

Refer to ECQ-213, "Component Inspection".

Is the inspection result normal?

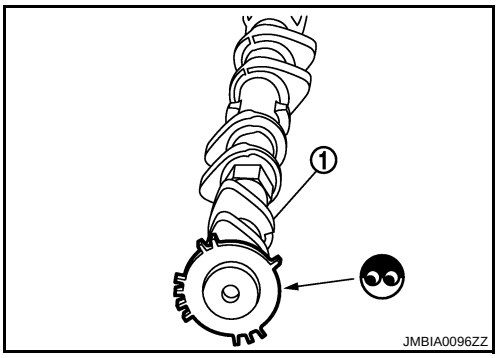
YES >> GO TO 9.
NO >> Replace camshaft position sensor (PHASE).

9. 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 10.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



10. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

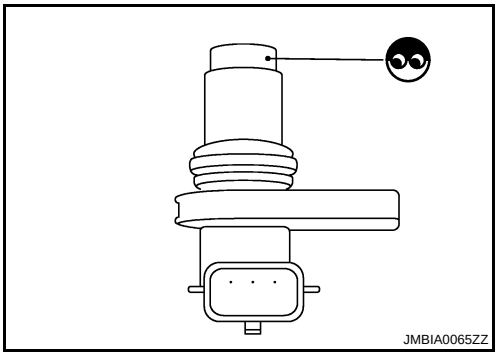
>> INSPECTION END

Component Inspection

INFOID:0000000001309808

1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect camshaft position sensor (PHASE) harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.



Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace camshaft position sensor (PHASE).

2. CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check resistance camshaft position sensor (PHASE) terminals as follows.

Terminals (Polarity)	Resistance
1 (+) - 2 (-)	Except 0 or ∞Ω [at 25°C (77°F)]
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace camshaft position sensor (PHASE).

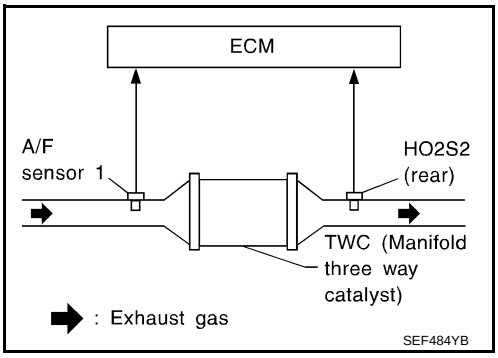
P0420 THREE WAY CATALYST FUNCTION

DTC Logic

INFOID:0000000001309809

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-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 7.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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

With CONSULT-III
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-III.
7. Drive vehicle at a speed of 80 km/h (50 MPH) or move at least 10 consecutive minutes.
   CAUTION:
   Always drive vehicle at a safe speed.
8. Check the indication of “CATALYST”.

Which is displayed on CONSULT-III screen?

CMPLT >> GO TO 6.
INCMP >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

1. 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.

5. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

6. PERFORM DTC CONFIRMATION PROCEDURE-III

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-215, "Diagnosis Procedure".
NO >> INSPECTION END

7. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to ECQ-215, "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 ECQ-215, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001309810

1. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Check the voltage between ECM harness connectors terminals under the following conditions.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	65 (HO2S2 signal)	F43	46	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 → 0 - 0.3 → 0.6 - 1.0

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-215, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001309811

1. CHECK EXHAUST SYSTEM

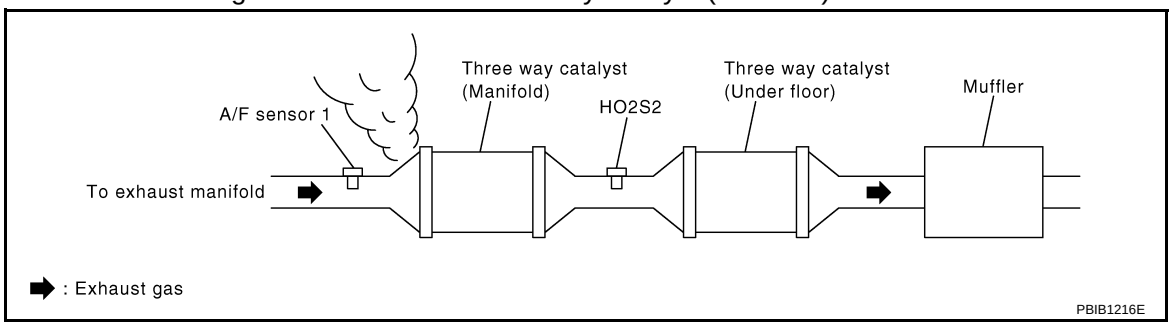
Visually check exhaust tubes and muffler for dent.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace.

2.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.
NO >> GO TO 3.

3.CHECK INTAKE AIR LEAK

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 IGNITION TIMING

Check the following items. Refer to ECQ-14, "BASIC INSPECTION : Special Repair Requirement".

Items	Specifications
Target idle speed	CVT: 650 ± 50 rpm (in P or N position) M/T: 650 ± 50 rpm (Neutral position)
Ignition timing	CVT: 15 ± 5° BTDC (in P or N position) M/T: 15 ± 5° BTDC (Neutral position)

Is the inspection result normal?

YES >> GO TO 5.
NO >> Follow the ECQ-14, "BASIC INSPECTION : Special Repair Requirement".

5.CHECK FUEL INJECTOR

1. Stop engine and then turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F14	21	F19	121	Battery voltage
	23			
	59			
	60			

Is the inspection result normal?

YES >> GO TO 6.
NO >> Perform ECQ-191, "Diagnosis Procedure".

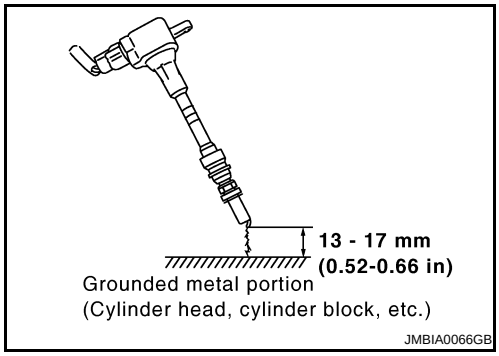
6.CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

NOTE:
Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:
- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
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?

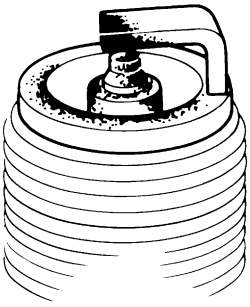
YES >> GO TO 8.
NO >> Check ignition coil, power transistor and their circuits. Refer to ECQ-242, "Diagnosis Procedure".

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-141, "Removal and Installation".
NO >> Repair or clean spark plug. Then GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-141, "Removal and Installation".

10. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Remove fuel injector assembly.
   Refer to EM-166, "Removal and Installation".
   Keep fuel hose and all fuel injectors connected to fuel tube.
3. Disconnect all ignition coil harness connectors.
4. Reconnect all fuel injector harness connectors disconnected.
5. Turn ignition switch ON.

Does fuel drip from fuel injector?

YES >> GO TO 11.
NO >> Replace the fuel injector(s) from which fuel is dripping.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the trouble fixed?

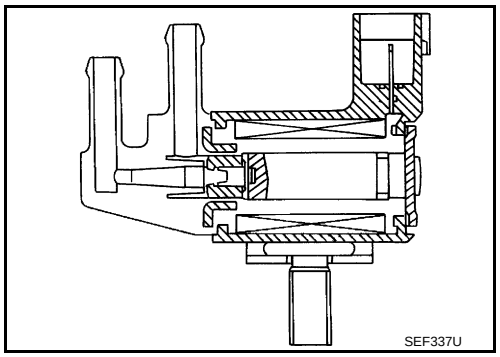
YES >> INSPECTION END
NO >> Replace three way catalyst assembly.

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:0000000001309822

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



DTC Logic

INFOID:0000000001309823

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 9V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 13 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-219, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309824

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

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.
- Harness connectors E7, F121
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F32	2	F43	42	Existed

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

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 4.
YES-2 >> Without CONSULT-III: GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to ECQ-221, "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-39, "Intermittent Incident".

>> INSPECTION END

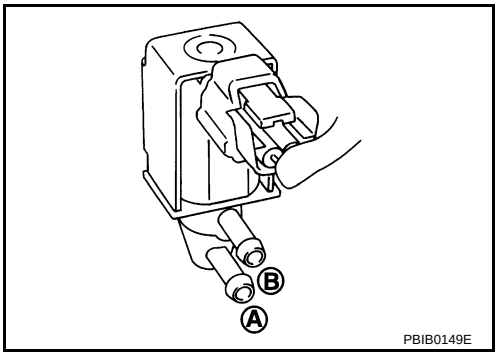
Component Inspection

INFOID:0000000001309825

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Turn ignition switch ON.
5. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III.
6. Touch “Qd” and “Qu” on CONSULT-III screen to adjust “PURG VOL CONT/V” opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition (PURG VOL CONT/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed

Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP canister purge volume control solenoid valve

P0500 VSS

Description

INFOID:0000000001309863

The vehicle speed signal is sent to the combination meter from the “ABS actuator and electric unit (control unit)” by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

DTC Logic

INFOID:0000000001309864

DTC DETECTION LOGIC

NOTE:

- **If DTC P0500 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001.Refer to** ECQ-110, "DTC Logic".
- **If DTC P0500 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to** **ECQ-111, "DTC Logic"**.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500	Vehicle speed sensor	The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM 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) • Vehicle speed sensor • Combination meter • ABS actuator and electric unit (control unit)

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-III

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Maintain the following conditions for at least 5 consecutive seconds.

   CAUTION:

   Always drive vehicle at a safe speed.

ENG SPEED	CVT: 2,200 - 6,000 rpm M/T: 2,200 - 6,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	CVT: 5.5 - 31.8 msec M/T: 4.8 - 31.8 msec
Shift lever	Except P or N position (CVT) Except Neutral position (M/T)
Steering wheel	Not being tuned

4. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Go to ECQ-223, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309866

1. CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-11, "Component Description".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace.

2. CHECK COMBINATION METER

Refer to MWI-24, "CONSULT-III Function (METER/M&A)".

>> INSPECTION END

P0562 BATTERY VOLTAGE

DTC Logic

INFOID:0000000001450407

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0562	System voltage low	An excessively low voltage from the battery is sent to ECM.	• Dead (Weak) battery • Battery dead (Under charge) • Charging system • Alternator

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 let it idle for 3 minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-224, "Diagnosis Procedure"
NO >> INSPECTION END.

Diagnosis Procedure

INFOID:0000000001450409

1.CHECK BATTERY

Refer to PG-136, "Battery".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace battery.

2.CHECK CHARGING SYSTEM

Refer to CHG-3, "Work Flow".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

P0563 BATTERY VOLTAGE

DTC Logic

INFOID:0000000001451237

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0563	System voltage high	An excessively high voltage from the battery is sent to ECM.	• Incorrect battery • Chargeing system • Alternator

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 let it idle for 3 minutes.
2. Drive the vehicle at a speed of 25 km/h (15.5 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 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-225, "Diagnosis Procedure"
NO >> INSPECTION END.

Diagnosis Procedure

INFOID:0000000001451238

1.CHECK BATTERY

Check that the proper type of battery is installed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace with the proper one.

2.CHECK CHARGING SYSTEM

Refer to CHG-3, "Work Flow".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

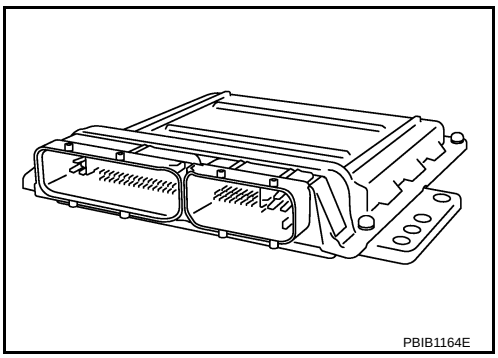
>> INSPECTION END

P0605 ECM

Description

INFOID:0000000001309880

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


PBIB1164E

DTC Logic

INFOID:0000000001309881

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605	Engine control module	A)	ECM calculation function is malfunctioning.	• ECM
		B)	ECM EEP-ROM system is malfunctioning.	
		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 ECQ-227, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Wait at least 10 second.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-227, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Wait at least 1 second.
2. Turn ignition switch OFF, wait at least 30 seconds, and then turn ON.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-227, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309882

1.INSPECTION START

With CONSULT-III

1. Turn ignition switch ON.
2. Select “SELF-DIAG RESULTS” mode with CONSULT-III.
3. Touch “ERASE”.
4. **Perform DTC CONFIRMATION PROCEDURE.**
   See ECQ-226, "DTC Logic".

With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. **Perform DTC CONFIRMATION PROCEDURE.**
   See ECQ-226, "DTC Logic".

Is the 1st trip DTC P0605 displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to ECQ-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

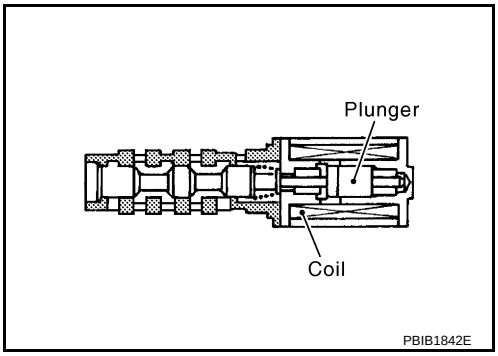
>> INSPECTION END

P1111 IVT CONTROL SOLENOID VALVE

Description

INFOID:0000000001316758

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:0000000001316759

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1111	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 ECQ-228, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001316760

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

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

IVT control solenoid valve		Ground	Voltage
Connector	Terminal		
F45	2	Ground	Battery voltage

Is the inspection result normal?

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

2.DETECT MALFUNCTION PART

Check the following.
- Harness connectors E7, F121
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R

>> Repair or replace harness or connectors.

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

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

IVT control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F45	1	F43	62	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 ECQ-229, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace intake valve timing control solenoid valve.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001316761

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

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

Terminals	Resistance [at 20°C (68°F)]
1 and 2	6.7 - 7.7 Ω
1 or 2 and ground	∞ Ω (Continuity should not exist)

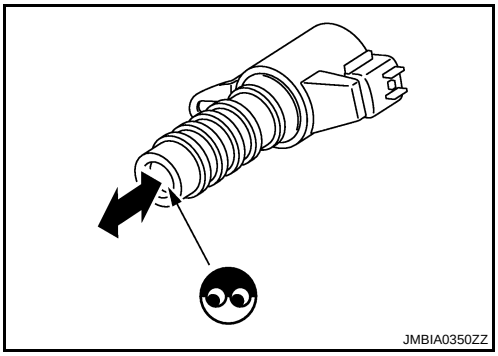
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace intake valve timing control solenoid valve.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.

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



CAUTION:

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

NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve.

P1212 TCS COMMUNICATION LINE

Description

INFOID:0000000001316762

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

INFOID:0000000001316763

DTC DETECTION LOGIC

NOTE:
- **If DTC P1212 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to ECM-108, "DTC Logic".**
- **If DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to ECM-109, "DTC Logic".**

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 short-ed.) • 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 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000001316764

Go to ECQ-10, "Work Flow".

P1217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000001309890

DTC DETECTION LOGIC

NOTE:

- **If DTC P1217 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to ECQ-110, "DTC Logic".**
- **If DTC P1217 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to ECQ-111, "DTC Logic".**

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217	Engine over 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 relays-1, -2, -3) • Cooling fan relays-4 and -5 • Cooling fan motors-1, -2 • 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-41, "Draining". Also, replace the engine oil. Refer to LU-17, "Draining".

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-23, "SAE Viscosity Number".**
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 ECQ-232, "Component Function Check".

NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-233, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001309891

1.PERFORM COMPONENT FUNCTION CHECK-I

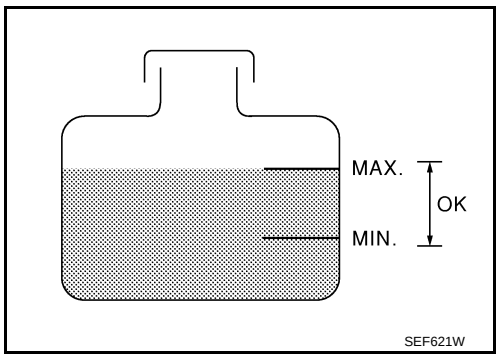
WARNING:

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.

Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.

Is the coolant level in the reservoir tank and/or radiator below the proper range?

YES >> Go to ECQ-233, "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 ECQ-233, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that cooling fan motors-1 and -2 operate at each speed (LOW/MID/HI).

Without CONSULT-III
Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PCS-8, "Diagnosis Description".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-233, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001309892

1.CHECK COOLING FAN OPERATION

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that cooling fan motors-1 and -2 operate at each speed (LOW/MID/HI).

Without CONSULT-III
1. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PCS-8, "Diagnosis Description".
2. Make sure that cooling fan motors-1 and -2 operate at each speed (Low/Middle/High).

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to ECQ-300, "Diagnosis Procedure".

2.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-41, "Inspection".

Is leakage detected?

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

3.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak. Refer to CO-41, "Inspection".
- Hose
- Radiator
- Water pump

>> Repair or replace malfunctioning part.

4. CHECK RADIATOR CAP

Check radiator cap. Refer to CO-48, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace radiator cap.

5. CHECK THERMOSTAT

Check thermostat. Refer to CO-58, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace thermostat.

6. CHECK WATER CONTROL VALVE

Check water control valve. Refer to CO-58, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace water control valve

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to ECQ-135, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace engine coolant temperature sensor.

8. CHECK MAIN 13 CAUSES

If the cause cannot be isolated, check the following.

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	MA-23, "SAE Viscosity Number"
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-41, "Draining"
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 bar, 0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	CO-48, "Removal and Installation"
ON*2	5	• Coolant leaks	• Visual	No leaks	CO-41, "Inspection"
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	CO-58, "Removal and Installation"
ON*1	7	• Cooling fan motor	• CONSULT-III	Operating	ECQ-300, "Component Function Check"
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	CO-41, "Inspection"
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	CO-41, "Inspection"

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	11	• Water control valve	• Remove and inspect the valve	Within the specified value	CO-58, "Removal and Installation"
OFF	12	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-202, "Removal and Installation"
	13	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	EM-203, "Disassembly and Assembly"

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to CO-37, "Troubleshooting Chart".

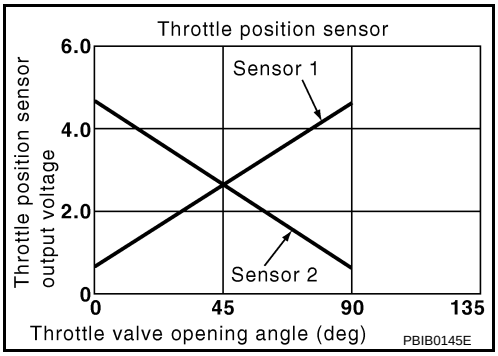
>> INSPECTION END

P1225 TP SENSOR

Description

INFOID:0000000001450366

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001450367

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 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-236, "Diagnosis Procedure".
NO >> INSPECTION END

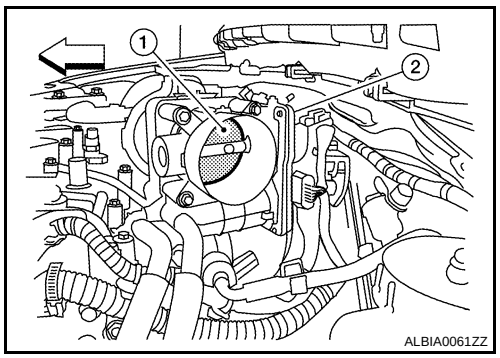
Diagnosis Procedure

INFOID:0000000001450368

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

3. Check if foreign matter is caught between the throttle valve (1) and the housing.



2. Electric throttle control actuator

⇦ : Vehicle front

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to ECQ-237, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001450369

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-19, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

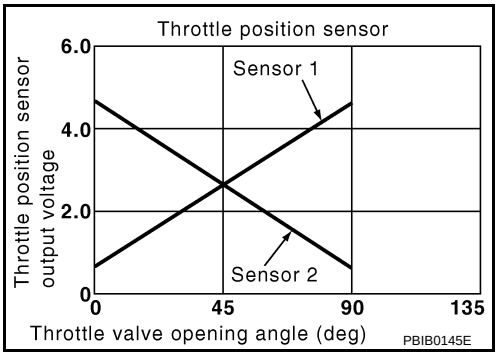
>> END

P1299 TP SENSOR

Description

INFOID:0000000001450319

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001450320

DTC DETECTION LOGIC

NOTE:
If DTC P1299 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1299	Throttle valve closed position learning performance	Closed throttle position learning is not performed successfully.	• Battery • Engine coolant temperature sensor • Intake air temperature sensor • Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Electric throttle control actuator (TP sensor 1 and 2) • Accelerator pedal position sensor (APP sensor 1 and 2) • Vehicle speed 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 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-238, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001450321

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-19, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.ERASE DTC

With CONSULT-III
1. Turn ignition switch ON.

2. Select “SELF-DIAG RESULTS“ mode with CONSULT-III.
3. Touch “ERASE“.

With GST

1. Turn ignition switch ON.
2. Select “Service $04“ with GST.

Is DTC erased?

YES >> INSPECTION END
NO >> GO TO 3.

3. CHECK BATTERY

Refer to PG-3, "How to Handle Battery".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace battery.

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to ECQ-135, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace engine coolant temperature sensor.

5. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to ECQ-132, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace mass air flow sensor (with intake air temperature sensor).

6. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to ECQ-209, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace crankshaft position sensor (POS).

7. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to ECQ-213, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace malfunctioning camshaft position sensor (PHASE).

8. CHECK THROTTLE POSITION SENSOR

Refer to ECQ-285, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunctioning electric throttle control actuator.
2. Go to ECQ-286, "Special Repair Requirement".

>> INSPECTION END.

10. CHECK APP SENSOR

Refer to ECQ-277, "Component Inspection".

Is the inspection result normal?

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

11. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to ECQ-277, "Special Repair Requirement".

>> INSPECTION END.

12. CHECK VEHICLE SPEED SENSOR

Refer to TM-411, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Go to ECQ-223, "Diagnosis Procedure".

13. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END.

P1320 IGNITION COIL

Description

INFOID:0000000001348742

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.

DTC Logic

INFOID:0000000001348750

DTC DETECTION LOGIC

NOTE:

- **If DTC P1320 is displayed with DTC P0335, P0340 first perform the trouble diagnosis for DTC P0335, P0340. Refer to ECQ-110, "DTC Logic", ECQ-110, "DTC Logic".**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1320	Ignition coil primary circuit	The ignition signal in the primary circuit is not sent to ECM during engine cranking or running.	• Harness or connectors (The ignition primary circuit is open or shorted.) • Power transistor unit built into ignition coil • Condenser

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 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine. (If engine does not run, turn ignition switch to START for at least 5 seconds.)
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-115, "Diagnosis Procedure".
NG >> INSPECTION END

Component Function Check

INFOID:0000000001348743

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT-III: GO TO 2.
YES-2 >> Without CONSULT-III: GO TO 3.
NO >> Go to ECQ-242, "Diagnosis Procedure".

2.IGNITION SIGNAL FUNCTION

With CONSULT-III

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
2. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

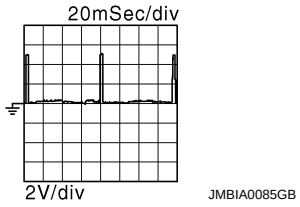
YES >> INSPECTION END
NO >> Go to ECQ-242, "Diagnosis Procedure".

3.IGNITION SIGNAL FUNCTION

Without CONSULT-III

1. Let engine idle.

2. Read the voltage signal between ECM harness connector terminals as follows.

(+)		(–)		Voltage signal
Connector	Terminal	Connector	Terminal	
F43	9	E19	121	
	10			
	28			
	29			

NOTE:
The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-242, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001348744

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 terminals as follows.

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
E19	115	E19	121	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to ECQ-106, "Diagnosis Procedure".

2. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Turn ignition switch ON.
4. Check the voltage between condenser harness connector and ground.

Condenser		Ground	Voltage
Connector	Terminal		
F13	1	Ground	Battery voltage

Is the inspection result normal?

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

3. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E15.
3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

IPDM E/R		Condenser		Continuity
Connector	Terminal	Connector	Terminal	
E15	47	F13	1	Existed

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

Is the inspection result normal?

YES >> Go to ECQ-106, "Diagnosis Procedure".
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. 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		
F13	2	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CONDENSER

Refer to ECQ-245, "Component Inspection (Condenser)"

Is the inspection result normal?

YES >> GO TO 6.
NG >> Replace condenser.

6. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Reconnect all harness connectors disconnected.
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ignition coil harness connector and ground.

Ignition coil			Ground	Voltage
Cylinder	Connector	Terminal		
1	F33	3	Ground	Battery voltage
2	F34	3		
3	F35	3		
4	F36	3		

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity
Cylinder	Connector	Terminal		
1	F33	2	Ground	Existed
2	F34	2		
3	F35	2		
4	F36	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F33	1	F43	10	Existed
2	F34	1		28	
3	F35	1		9	
4	F36	1		29	

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to ECQ-244, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace malfunctioning ignition coil with power transistor.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000001348745

1.CHECK IGNITION COIL WITH POWER TRANSISTOR-I

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

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?

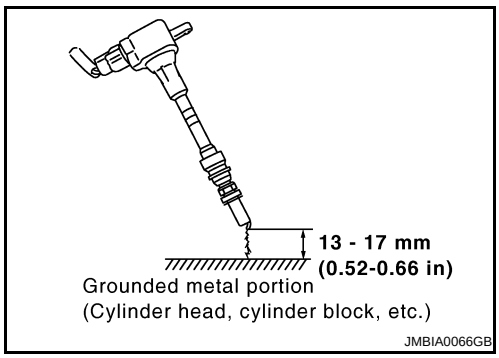
YES >> GO TO 2.
NO >> Replace malfunctioning ignition coil with power transistor.

2.CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
4. Start engine.
5. After engine stalls, crank it two or three times to release all fuel pressure.
6. Turn ignition switch OFF.

7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
8. Remove ignition coil and spark plug of the cylinder to be checked.
9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
10. Connect spark plug and harness connector to ignition coil.
11. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm 0.66 in) is taken.**

NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning ignition coil with power transistor.

Component Inspection (Condenser)

INFOID:0000000001348746

1. CHECK CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check resistance between condenser terminals as follows.

Terminals	Resistance
1 and 2	Above 1 MΩ [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace condenser.

P1564 ASCD STEERING SWITCH

Description

INFOID:0000000001309921

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 ECQ-50, "System Description" for the ASCD function.

DTC Logic

INFOID:0000000001309922

DTC DETECTION LOGIC

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to ECQ-226, "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

1. Turn ignition switch ON.
2. Wait at least 10 seconds.
3. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Check DTC.

Is DTC detected?

YES >> Go to ECQ-246, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309923

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YS >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ASCD STEERING SWITCH CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
E19	108 (ASCD steering switch signal)	E19	100	MAIN switch: Pressed	Approx. 0V
				CANSEL switch: Pressed	Approx. 1V
				SET/COAST switch: Pressed	Approx. 2V
				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.

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 M33.
4. Check the continuity between combination switch and ECM harness connector.

Combination switch	ECM		Continuity
Terminal	Connector	Terminal	
33	E19	100	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 M33, E352
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

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

5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and combination switch.

Combination switch	ECM		Continuity
Terminal	Connector	Terminal	
34	E19	108	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 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.

7.CHECK ASCD STEERING SWITCH

Refer to ECQ-248, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace ASCD steering switch.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001309924

1.CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector M33.
2. Check the continuity between combination switch harness connector terminals under following conditions.

Combination meter		Condition	Resistance
Connector	Terminals		
M352	33 and 34	MAIN switch: Pressed	Approx. 0 Ω
		CANCEL switch: Pressed	Approx. 250 Ω
		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
NO >> Replace ASCD steering switch

P1572 ASCD BRAKE SWITCH

Description

INFOID:0000000001309925

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 ECQ-50, "System Description" for the ASCD function.

DTC Logic

INFOID:0000000001309926

DTC DETECTION LOGIC

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to ECQ-226, "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
P1572	ASCD brake switch	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.) • Harness or connectors (The ASCD clutch switch circuit is shorted.) (M/T) • Stop lamp switch • ASCD brake switch • ASCD clutch switch (M/T) • Incorrect stop lamp switch installation • Incorrect ASCD brake switch installation • Incorrect ASCD clutch switch installation (M/T) • ECM
		B)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	

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 - I

With CONSULT-III

1. Turn ignition switch ON wait at least 10 seconds.
2. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Go to ECQ-250, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A - II

With CONSULT-III

1. Drive the vehicle for at least 10 consecutive seconds under the following conditions.
CAUTION:
Always drive vehicle at a safe speed.
NOTE:
This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-250, "Diagnosis Procedure".
NO >> INSPECTION END

With GST
Follow the procedure “With CONSULT-III” above.

Diagnosis Procedure

INFOID:0000000001309927

1.CHECK OVERALL FUNCTION-I

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E19	94 (ASCD brake switch signal)	E19	121	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	Approx. 0V
					Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO-1 >> CVT models: GO TO 3.
NO-1 >> M/T models: GO TO 7.

2.CHECK OVERALL FUNCTION-II

Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E19	84 (Stop lamp switch signal)	E19	121	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	Approx. 0V
					Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 19.
NO >> GO TO 14.

3.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

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

4. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector M77, E105
- 10A fuse (No.1)
- Harness for open or short between ASCD brake switch and fuse

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

5. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

ASCD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E112	2	E19	94	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ASCD BRAKE SWITCH

Refer to ECQ-253, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 19.
NO >> Replace ASCD brake switch.

7. CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD clutch switch harness connector and ground.

ASCD clutch switch		Ground	Condition		Voltage (V)
Connector	Terminal				
E111	1	Ground	Brake pedal	Slightly depressed	Approx. 0
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 8.

8. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector M77, E105
- 10A fuse (No.3)
- Harness for open or short between ASCD brake switch and fuse

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

10. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ASCD brake switch harness connector and ASCD clutch switch harness connector.

ASCD brake switch		ASCD clutch switch		Continuity
Connector	Terminal	Connector	Terminal	
E112	2	E111	1	Existed

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

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ASCD BRAKE SWITCH

Refer to ECQ-253, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 19.
NO >> Replace ASCD brake switch.

12. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

ECM		ASCD clutch switch		Continuity
Connector	Terminal	Connector	Terminal	
E19	94	E111	2	Existed

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

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK ASCD CLUTCH SWITCH

Refer to ECQ-254, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 19.
NO >> Replace ASCD clutch switch.

14. 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		
E115	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 16.
NO >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector M77, E105
- 10A fuse (No.11)
- 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.

16. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

ECM		ASCD clutch switch		Continuity
Connector	Terminal	Connector	Terminal	
E19	94	E111	2	Existed

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

Is the inspection result normal?

YES >> GO TO 18.
NG >> GO TO 17.

17. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector M77, E105
- 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.

18. CHECK STOP LAMP SWITCH

Refer to ECQ-254, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 19.
NO >> Replace stop lamp switch.

19. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000001309928

1. CHECK ASCD BRAKE SWITCH-I

1. Turn ignition switch OFF.

2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-8, "Inspection and Adjustment".
2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD brake switch.

Component Inspection (ASCD Clutch Switch)

INFOID:0000000001309929

1.CHECK ASCD CLUTCH SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ASCD CLUTCH SWITCH-II

1. Adjust ASCD clutch switch installation. Refer to CL-5, "Inspection and Adjustment".
2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD clutch switch.

Component Inspection (Stop Lamp Switch)

INFOID:0000000001309930

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-8, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

P1574 ASCD VEHICLE SPEED SENSOR

Description

INFOID:0000000001309931

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 ECQ-50, "System Description" for ASCD functions.

DTC Logic

INFOID:0000000001309932

DTC DETECTION LOGIC

NOTE:

- **If DTC P1574 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to ECQ-110, "DTC Logic".**
- **If DTC P1574 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to ECQ-111, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to ECQ-222, "DTC Logic"**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to ECQ-226, "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.) (Combination meter circuit is open or shorted.) • Combination meter • ABS actuator and electric unit (control unit) • Wheel sensor • TCM (CVT models) • 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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. 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 ECQ-256, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309933

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-217, "Diagnosis Description".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble shooting relevant to DTC indicated.

2. CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-17, "CONSULT-III Function (ABS)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3. CHECK COMBINATION METER

Check combination meter function.
Refer to MWI-24, "CONSULT-III Function (METER/M&A)".

>> INSPECTION END

P1706 PNP SWITCH

Description

INFOID:0000000001316765

When the shift lever position is P or N (CVT), Neutral position (M/T), park/neutral position (PNP) switch is ON. ECM detects the position because the continuity of the line (the ON signal) exists.

DTC Logic

INFOID:0000000001316766

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	• Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] • Park/neutral position (PNP) switch

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 5.

2.PRECONDITIONING

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

>> GO TO 3.

3.CHECK PNP SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-III. Then check the “P/N POSI SW” signal under the following conditions.

Position (Shift lever)	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 ECQ-259, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Maintain the following conditions for at least 50 consecutive seconds.

CAUTION:
Always drive vehicle at a safe speed.

ENG SPEED	CVT: 2,000 - 6,375 rpm M/T: 2,000 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)

B/FUEL SCHDL	CVT: 2.4 - 31.8 msec M/T: 3.5 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 mph)
Shift lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-259, "Diagnosis Procedure".
NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to ECQ-259, "Component Function Check".

NOTE:
Use component function check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-259, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001316767

1. PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
F43	27 (PNP switch signal)	F43	121	Shift lever	P or N (CVT) Neutral (M/T)	Approx. 0V
					Except above	BATTERY VOLTAGE

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-259, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001316768

1. CHECK PNP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect Park/neutral position (PNP) switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between PNP switch harness connector and ground.

PNP switch		Ground	Voltage
Connector	Terminal		
F21 (CVT)	1	Ground	Battery voltage
F48 (M/T)	2		

Is the inspection result normal?

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

2. DTECTED MALFUNCTIONING PART

Check the following.
- Harness connectors E6, F123
- Harness for open or short between PNP switch and IPDM E/R

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

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

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

PNP switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F21 (CVT)	2	F43	27	Existed
F48 (M/T)	1			

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

Is the inspection result normal?

YES >> GO TO 5.
NO-1 >> Repair open circuit or short to ground or short to power in harness or connectors. (M/T)
NO-2 >> GO TO 4. (CVT)

4. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Check the continuity between PNP switch harness connector and ECM harness connector.

PNP switch		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F21 (CVT)	1	E15	58	Existed

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

ECM		IPDM		Continuity
Connector	Terminal	Connector	Terminal	
F43	27	E15	58	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 PNP SWITCH

Refer to TM-404, "Component Inspection" (CVT) or TM-66, "Component Inspection" (M/T).

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace PNP switch.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

P1715 INPUT SPEED SENSOR (PRIMARY SPEED SENSOR)

Description

INFOID:0000000001309934

ECM receives primary speed sensor signal from TCM through CAN communication line. ECM uses this signal for engine control.

DTC Logic

INFOID:0000000001309935

DTC DETECTION LOGIC

NOTE:

- **If DTC P1715 is displayed with DTC U1000, U1001 first perform the trouble diagnosis for DTC U1000, U1001. Refer to ECQ-110, "DTC Logic".**
- **If DTC P1715 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to ECQ-111, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to ECQ-206, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to ECQ-210, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to ECQ-226, "DTC Logic".**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715	Input speed sensor (Primary speed sensor) (TCM output)	Primary speed sensor signal is different from the theoretical value calculated by ECM from secondary speed sensor 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

1. 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 ECQ-261, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309936

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-392, "Diagnosis Description".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM.

>> INSPECTION END

P1805 BRAKE SWITCH

Description

INFOID:0000000001309937

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

DTC Logic

INFOID:0000000001309938

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	• Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-III.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-263, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309939

1.CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is 1st trip DTC detected?

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

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		
E115(CVT)	1	Ground	Battery voltage
E114(M/T)	1	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector M77,E105
- 10A fuse (No. 11)
- Harness for open or short between stop lamp switch and battery

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

4.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

ECM		Stop lamp switch		Continuity
Connector	Terminal	Connector	Terminal	
E19	84	E115(CVT)	2	Existed
		E114(M/T)	2	

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

Is the inspection result normal?

YES >> GO TO 6.
NG >> GO TO 5.

5.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.

6.CHECK STOP LAMP SWITCH

Refer to ECQ-264, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace stop lamp switch.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Stop Lamp Switch)

INFOID:0000000001309940

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-8, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

Description

INFOID:0000000001309948

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

DTC Logic

INFOID:0000000001309949

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 8V.

Witch DTC is detected?

P2100 >> GO TO 2.
P2103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to ECQ-266, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to ECQ-266, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309950

1.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 E15.
4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F43	22	E13	32	Existed

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

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

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F43	2	E15	52	Existed

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

Is the inspection result normal?

YES >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUSE

1. Disconnect 15A fuse (No. 61) from IPDM E/R.
2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace 15A fuse.

4. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:0000000001309951

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:0000000001309952

DTC DETECTION LOGIC

NOTE:
If DTC P2101 is displayed with DTC P2100 or P2119, first perform the trouble diagnosis for DTC P2100 or P2119. Refer to ECQ-266, "DTC Logic" or ECQ-273, "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 8V 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.
3. Check DTC.

Is DTC detected?

YES >> Go to ECQ-268, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309953

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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

1. Check the voltage between ECM harness connector terminals as follows.

ECM		ECM		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	2	E19	121	Ignition switch OFF	Approx. 0V
				Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 3.

3. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector F10.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E13	32	F43	22	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 CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

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

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E15	52	F43	2	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 FUSE

1. Disconnect 15A fuse (No. 61) from IPDM E/R.
2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace 15A fuse.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

7. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	5	F43	1	Not existed
			3	Existed
	6		1	Existed
			3	Not existed

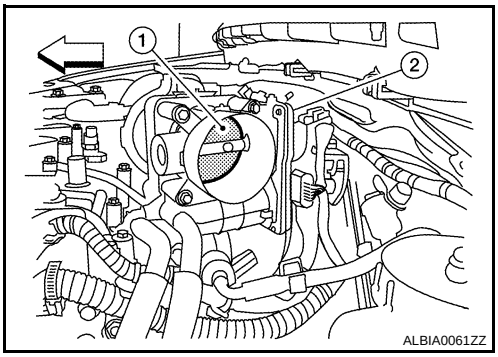
5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve (1) and the housing.



2. Electric throttle control actuator
⇦ : Vehicle front

Is the inspection result normal?

YES >> GO TO 9.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

9.CHECK THROTTLE CONTROL MOTOR

Refer to ECQ-270, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 11.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace harness or connectors.

11.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunction electric throttle control actuator.
2. Go to ECQ-271, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000001309954

1.CHECK THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between electric throttle control actuator terminals as follows.

Terminals	Resistance
1 and 3	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. Go to ECQ-271, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001309955

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-19, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

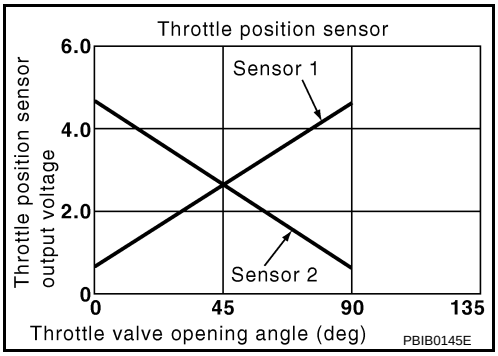
>> END

P2109 TP SENSOR

Description

INFOID:0000000001309893

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001309894

DTC DETECTION LOGIC

NOTE:
If DTC P2109 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2109	Throttle valve closed position learning performance	Throttle valve closed position is not memorized in the ECM.	• Throttle valve closed position learning has not been performed.

Diagnosis Procedure

INFOID:0000000001309895

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-19, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.ERASE DTC

With CONSULT-III
1. Turn ignition switch ON.
2. Select “SELF-DIAG RESULTS“ mode with CONSULT-III.
3. Touch “ERASE“.

With GST
1. Turn ignition switch ON.
2. Select “Service $04“ with GST.

Is DTC erased?

YES >> INSPECTION END.
NO >> GO TO 3.

3.CHECK INTERMITTENT INCIDENT

Refer toGI-39, "Intermittent Incident".

>> INSPECTION END.

Special Repair Requirement

INFOID:0000000001309896

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-19, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> END

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

INFOID:0000000001309961

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:0000000001309962

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P2119	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	• Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM 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.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 second.
3. Turn ignition switch ON and wait at least 1 second.
4. Set shift lever to D (CVT) or 1st (M/T) position and wait at least 5 seconds.
5. Set shift lever to N, P (CVT) or Neutral (M/T) position.
6. Start engine and let it idle for 3 seconds.
7. Check DTC.

Is DTC detected?

YES >> Go to ECQ-273, "Diagnosis Procedure".
NO >> INSPECTION END

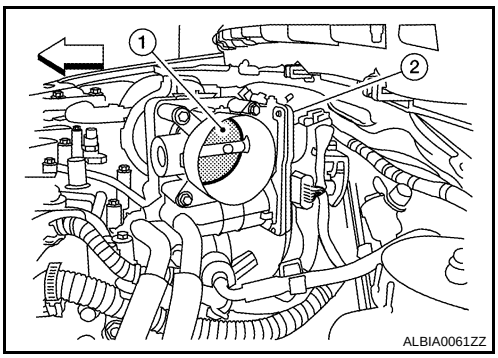
Diagnosis Procedure

INFOID:0000000001309963

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

3. Check if foreign matter is caught between the throttle valve (1) and the housing.



2. Electric throttle control actuator

⇦ : Vehicle front

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to ECQ-274, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001309964

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-19, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

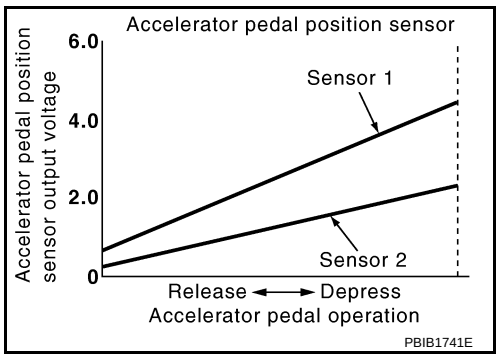
>> END

P2122, P2123 APP SENSOR

Description

INFOID:0000000001309965

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

DTC Logic

INFOID:0000000001309966

DTC DETECTION 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.) (TP sensor circuit is open or shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1) • Electric throttle control actuator (TP sensor) • Camshaft position sensor (PHASE) • Refrigerant pressure sensor
P2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 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.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to ECQ-275, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309967

1.CHECK GROUND CONNECTION

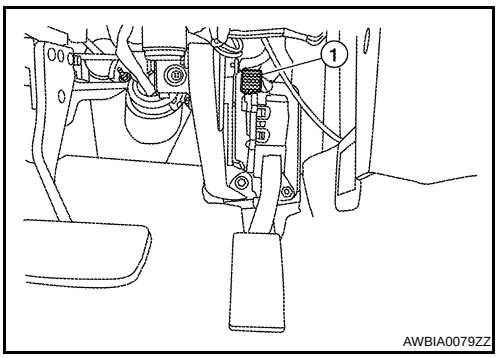
1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT-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		
E110	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT-II

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F43	15	Refrigerant pressure sensor	E49	3
	33	CMP sensor (PHASE)	F26	1
	34	TP sensor	F29	1
E19	113	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.
- Refrigerant pressure sensor (Refer to ECQ-312, "Diagnosis Procedure".)
- Camshaft position sensor (PHASE) (Refer to ECQ-213, "Component Inspection".)
- Electric throttle control actuator (TP sensor) (Refer to ECQ-196, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning component.

5.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	
E110	2	E19	99	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 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	
E110	3	E19	107	Existed

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

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK APP SENSOR

Refer to ECQ-277, "Component Inspection".

Is the inspection result normal?

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

8.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to ECQ-277, "Special Repair Requirement".

>> INSPECTION END

9.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001309968

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 terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E110	107 (APP sensor 1 signal)	E19	98	Accelerator pedal	Fully released	0.5 - 1.0V
					Fully depressed	4.2 - 4.8V
	106 (APP sensor 2 signal)		100		Fully released	0.25 - 0.5V
					Fully depressed	2.0 - 2.5V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to ECQ-277, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001309969

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to ECQ-19, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-19, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

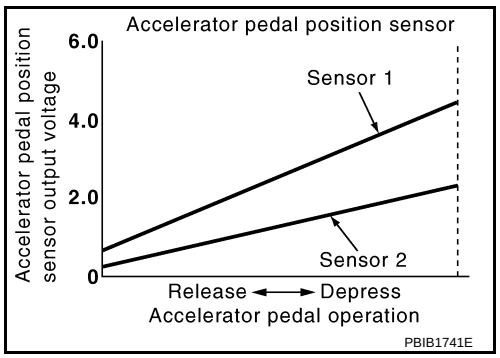
>> END

P2127, P2128 APP SENSOR

Description

INFOID:0000000001309970

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

DTC Logic

INFOID:0000000001309971

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.) [Crankshaft position sensor (POS) circuit is shorted.] • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS)
P2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 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.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to ECQ-279, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309972

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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		
E110	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	5	E19	105	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 APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E43	12	CKP sensor (POS)	F20	1
E19	105	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 ECQ-209, "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

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	
E110	1	E19	98	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 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	
E110	6	E19	106	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 ECQ-281, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to ECQ-282, "Special Repair Requirement".

>> INSPECTION END

10. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001309973

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 terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E110	107 (APP sensor 1 signal)	E19	98	Accelerator pedal	Fully released	0.5 - 1.0V
					Fully depressed	4.2 - 4.8V
	106 (APP sensor 2 signal)		100		Fully released	0.25 - 0.5V
					Fully depressed	2.0 - 2.5V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to ECQ-282, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001309974

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to ECQ-19, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-19, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

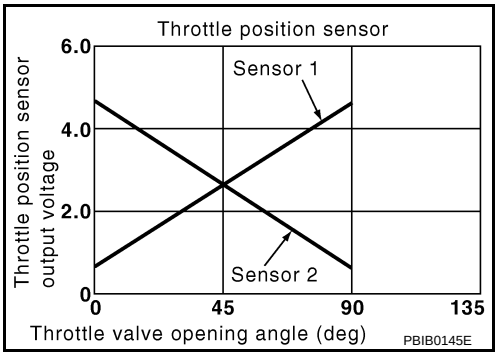
>> END

P2135 TP SENSOR

Description

INFOID:0000000001309975

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001309976

DTC DETECTION 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 and 2 circuit is open or shorted.) (APP sensor 1 circuit is open or shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) • Electric throttle control actuator (TP sensor 1 and 2) • Accelerator pedal position sensor (APP sensor 1) • Camshaft position sensor (PHASE) • Refrigerant pressure 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 8V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and keep the engine speed 2,000 rpm for at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to ECQ-283, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309977

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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-I

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

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5V

Is the inspection result normal?

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

3.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-II

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	1	F43	34	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit.

4.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F43	15	Refrigerant pressure sensor	E49	3
	33	CMP sensor (PHASE)	F26	1
	34	TP sensor	F29	1
E19	113	APP sensor	E110	4

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.
- Refrigerant pressure sensor (Refer to ECQ-312, "Diagnosis Procedure".)
- Camshaft position sensor (PHASE) (Refer to ECQ-213, "Component Inspection".)
- Accelerator pedal position sensor(APP sensor) (Refer to ECQ-277, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace malfunctioning component.

6.CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F43	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 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	
F29	2	F43	71	Existed
	3		72	

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 THROTTLE POSITION SENSOR

Refer to ECQ-285, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. ECQ-286, "Special Repair Requirement"

>> INSPECTION END

10. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001309978

1. CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform ECQ-286, "Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
F43	71 (TP sensor 1 signal)	F43	52	Accelerator pedal	Fully released	More than 0.36V
					Fully depressed	Less than 4.75V
	72 (TP sensor 2 signal)				Fully released	Less than 4.75V
					Fully depressed	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. Go to ECQ-286, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001309979

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-19, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

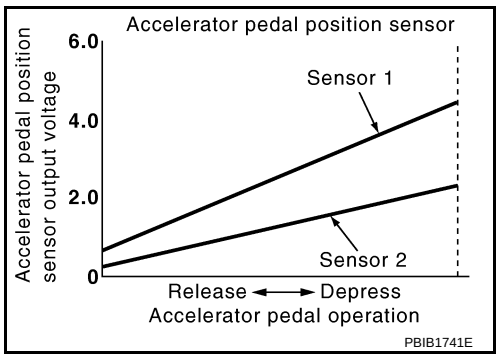
>> END

P2138 APP SENSOR

Description

INFOID:0000000001309980

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

DTC Logic

INFOID:0000000001309981

DTC DETECTION 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 and 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) (TP sensor circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2) • Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Refrigerant pressure sensor • Electric throttle control actuator (TP 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 8V 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 ECQ-288, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309982

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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 sensor		Ground	Voltage
Connector	Terminal		
E110	4	Ground	Approx. 5V

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. Turn ignition switch ON.
2. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	5	Ground	Approx. 5V

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	
E110	5	E19	105	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.

5.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F43	12	CKP sensor (POS)	F20	1
	15	Refrigerant pressure sensor	E49	3
	33	CMP sensor (PHASE)	E219	3
	34	TP sensor	F30	1
E19	105	APP sensor	E110	5
	113	APP sensor	E110	4

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 ECQ-209, "Component Inspection".)
- Refrigerant pressure sensor (Refer to ECQ-312, "Diagnosis Procedure".)
- Camshaft position sensor (PHASE) (Refer to ECQ-213, "Component Inspection".)
- Electric throttle control actuator(TP sensor) (Refer to ECQ-196, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace malfunctioning component.

7.CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	1	F19	98	Existed
	2		99	

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

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

8.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	3	F19	107	Existed
	6		106	

2. 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 ECQ-290, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 10.

10. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to ECQ-290, "Special Repair Requirement".

>> INSPECTION END

11. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001309983

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 terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E110	107 (APP sensor 1 signal)	E19	98	Accelerator pedal	Fully released	0.5 - 1.0V
					Fully depressed	4.2 - 4.8V
	106 (APP sensor 2 signal)		99		Fully released	0.25 - 0.5V
					Fully depressed	2.0 - 2.5V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to ECQ-290, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001309984

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to ECQ-19, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-19, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> END

P2A00 A/F SENSOR 1

Description

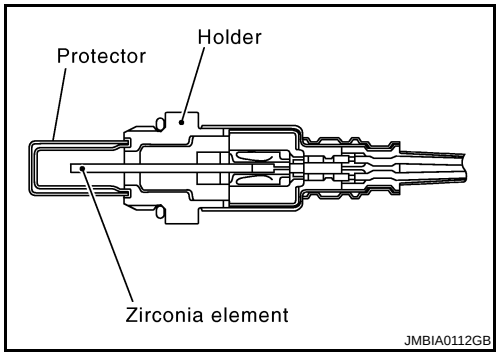
INFOID:0000000001309987

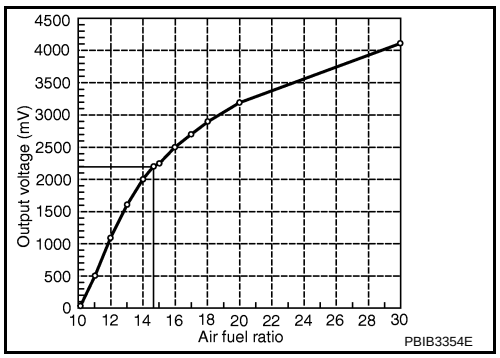
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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:0000000001309988

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
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 • Fuel pressure • Fuel injector • Intake air leaks

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 11V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
2. Let engine idle for 1 minute.
3. Drive vehicle at a speed of 80 km/h (50 MPH) or more at least 10 consecutive minutes.
   CAUTION:
   Always drive vehicle at a safe speed.
4. Check 1st trip DTC detected?.

Is 1st trip DTC detected?

YES >> Go to ECQ-156, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001309989

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

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

2.RETIGHTEN A/F SENSOR 1

1. Loosen and retighten the A/F sensor 1.

Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)

>> GO TO 3.

3.CHECK FOR INTAKE AIR LEAK

1. Start engine and run it at idle.
2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

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

4.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to ECQ-20, "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 P0171or P0172. Refer to ECQ-183, "DTC Logic" or ECQ-187, "DTC Logic".
NO >> GO TO 5.

5.CHECK HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Check harness connector for water.

Water should not exit.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness connector.

6.CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F27	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R harness connector E14
- 15A fuse (No. 63)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F27	1	F43	54	Existed
	2		53	

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

A/F sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F27	1	F43	54	Ground	Not existed
	2		53		

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 A/F SENSOR 1 HEATER

Refer to ECQ-116, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 11.

10. CHECK INTERMITTENT INCIDENT

Perform GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

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

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

CAUTION:
- **Discard any 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 tool and approved anti-seize lubricant.**

>> GO TO 12.

12. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to ECQ-20, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".

>> INSPECTION END

ASCD BRAKE SWITCH

Description

INFOID:0000000001309990

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 ECQ-50, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000001309991

1.CHECK FOR ASCD BRAKE SWITCH FUNCTION

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as follows.

ECM		ECM		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E19	94 (ASCD brake switch signal)	E19	121	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	Approx. 0V
					Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to ECQ-295, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001309992

1.CHECK OVERALL FUNCTION-I

Check which type of transmission the vehicle is equipped with.

Is the inspection result normal?

CVT >> GO TO 2.
M/T >> GO TO 6.

2.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector M77, E105
- 10A fuse (No. 1)
- Harness for open or short between ASCD brake switch and fuse

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

4.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

ASCD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E112	2	E19	94	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 ASCD BRAKE SWITCH

Refer to ECQ-297, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD brake switch.

6.CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.
4. Check the continuity between ASCD clutch switch harness connector and ground.

ASCD clutch switch		Ground	Condition		Voltage (V)
Connector	Terminal				
E111	1	Ground	Brake pedal	Slightly depressed	Approx. 0
				Fully released	Battery voltage

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

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 7.

7.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

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

8.DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector M77, E105
- 10A fuse (No. 1)
- 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.

9.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Check the continuity between ASCD brake switch harness connector and ASCD clutch switch harness connector.

ASCD brake switch		ASCD clutch switch		Continuity
Connector	Terminal	Connector	Terminal	
E112	2	E111	1	Existed

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 ASCD BRAKE SWITCH

Refer to ECQ-297, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD brake switch.

11. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

ASCD clutch switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E111	2	E19	94	Existed

4. 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 ASCD CLUTCH SWITCH

Refer to ECQ-298, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD clutch switch.

13. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000001309993

1. CHECK ASCD BRAKE SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-8, "Inspection and Adjustment".
2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD brake switch.

Component Inspection (ASCD Clutch Switch)

INFOID:0000000001309994

1.CHECK ASCD CLUTCH SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ASCD CLUTCH SWITCH-II

1. Adjust ASCD clutch switch installation. Refer to CL-5, "Inspection and Adjustment".
2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD clutch switch.

ASCD INDICATOR

Description

INFOID:0000000001309995

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 ECQ-50, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000001309996

1.ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	• Ignition switch: ON	• MAIN switch: Pressed at the 1st time →at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed: Between 40 km/h (25 MPH) and M/T models:171 km/h (106 MPH),CVT models:166 km/h (103 MPH).	• ASCD: Operating	ON
		• ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-299, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001309997

1.CHECK DTC

Check that DTC U1000 or U1001 is not displayed.
Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for DTC U1000, U1001. Refer to ECQ-110, "DTC Logic".

2.CHECK COMBINATION METER OPERATION

Refer to WCS-9, "CONSULT-III Function (METER/M&A)".
Is the inspection result normal?

YES >> GO TO 3.
NO >> Check combination meter circuit. Refer to WCS-4, "WARNING CHIME SYSTEM : System Diagram".

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

COOLING FAN

Description

INFOID:0000000001309998

Cooling fan operates at each speed when the current flows in the cooling fan motor as follows.
Refer to ECQ-58, "System Diagram" for cooling fan operation.

Component Function Check

INFOID:0000000001309999

1.CHECK COOLING FAN LOW SPEED FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III and touch “LOW” on the CONSULT-III screen.
3. Make sure that cooling fans operates at low speed.

Without CONSULT-III

1. Start engine and let it idle.
2. Turn air conditioner switch and blower fan switch ON.
3. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Check cooling fan low speed control circuit.

2.CHECK COOLING FAN HIGH SPEED FUNCTION

With CONSULT-III

1. Touch “HI” on the CONSULT-III screen.
2. Make sure that cooling fans operates at higher speed than low speed.

Without CONSULT-III

1. Turn ignition switch OFF.
2. Turn air conditioner switch and blower fan switch OFF.
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5. Restart engine and make sure that cooling fan operates at higher speed than low speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Check cooling fan high speed control circuit.

Diagnosis Procedure

INFOID:0000000001310000

1.CHECK IPDM E/R POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E10.
3. Check the voltage between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Voltage
Connector	Terminal		
E10	6	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short ground or short to power in harness or connectors.

2.CHECK COOLING FAN MOTORS POWER SUPPLY CIRCUIT-I

1. Disconnect cooling fan relay-4 and -5.
2. Check the voltage between cooling fan relays terminals and ground.

Cooling fan relay			Ground	Voltage
Relay	Connector	Terminal		
4	E57	2	Ground	Battery voltage
5	E59	2		

3. Also check harness for short to ground or short to power.

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R connector E14
- 15A fuse (No. 63)
- Harness for open or short between IPDM E/R and cooling fan relay-4 and -5.

>> Repair or replace malfunctioning part.

4. CHECK COOLING FAN MOTORS POWER SUPPLY CIRCUIT-II

1. Disconnect cooling fan motor-2 harness connector.
2. Check the voltage between cooling fan motor-2 harness connector and ground.

Cooling fan motor-2		Ground	Voltage
Connector	Terminal		
E54	1	Ground	Battery voltage
	2		

3. Also check harness for short to ground or short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- 40A fusible link (letter M)
- Harness for open or short between cooling fan motor-2 and battery

>> Repair or replace malfunctioning part.

6. CHECK COOLING FAN MOTORS CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-1, 2 harness connector.
3. Check the continuity between cooling fan motor-1, 2 harness connectors and IPDM E/R harness connector.

Cooling fan motor			IPDM E/R		Continuity
Motor	Connector	Terminal	Connector	Terminal	
1	E53	1	E10	4	Existed
1	E53	2	E10	8	
2	E54	3	E10	7	

4. 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 for open or short between cooling fan motor-1, -2 and IPDM E/R
- Harness for open or short between cooling fan motor-1 and ground
- Harness for open or short between IPDM E/R and ground

>> Repair or replace malfunctioning part.

8. CHECK COOLING FAN MOTORS CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor--1, -2harness connector.
3. Check the continuity between cooling fan relay-4, -5 terminals and cooling fan motor-1, -2 harness connector.

Cooling fan relay			Cooling fan motor			Continuity
Relay	Connector	Terminal	motor	Connector	Terminal	
4	E57	5	1	E53	2	Existed
4	E57	3	2	E54	3	
5	E59	3	2	E54	4	

4. Check the continuity between cooling fan relay-4, -5 terminals and IPDM E/R harness connector.

Cooling fan relay			IPDM E/R		Continuity
Relay	Connector	Terminal	Connector	Terminal	
4	E57	1	E13	31	Existed
		2	E14	40	
		3	E10	7	
		5	E10	8	
5	E59	1	E15	50	
		2		40	

5. Check the continuity between cooling fan relay-4, 5 or IPDM E/R harness connector or cooling fan motor-1, -2 harness connector ground.

Cooing fan relay			IPDM E/R		Cooling fan motor-1		Ground	Continuity
Relay	Connector	Terminal	Connector	Terminal	Connector	Terminal		
5	E59	5	E11	11	E53	3	Ground	Existed
			E13	25		4		

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

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan relay-4, -5 and IPDM E/R
- Harness for open or short between cooling fan relay-4 and cooling fan motor-1,-2
- Harness for open or short between cooling fan relay-5 and cooling fan motor-1
- Harness for open or short between cooling fan relay-5 and ground
- Harness for open or short between cooling fan motor-1 and ground
- Harness for open or short between IPDM E/R and ground

>> Repair or replace malfunctioning part.

10. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace ground connection.

11. CHECK COOLING FAN RELAYS

Refer to ECQ-303, "Component Inspection (Cooling Fan Relay)".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace malfunctioning cooling fan relay.

12. CHECK COOLING FAN MOTORS

Refer to ECQ-303, "Component Inspection (Cooling Fan Motor)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace malfunctioning cooling fan motor.

13. CHECK INTERMITTENT INCIDENT

Perform GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connector.

Component Inspection (Cooling Fan Motor)

INFOID:0000000001310001

1. CHECK COOLING FAN MOTORS

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-1 and -2 harness connectors E53, E54.
3. Supply cooling fan motor terminals with battery voltage and check operation.

Speed	Terminals		Operation
	(+)	(–)	
Low	1	4	Cooling fans operates at low speed.
	2	3	
High	1 and 2	3 and 4	Cooling fans operates at high speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan motor.

Component Inspection (Cooling Fan Relay)

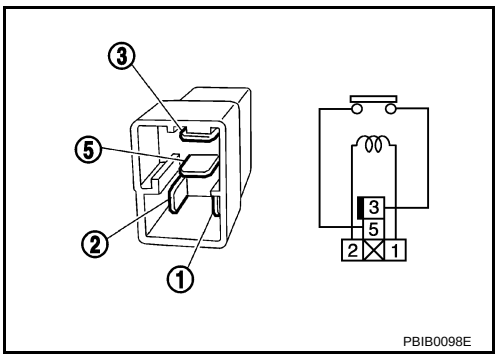
INFOID:0000000001310002

1. CHECK COOLING FAN RELAYS

1. Turn ignition switch OFF.
2. Remove cooling fan relay.

3. Check the continuity between cooling fan relay terminals under the following conditions.

Terminals	Conditions	Continuity
3 and 5	12V direct current supply between terminals 1 and 2	Existed
	No current supply	Not existed



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Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace cooling fan relay.

ELECTRICAL LOAD SIGNAL

Description

INFOID:0000000001310003

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred through the CAN communication line from BCM to ECM via IPDM E/R.

Component Function Check

INFOID:0000000001310004

1.CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

1. Turn ignition switch ON.
2. Connect CONSULT-III and select “DATA MONITOR” mode.
3. Select “LOAD SIGNAL” and check indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Rear window defogger switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to ECQ-305, "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 ECQ-305, "Diagnosis Procedure".

3.CHECK HEATER FAN CONTROL SWITCH FUNCTION

Select “HEATER FAN SW” and check indication under the following conditions.

Monitor item	Condition		Indication
HEATER FAN SW	Heater fan control switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-305, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001310005

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to ECQ-305, "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-4, "System Diagram".

>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Refer to EXL-13, "System Diagram" (XENON TYPE) or EXL-237, "System Diagram" (HALOGEN TYPE).

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

FUEL PUMP

Description

INFOID:0000000001310010

Sensor	Input signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓ Fuel pump
Battery	Battery voltage*		

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

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine startability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops.
Except as shown above	Stops.

Component Function Check

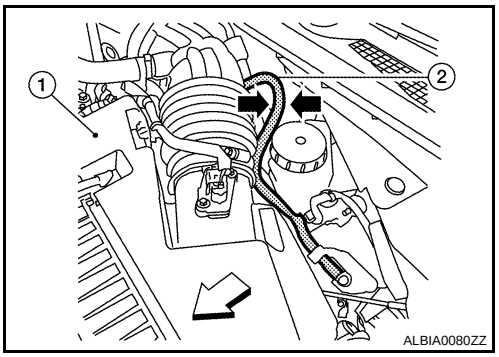
INFOID:0000000001310011

1. CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose (2) with two fingers.

1 : Air cleaner assembly

⇦ : Vehicle front



Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

YES >> INSPECTION END

NO >> ECQ-307, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001310012

1. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector and ground.

(+)		(–)		Ground	Voltage
Connector	Terminal	Connector	Terminal		
F43	78	E19	121	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect IDPDM E/R harness connector F10.
3. Check the continuity between IPDM E/R harness connector and ECM harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F43	78	E13	33	Existed

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E6, B123
- IPDM E/R connector F10
- Harness for open or short between “fuel level sensor unit and fuel pump” and IPDM E/R

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

4.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Disconnect “fuel level sensor unit and fuel pump” harness connector.
2. Check the continuity between IPDM E/R harness connector and “fuel level sensor unit and fuel pump” and ground.

IPDM E/R		Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E14	46	B40	5	Existed

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connector (B66, B67),(M11, B1),(E105, M77)
- 15A fuse (NO.57)
- Harness for open or short between “fuel level sensor unit and fuel pump” and IPDM E/R
- Harness for open or short between “fuel level sensor unit and fuel pump” and ground

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

6.CHECK FUEL PUMP GROUND CIRCUIT

1. Check the continuity between “fuel level sensor unit and fuel pump” and ground.

Fuel level sensor unit and fuel pump		Ground	Continuity
Connector	Terminal		
B40	3	Ground	Existed

2. Also heck harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to power in harness or connectors.

7.CHECK FUEL PUMP

Refer to ECQ-309, "Component Inspection (Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace fuel pump.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

Component Inspection (Fuel Pump)

INFOID:0000000001310013

1.CHECK FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Check resistance between “fuel level sensor unit and fuel pump” terminals as follows.

Terminals	Resistance
1 and 3	0.2 - 5.0Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace “fuel level sensor unit and fuel pump”.

Component Inspection (Condenser-1)

INFOID:0000000001310014

1.CHECK CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser-1 harness connector.
3. Check resistance between condenser-1 terminals as follows.

Terminal	Resistance
1 and 2	Above 1MΩ [at 25°C (77°F)]

Is the inspection result normal?

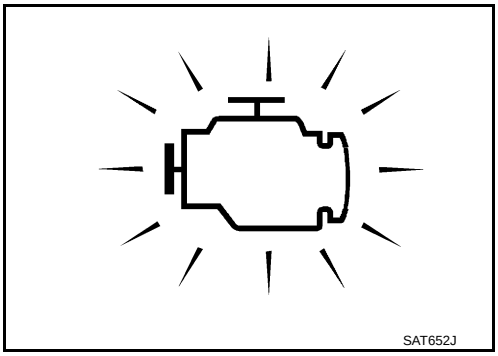
YES >> INSPECTION END
NO >> Replace condenser-1.

MALFUNCTION INDICATOR LAMP

Description

INFOID:0000000001310020

The Malfunction Indicator Lamp (MI) is located on the combination meter.
The MI 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 MI should go off. If the MI remains on, the on board diagnostic system has detected an engine system malfunction.
For details, refer to ECQ-310, "Diagnosis Procedure".



Component Function Check

INFOID:0000000001310021

1.CHECK MI FUNCTION

1. Turn ignition switch ON.
2. Make sure that MI lights up.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-310, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001310022

1.CHECK DTC

Check that DTC U1000 or U1001 is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for DTC U1000, U1001. Refer to ECQ-110, "Diagnosis Procedure".

2.CHECK DTC WITH METER

Refer to MWI-24, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

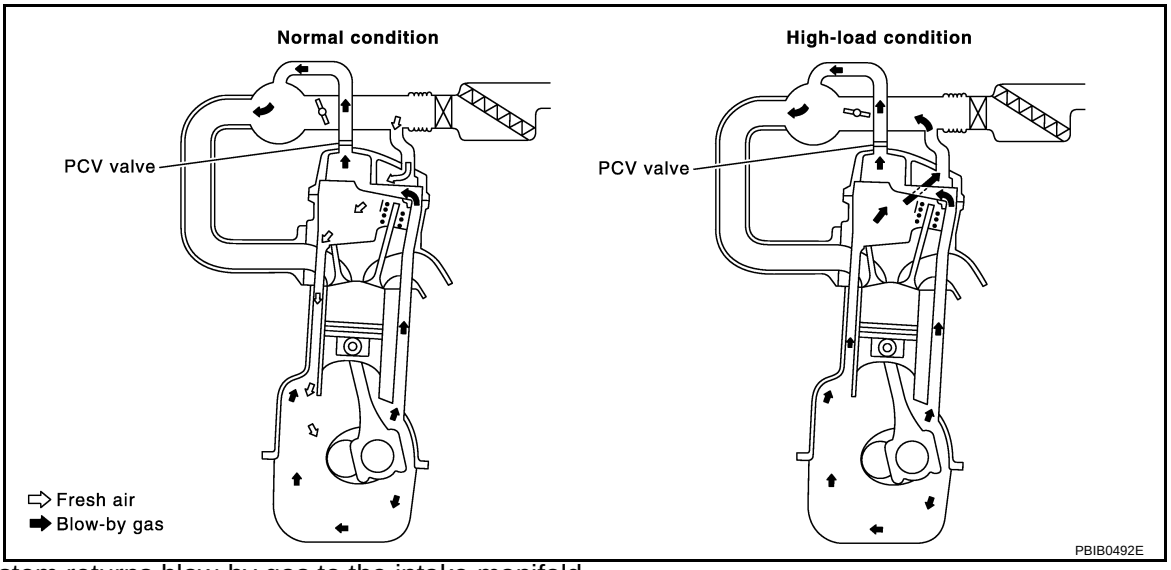
Is the inspection result normal?

YES >> Replace combination meter.
NO >> Repair or replace.

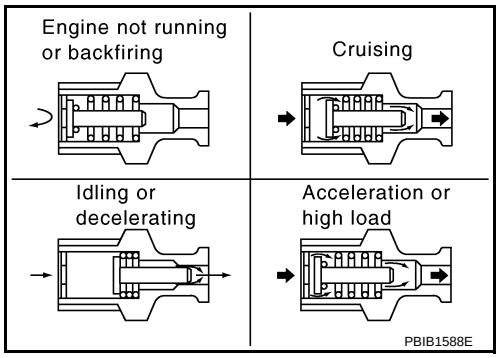
POSITIVE CRANKCASE VENTILATION

Description

INFOID:0000000001310027



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 then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



Component Inspection

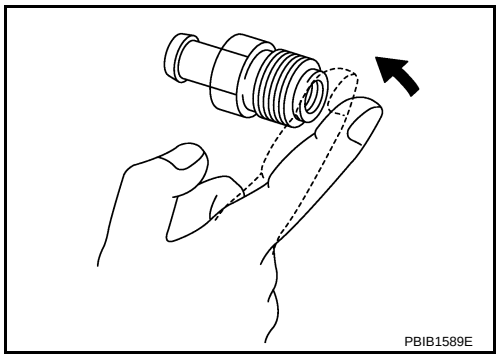
INFOID:0000000001310028

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.

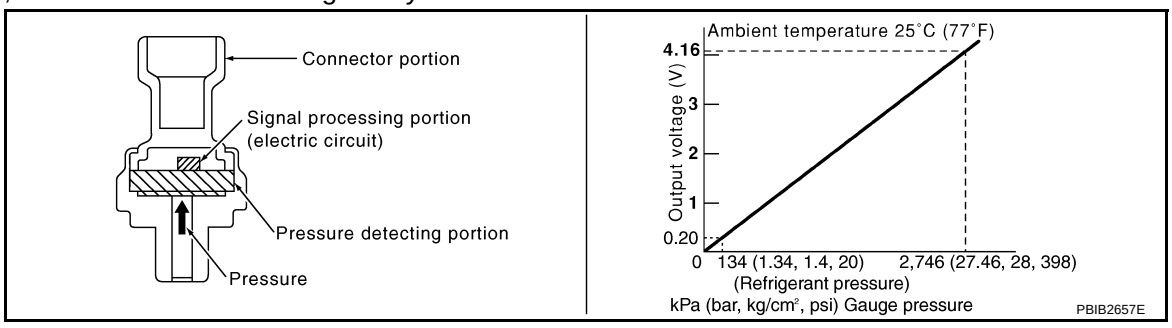


REFRIGERANT PRESSURE SENSOR

Description

INFOID:0000000001310029

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



Component Function Check

INFOID:0000000001310030

1.CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower fan switch ON.
3. Check the voltage between ECM harness connector terminals as follows.

ECM		ECM		Voltage
Connector	Terminal	Connector	Terminal	
F43	37 (Refrigerant pressure sensor signal)	F43	18	1.0 - 4.0V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-312, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001310031

1.CHECK GROUND CONNECTION

1. Turn A/C switch and blower fan switch OFF.
2. Stop engine.
3. Turn ignition switch OFF.
4. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pressure sensor		Ground	Voltage
Connector	Terminal		
E49	3	Ground	Approx. 5V

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- Harness for open or short between ECM and refrigerant pressure sensor

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

4. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E49	1	F43	18	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 F1, E3
- Harness for open or short between ECM and refrigerant pressure sensor

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

6. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and refrigerant pressure sensor harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E49	2	F43	37	Existed

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

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- 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-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.
NO >> Repair or replace.

ECU DIAGNOSIS

ECM

Reference Value

INFOID:0000000001310032

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.

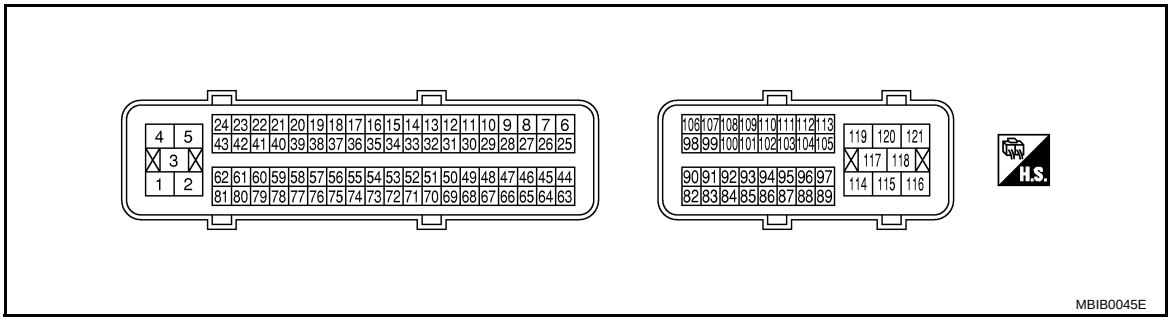
Monitor Item	Condition		Values/Status
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See ECQ-99, "Diagnosis Procedure".		
B/FUEL SCHDL	See ECQ-99, "Diagnosis Procedure".		
A/F ALPHA-B1	See ECQ-99, "Diagnosis Procedure".		
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
HO2S2 (B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		0 - 0.3V ←→ Approx. 0.6 - 1.0V
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2*1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
THRL SEN 1-B1	• Ignition switch: ON (Engine stopped) • Shift lever: D (CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
THRL SEN 2-B1*1	• Ignition switch: ON (Engine stopped) • Shift lever: D (CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
INT/A TEMP SE	• Ignition switch: ON		Indicates intake air temperature
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	• Ignition switch: ON	Shift lever: P or N (CVT), Neutral (M/T)	ON
		Selector lever: Except above	OFF
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON
		Rear window defogger switch and lighting switch: OFF	OFF

Monitor Item	Condition		Values/Status
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	• Engine: After warming up, idle the engine		BTDC 9.75°
CAL/LD VALUE	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	4.0 - 10.0 g·m/s
PURG VOL C/V	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%
		2,000 rpm	20% - 90%
INT/V TIM (B1)	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	–5° - 5°CA
		2,000 rpm	Approx. 0° - 20°CA
INT/V SOL (B1)	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0%
		2,000 rpm	Approx. 0% - 60%
AIR COND RLY	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	• For 1 seconds after turning ignition switch: ON • Engine running or cranking		ON
	• Except above		OFF
THRTL RELAY	• Ignition switch: ON		ON
COOLING FAN	• Engine: After warming up • Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F)or less.	OFF
		Engine coolant temperature is between94°C (203°F) and 99°C (210°F)	LOW
		Engine coolant temperature is between94°C (203°F) and 99°C (210°F)	MID
		Engine coolant temperature is 100°C (212°F) or more	HIGH
HO2S2 HTR (B1)	• 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
	• For 2 minutes after starting engine		OFF

Monitor Item	Condition		Values/Status
I/P PULLY SPD	• Vehicle speed: More than 20 km/h (12 MPH)		Almost the same speed as the tachometer indication
A/F LEARN-B1	• Engine: After warming up, idle the engine		–16.500 - 10.359%
VEHICLE SPEED	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
TRVL AFTER MIL	• Ignition switch: ON	Vehicle has traveled after MI has turned ON.	0 - 65,535 km (0 - 40,723 miles)
A/F S1 HTR (B1)	• Engine: After warming up, idle the engine (More than 140 seconds after starting engine.)		4 - 100%
AC PRESS SEN	• Engine: Idle • Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0V
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
SET VHCL SPD	• Engine: Running	ASCD: Operating	The preset vehicle speed is displayed

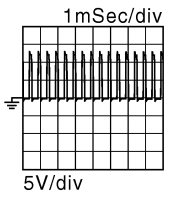
*1: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

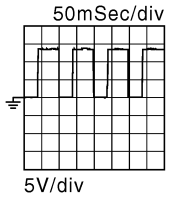
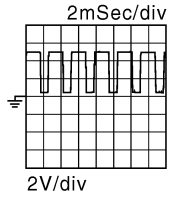
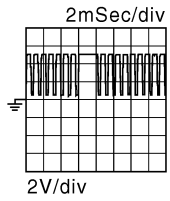
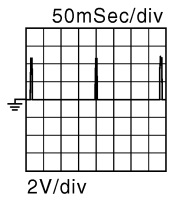
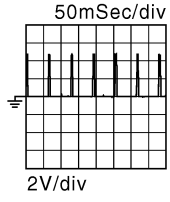
TERMINAL LAYOUT

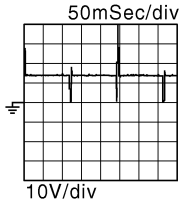
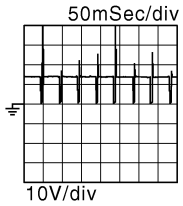


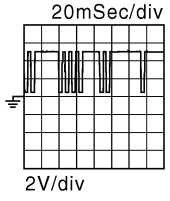
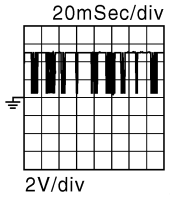
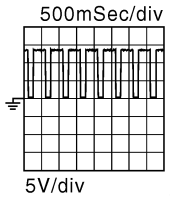
PHYSICAL VALUES

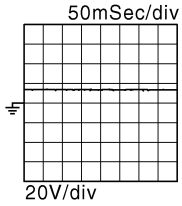
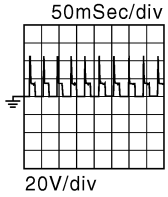
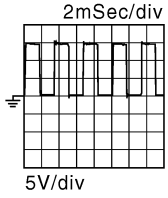
NOTE:
- ECM is located near the battery in the engine room.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
1 (L/Y)	121 (B)	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14V★  JMBIA0512GB
2 (R)	121 (B)	Throttle control motor relay power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
3 (P)	121 (B)	Throttle control motor (Close)	Output	[Ignition switch: ON] • For 10 second after turning ignition switch ON • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	0 - 14V★
4 (R)	121 (B)	A/F sensor 1 heater	Output	[Engine is running] • Warm-up condition • Idle speed	0 - 14V★  JMBIA0513GB
5 (B)	—	ECM ground	—	—	—
6 (W)	121 (B)	Crankshaft position sensor (POS)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  JMBIA0514GB
				[Engine is running] • Engine speed: 2,000 rpm	1.0 - 4.0V★  JMBIA0515GB
9 (R) 10 (SB)	121 (B)	Ignition signal No. 3 Ignition signal No. 2	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 4.0V★  JMBIA0516GB
28 (W) 29 (G)		Ignition signal No. 1 Ignition signal No. 4		[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 - 4.0V★  JMBIA0517GB
11 (B)	—	Sensor ground [Crankshaft position sensor (POS)]	—	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
12 (P)	121 (B)	Sensor power supply [Crankshaft position sensor (POS)]	—	[Ignition switch: ON]	5V
15 (L)	121 (B)	Sensor power supply (Refrigerant pressure sensor)	—	[Ignition switch: ON]	5V
18 (V)	—	Sensor ground (Refrigerant pressure sensor)	—	—	—
20 (G)	121 (B)	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] • A few seconds after turning ignition switch OFF	0 - 1.5V
				[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
21 (P)	121 (B)	Fuel injector No. 4	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  JMBIA0089GB
23 (BR)		Fuel injector No. 3			
59 (GR)		Fuel injector No. 2		[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  JMBIA0090GB
60 (LG)		Fuel injector No. 1			
22 (LG)	121 (B)	Throttle control motor relay	Output	[Ignition switch: ON → OFF]	0 - 1.5V ↓ BATTERY VOLTAGE (11 - 14V)
				[Ignition switch: ON]	0 - 1.0V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
25 (G)	121 (B)	Camshaft position sensor (PHASE)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 4.0★  JMBIA0518GB
				[Engine is running] • Engine speed is 2,000 rpm	1.0 - 4.0★  JMBIA0519GB
27 (LG)	121 (B)	PNP switch	Input	[Ignition switch: ON] • Shift lever: P or N (CVT), Neutral (M/T)	BATTERY VOLTAGE (11 - 14V)
				[Ignition switch: ON] • Shift lever: Except above	0V
30 (Y)	—	Sensor ground [Camshaft position sensor (PHASE)]	—	—	—
33 (P)	121 (B)	Sensor power supply [Camshaft position sensor (PHASE)]	—	[Ignition switch: ON]	5V
34 (W)	121 (B)	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5V
37 (LG)	18 (V)	Refrigerant pressure sensor	Input	[Engine is running] • Warm-up condition • Both A/C switch and blower fan motor switch: ON (Compressor operates)	1.0 - 4.0V
39 (Y)	121 (B)	Heated oxygen sensor 2 heater	Output	[Engine is running] • 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 - 14V★  JMBIA0520GB
				[Ignition switch: ON] • Engine stopped [Engine is running] • For 2 minutes after starting engine • Idle speed	BATTERY VOLTAGE (11 - 14V)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
42 (Y)	121 (B)	EVAP canister purge volume control solenoid valve	Output	[Engine is running] • Idle speed	BATTERY VOLTAGE (11 - 14V)★  JMBIA0087GB
				[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)	BATTERY VOLTAGE (11 - 14V)★  JMBIA0521GB
44 (O)	121 (B)	Knock sensor 2	—	[Engine is running] • Warm-up condition • Idle speed	2.4V
46 (L)	—	Sensor ground (Heated oxygen sensor 2)	—	—	—
48 (Y)	—	Sensor ground (Intake air temperature sensor)	—	—	—
51 (L)	—	Sensor ground (Mass air flow sensor)	—	—	—
52 (R)	—	Sensor ground (Throttle position sensor)	—	—	—
53 (LG)	121 (B)	A/F sensor 1	Input	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.
54 (Y)	121 (B)	A/F sensor 1 (bank 1)	Input	[Ignition switch: ON]	2.2V
56 (O)	—	Sensor ground (Engine coolant temperature sensor)	—	—	—
62 (O)	121 (B)	Intake valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
				[Engine is running] • Warm-up condition • Engine speed: 2,000rpm	0 - 14V★  JMBIA0522GB
63 (W)	121 (B)	Knock sensor 1	Input	[Engine is running] • Idle speed	2.4V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
65 (P)	46 (L)	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 - 1.0V
67 (W)	48 (Y)	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with intake air temperature.
71 (G)	52 (R)	Throttleposition sensor 1	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
				[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
72 (B)	52 (R)	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
				[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
73 (P)	51 (L)	Mass air flow sensor	Input	[Engine is running] • Warm-up condition • Idle speed	0.9 - 1.1V
				[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	1.4 - 1.7V
75 (P)	56 (O)	Engine coolant temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with engine coolant temperature.
78 (L)	121 (B)	Fuel pump relay	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.5V
				[Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)
82 (L)	121 (B)	CAN communication line	Input/ Output	—	—
84 (R)	121 (B)	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0V
				[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
87 (Y)	121 (B)	Data link connector	Input/ Output	[Ignition switch: ON] • CONSULT-III or GST: Disconnected	BATTERY VOLTAGE (11 - 14V)
89 (O)	121 (B)	Power supply for ECM (Back-up)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
90 (P)	121 (B)	CAN communication line	Input/ Output	—	—
93 (O)	121 (B)	Ignition switch	Input	[Ignition switch: OFF]	0V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
94 (GR)	121 (B)	ASCD brake switch	Input	[Ignition switch: ON] • Brake pedal: Slightly depressed (CVT) • Brake pedal or clutch pedal: Slightly depressed (M/T)	0V
				[Ignition switch: ON] • Brake pedal: Fully released (CVT) • Brake pedal and clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)
98 (B)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
99 (W)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—
100 (B)	—	Sensor ground (ASCD steering switch)	—	—	—
105 (V)	121 (B)	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5V
106 (G)	99 (W)	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4V
107 (R)	98 (B)	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
108 (V)	100 (B)	ASCD steering switch	Input	[Ignition switch: ON] • ASCD steering switch: OFF	4V
				[Ignition switch: ON] • MAIN switch: Pressed	0V
				[Ignition switch: ON] • CANCEL switch: Pressed	1V
				[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3V
				[Ignition switch: ON] • SET/COAST switch: Pressed	2V
113 (LG)	121 (B)	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5V
115 (R)	121 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
118 (B) 119 (B) 120 (B) 121 (B)	—	ECM ground	—	—	—

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Wiring Diagram — ENGINE CONTROL SYSTEM —

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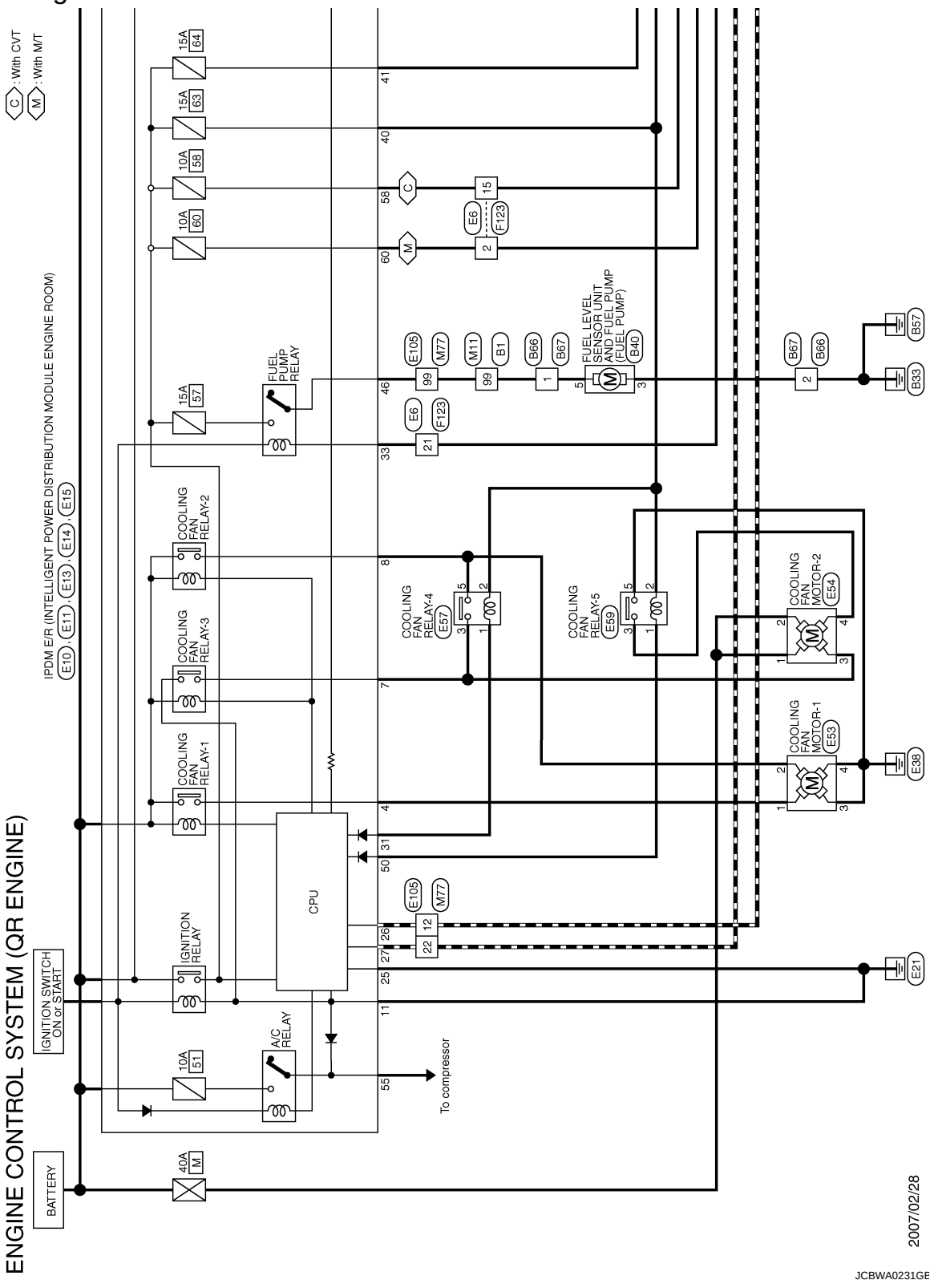
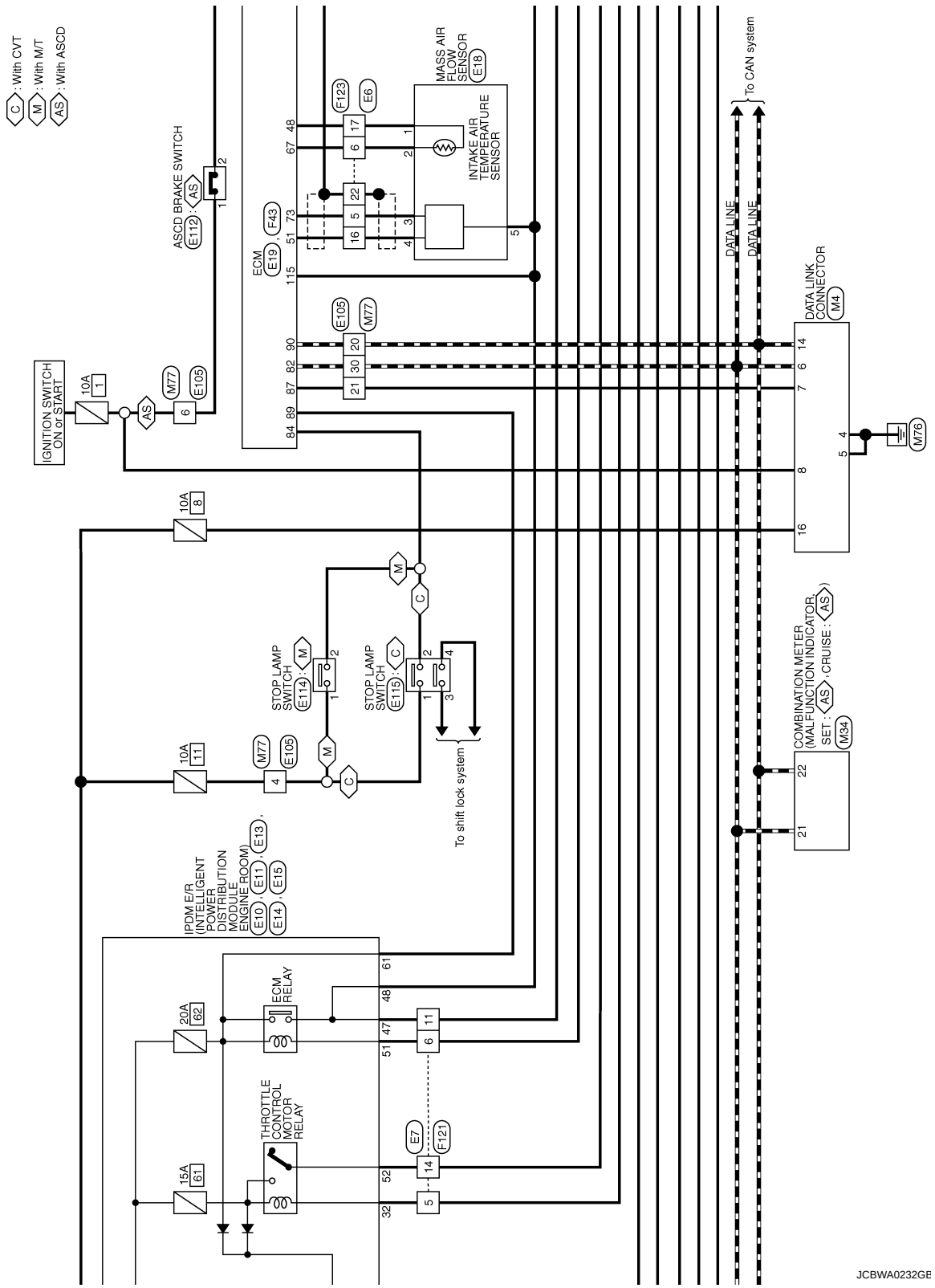
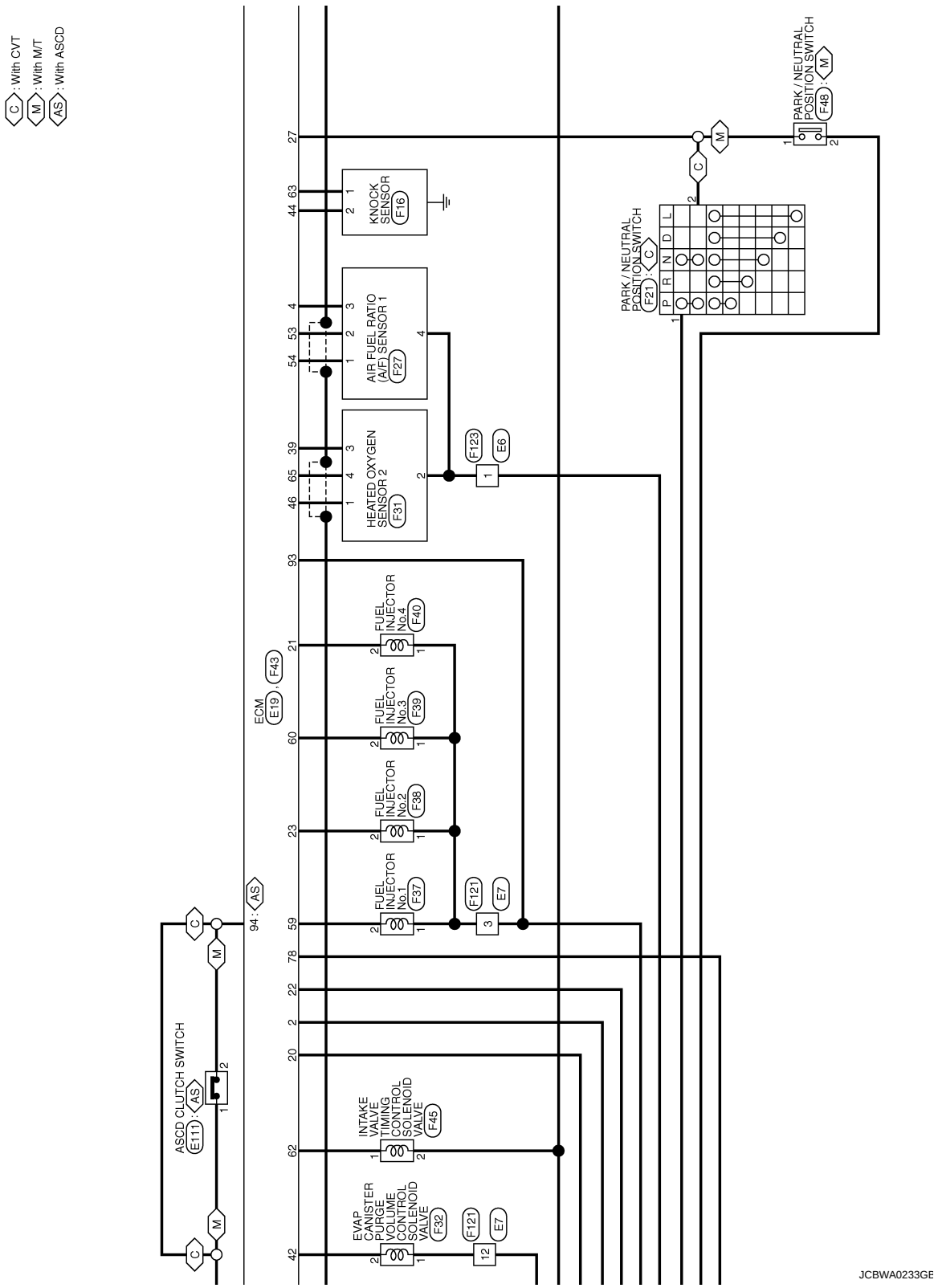
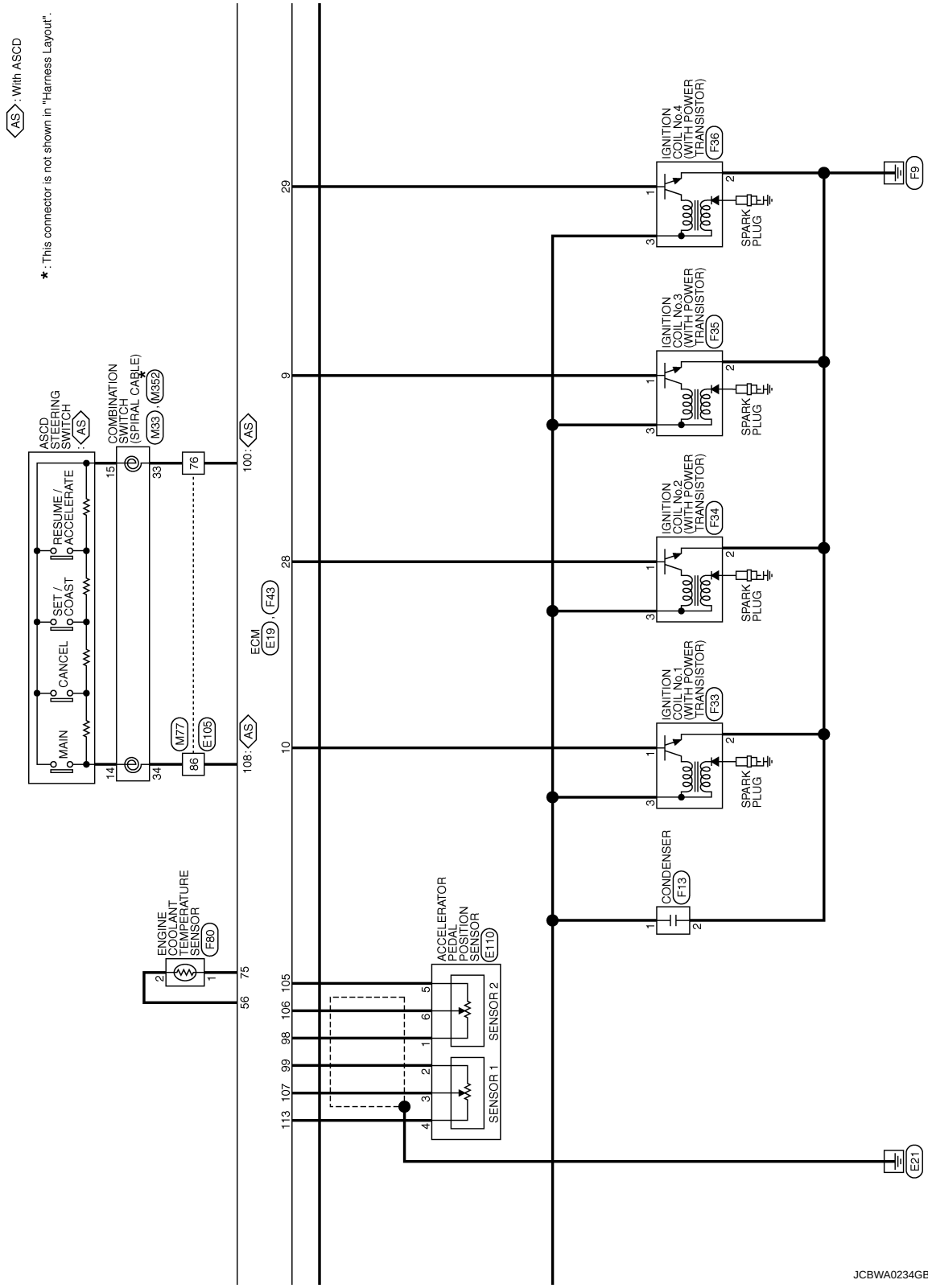
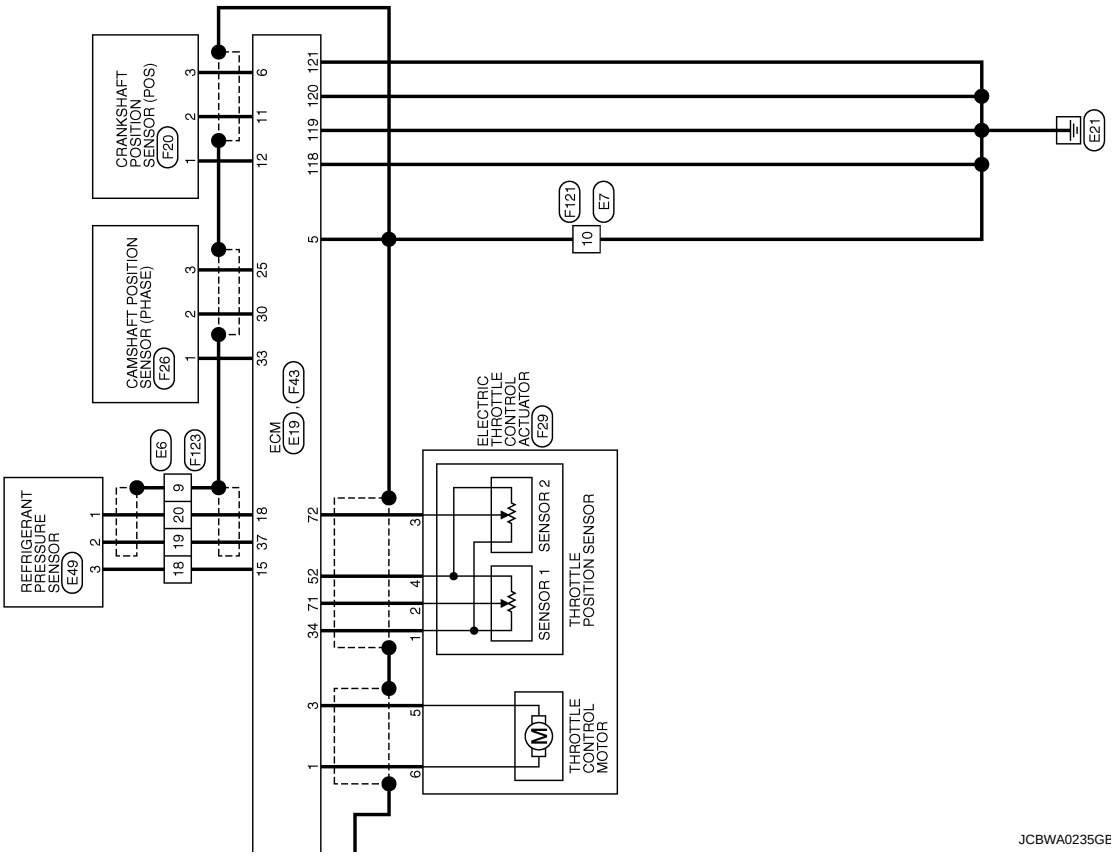



C : With CVT
M : With M/T
AS : With ASCD
ASCD BRAKE SWITCH
E112 : AS
MASS AIR FLOW SENSOR
E18
INTAKE AIR TEMPERATURE SENSOR
F123
E6
F43
ECM
E19
To CAN system
DATA LINE
DATA LINE
DATA LINK CONNECTOR
M4
M76
IGNITION SWITCH ON or START
10A 1
E105
M77
10A 8
10A 11
STOP LAMP SWITCH
E114 : M
STOP LAMP SWITCH
E115 : C
To shift lock system
COMBINATION METER (MALFUNCTION INDICATOR, SET : AS, CRUISE : AS)
M34
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
E10, E11, E13, E14, E15
20A 62
ECM RELAY
15A 61
THROTTLE CONTROL MOTOR RELAY
E7
F121
JCBWA0232GB


C : With CVT
M : With M/T
AS : With ASCD
PARK / NEUTRAL POSITION SWITCH (F48) : M
PARK / NEUTRAL POSITION SWITCH (F21) : C
P R N D L
KNOCK SENSOR (F16)
AIR FUEL RATIO (A/F) SENSOR 1 (F27)
HEATED OXYGEN SENSOR 2 (F31)
F123
E6
FUEL INJECTOR No.4 (F40)
FUEL INJECTOR No.3 (F39)
FUEL INJECTOR No.2 (F38)
FUEL INJECTOR No.1 (F37)
F121
E7
ECM (E19) : (F43)
94 : AS
ASCD CLUTCH SWITCH (E11) : AS
INTAKE VALVE TIMING CONTROL SOLENOID VALVE (F45)
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (F32)
JCBWA0233GE


AS : With ASCD
* : This connector is not shown in "Harness Layout".
ASCD STEERING SWITCH
AS
RESUME / ACCELERATE
SET / COAST
CANCEL
MAIN
COMBINATION SWITCH (SPIRAL CABLE)*
M33
M352
15
14
33
34
76
86
M77
E105
100 : AS
108 : AS
ECM
E19 : F43
29
9
28
10
IGNITION COIL No.4 (WITH POWER TRANSISTOR)
F36
IGNITION COIL No.3 (WITH POWER TRANSISTOR)
F35
IGNITION COIL No.2 (WITH POWER TRANSISTOR)
F34
IGNITION COIL No.1 (WITH POWER TRANSISTOR)
F33
SPARK PLUG
CONDENSER
F13
F9
E21
ENGINE COOLANT TEMPERATURE SENSOR
F80
75
56
ACCELERATOR PEDAL POSITION SENSOR
E110
SENSOR 1
SENSOR 2
105
106
98
99
107
113
JCBWA0234GB


CRANKSHAFT POSITION SENSOR (POS)
F20
CAMSHAFT POSITION SENSOR (PHASE)
F26
REFRIGERANT PRESSURE SENSOR
E49
E6
F123
ECM
E19
F43
ELECTRIC THROTTLE CONTROL ACTUATOR
F29
THROTTLE POSITION SENSOR
SENSOR 1
SENSOR 2
THROTTLE CONTROL MOTOR
F121
E7
10
E21
JCBWA0235GE

ENGINE CONTROL SYSTEM (QR ENGINE)

Connector No.	B1
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-CS16-TM4

Terminal No.	Color of Wire	Signal Name [Specification]
99	R	–

Connector No.	B40
Connector Name	FUEL LEVEL SENSOR UNIT AND FUEL PUMP
Connector Type	E05FGY-RS

Terminal No.	Color of Wire	Signal Name [Specification]
3	B	–
5	R	–

Connector No.	E6
Connector Name	WIRE TO WIRE
Connector Type	TK24MW-1Y

Terminal No.	Color of Wire	Signal Name [Specification]
1	V	–[With QR engine]
2	SB	–
5	Y	–[With QR engine]
6	W	–[With gasoline engine]
9	SHIELD	–[With QR engine]
15	LG	–
16	O	–[With QR engine]
17	BR	–[With QR engine]
18	L	–
19	LG	–[With QR engine]
20	V	–
21	GR	–[With gasoline engine]
22	SHIELD	–

Connector No.	B66
Connector Name	WIRE TO WIRE
Connector Type	NS04FW-CS

Terminal No.	Color of Wire	Signal Name [Specification]
1	R	–
2	B	–

Connector No.	B67
Connector Name	WIRE TO WIRE
Connector Type	NS04MW-CS

Terminal No.	Color of Wire	Signal Name [Specification]
1	R	–
2	B	–

Connector No.	E7
Connector Name	WIRE TO WIRE
Connector Type	NS16MW-CS

Terminal No.	Color of Wire	Signal Name [Specification]
3	O	–
5	LG	–[With gasoline engine]
6	W	–[With gasoline engine]
10	B	–
11	GR	–
12	R	–
14	P	–[With gasoline engine]

Connector No.	E10
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	M06FW-LC

Terminal No.	Color of Wire	Signal Name [Specification]
4	W	–
7	P	–
8	G	–

JCBWA0236GB

ENGINE CONTROL SYSTEM (QR ENGINE)

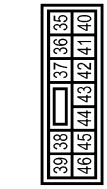
Connector No.	E11
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	M06FB-LC

Terminal No.	Color of Wire	Signal Name [Specification]
11	B	–

Connector No.	E13
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	TH12FW-NH

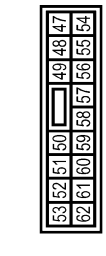
Terminal No.	Color of Wire	Signal Name [Specification]
25	B	–
26	P	–
27	L	–
31	V	–
32	LG	–
33	GR	–

Connector No.	E14
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS12FBR-CS



Terminal No.	Color of Wire	Signal Name [Specification]
40	V	–
41	LG	–
46	W	–

Connector No.	E15
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS16FW-CS

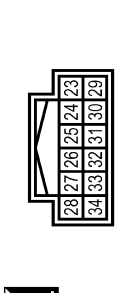


Terminal No.	Color of Wire	Signal Name [Specification]
47	GR	–[With gasoline engine]
48	R	–[With gasoline engine]
50	G	–
51	W	–
52	P	–
55	O	–
58	LG	–[Except M/T]
60	SB	–
61	O	–

Connector No.	E18
Connector Name	MASS AIR FLOW SENSOR
Connector Type	RH06FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	BR	–[With QR engine]
2	W	–
3	Y	–[With QR engine]
4	O	–[With QR engine]
5	R	–[With QR engine]

Connector No.	E19
Connector Name	ECM
Connector Type	BAA32FB-AHY8



Terminal No.	Color of Wire	Signal Name [Specification]
82	L	VEHCAN-H
84	R	BRAKE
87	Y	KLINE
89	O	BATT
90	P	VEHCAN-L
93	O	IGNSW
94	GR	BNCSW
98	B	GNDA-APS2
99	W	GNDA-APS1
100	B	GND-ASCDSW
105	V	AVCC-APS2
106	G	APS2
107	R	APS1
108	V	ASCDSW
113	LG	AVCC-APS1
115	R	VBR
118	B	GND
119	B	GND
120	B	GND
121	B	GND

Connector No.	E49
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Type	RK03FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	V	–
2	LG	–[With QR engine]
3	L	–

JCBWA0237GE

ENGINE CONTROL SYSTEM (QR ENGINE)

Connector No.	E53
Connector Name	COOLING FAN MOTOR-1
Connector Type	RS04FGY-PR

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–
2	G	–
3	B	–
4	B	–

Connector No.	E54
Connector Name	COOLING FAN MOTOR-2
Connector Type	RS04FGY-PR

Terminal No.	Color of Wire	Signal Name [Specification]
1	O	–
2	O	–
3	P	–
4	GR	–

Connector No.	E57
Connector Name	COOLING FAN RELAY-4
Connector Type	MS02FL-M2

Terminal No.	Color of Wire	Signal Name [Specification]
1	V	–
2	O	–
3	P	–
5	G	–

Connector No.	E59
Connector Name	COOLING FAN RELAY-5
Connector Type	MS02FL-M2

Terminal No.	Color of Wire	Signal Name [Specification]
1	G	–
2	V	–
3	GR	–
5	B	–

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4

Terminal No.	Color of Wire	Signal Name [Specification]
4	V	–
6	W	–
12	P	–
20	P	–
21	Y	–
22	L	–
30	L	–
76	B	–
86	V	–
99	W	–

Connector No.	E110
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Type	RH06FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	B	–[With QR engine]
2	W	–[With gasoline engine]
3	R	–[With QR engine]
4	LG	–[With gasoline engine]
5	V	–[With QR engine]
6	G	–[With gasoline engine]

Connector No.	E111
Connector Name	ASCD CLUTCH SWITCH
Connector Type	M02FBR-LC

Terminal No.	Color of Wire	Signal Name [Specification]
1	P	–
2	GR	–

Connector No.	E112
Connector Name	ASCD BRAKE SWITCH
Connector Type	M02FBR-LC

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–
2	GR	–[With ESP]
2	P	–[Without ESP]

JCBWA0238GE

ENGINE CONTROL SYSTEM (QR ENGINE)

Connector No.	E114
Connector Name	STOP LAMP SWITCH
Connector Type	M02FB-LC

Terminal No.	Color of Wire	Signal Name [Specification]
1	V	–
2	P	–

Connector No.	E115
Connector Name	STOP LAMP SWITCH
Connector Type	M04FW-LC

Terminal No.	Color of Wire	Signal Name [Specification]
1	V	–
2	P	–
3	O	–
4	LG	–

Connector No.	F13
Connector Name	CONDENSER
Connector Type	M02FW-LC

Terminal No.	Color of Wire	Signal Name [Specification]
1	BR	–
2	B	–

Connector No.	F16
Connector Name	KNOCK SENSOR
Connector Type	E02FG-RS-LGY

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–
2	O	–

Connector No.	F20
Connector Name	CRANKSHAFT POSITION SENSOR (POS)
Connector Type	RH03FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	P	–[With QR engine]
2	B	–[With QR engine]
3	W	–

Connector No.	F21
Connector Name	PARK / NEUTRAL POSITION SWITCH
Connector Type	RK08FG

Terminal No.	Color of Wire	Signal Name [Specification]
1	GR	–
2	Y	–

Connector No.	F26
Connector Name	CAMSHAFT POSITION SENSOR (PHASE)
Connector Type	RH03FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	P	–
2	Y	–[With QR engine]
3	G	–[With QR engine]

Connector No.	F27
Connector Name	AIR FUEL RATIO (A/F) SENSOR 1
Connector Type	AFZ04FGY

Terminal No.	Color of Wire	Signal Name [Specification]
1	V	AF(+)
2	LG	AF(–)
3	Y	HEATER(–)
4	W	HEATER(+)

JCBWA0239GE

ENGINE CONTROL SYSTEM (QR ENGINE)

Connector No.	F29
Connector Name	ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Type	RH06FB

H.S.

1 2 3 4 5 6

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–[With QR engine]
2	G	–[With QR engine]
3	B	–[With QR engine]
4	R	–[With QR engine]
5	P	–[With QR engine]
6	L/Y	–[With QR engine]

Connector No.	F31
Connector Name	HEATED OXYGEN SENSOR 2
Connector Type	AFZ04FB

H.S.

1 2 3 4

Terminal No.	Color of Wire	Signal Name [Specification]
1	L	–
2	BR	–
3	Y	–
4	P	–

Connector No.	F32
Connector Name	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Connector Type	E02FL–RS–LGY

H.S.

1 2

Terminal No.	Color of Wire	Signal Name [Specification]
1	P	–[With QR engine]
2	Y	–

Connector No.	F33
Connector Name	IGNITION COIL No.1 (WITH POWER TRANSISTOR)
Connector Type	E03FGY–RS

H.S.

1 2 3

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	B	–
3	BR	–

Connector No.	F34
Connector Name	IGNITION COIL No.2 (WITH POWER TRANSISTOR)
Connector Type	E03FGY–RS

H.S.

1 2 3

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–
2	B	–
3	BR	–

Connector No.	F35
Connector Name	IGNITION COIL No.3 (WITH POWER TRANSISTOR)
Connector Type	E03FGY–RS

H.S.

1 2 3

Terminal No.	Color of Wire	Signal Name [Specification]
1	R	–
2	B	–
3	BR	–

Connector No.	F36
Connector Name	IGNITION COIL No.4 (WITH POWER TRANSISTOR)
Connector Type	E03FGY–RS

H.S.

1 2 3

Terminal No.	Color of Wire	Signal Name [Specification]
1	G	–
2	B	–
3	BR	–

Connector No.	F37
Connector Name	FUEL INJECTOR No.1
Connector Type	HS02FGY

H.S.

1 2

Terminal No.	Color of Wire	Signal Name [Specification]
1	O	–
2	GR	–

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ENGINE CONTROL SYSTEM (QR ENGINE)

Connector No.	F38
Connector Name	FUEL INJECTOR No.2
Connector Type	HS02FGY

Terminal No.	Color of Wire	Signal Name [Specification]
1	O	–
2	BR	–

Connector No.	F39
Connector Name	FUEL INJECTOR No.3
Connector Type	HS02FGY

Terminal No.	Color of Wire	Signal Name [Specification]
1	O	–
2	SB	–[With QR engine]

Connector No.	F40
Connector Name	FUEL INJECTOR No.4
Connector Type	HS02FGY

Terminal No.	Color of Wire	Signal Name [Specification]
1	O	–
2	P	–

Connector No.	F43
Connector Name	ECM
Connector Type	BAA76FB-AHY5

Terminal No.	Color of Wire	Signal Name [Specification]
1	L/Y	MOTOR1
2	R	VMOT1
3	P	MOTOR2
4	Y	AFH1
5	B	GND
6	W	POS
9	R	IGN#3
10	SB	IGN#1
11	B	GND-POS
12	P	AVCC-POS
15	L	AVCC-PDPRES
18	V	GNDA-PDPRES
20	G	SSOFF
21	P	INJ#4
22	LG	MOTRLY1
23	BR	INJ#2
25	G	PHASE#1
27	LG	NEUT-H
28	W	IGN#2
29	G	IGN#4
30	Y	GNDA-PHASE#1
33	P	AVCC-PHASE#1
34	W	AVCC-TPS
37	LG	PDPRES
39	Y	O2HR1
42	Y	EVAP
44	O	KNK2
46	L	GNDA-O2SR1
48	BR	GNDA-TA1
51	L	QA1–
52	R	GNDA-TPS
53	LG	AF–1
54	Y	AF+1
56	O	GNDA-TW
59	GR	INJ#1
60	SB	INJ#3
62	O	CVTC#1
63	W	KNK1
65	P	O2SR1
67	W	TA1
71	G	TPS1
72	B	TPS2
73	Y	QA1+
75	P	TW
78	L	FPR

Connector No.	F45
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
Connector Type	E02FG-RS-LGY

Terminal No.	Color of Wire	Signal Name [Specification]
1	O	–
2	BR	–

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ENGINE CONTROL SYSTEM (QR ENGINE)

Connector No.	F48
Connector Name	PARK / NEUTRAL POSITION SWITCH
Connector Type	RK02FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	LG	–[With gasoline engine]
2	SB	–

Connector No.	F80
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Type	E02FGY-RS

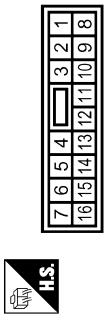
Terminal No.	Color of Wire	Signal Name [Specification]
1	P	–
2	O	–

Connector No.	F123
Connector Name	WIRE TO WIRE
Connector Type	TK24FW-1V

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–[With QR engine]
2	SB	–
5	Y	–[With QR engine]
6	W	–[With gasoline engine]
9	SHIELD	–[With QR engine]
15	GR	–
16	O	–[With QR engine]
17	BR	–[With QR engine]
18	L	–
19	LG	–[With QR engine]
20	V	–

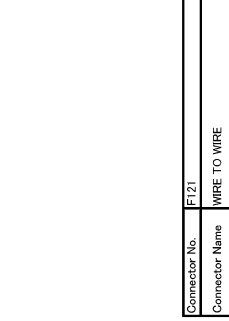
21	L	–[With gasoline engine]
22	SHIELD	–

Connector No.	F121
Connector Name	WIRE TO WIRE
Connector Type	NS16FW-CS



Terminal No.	Color of Wire	Signal Name [Specification]
3	O	–
5	LG	–[With gasoline engine]
6	G	–[With gasoline engine]
10	B	–
11	BR	–
12	P	–[With QR engine]
14	R	–[With QR engine]

Connector No.	M4
Connector Name	DATA LINK CONNECTOR
Connector Type	BD16FW



Terminal No.	Color of Wire	Signal Name [Specification]
4	B	–
5	B	–
6	L	–
7	O	–
8	W	–
14	P	–
16	Y	–

Connector No.	M11
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4

Terminal No.	Color of Wire	Signal Name [Specification]
99	R	–

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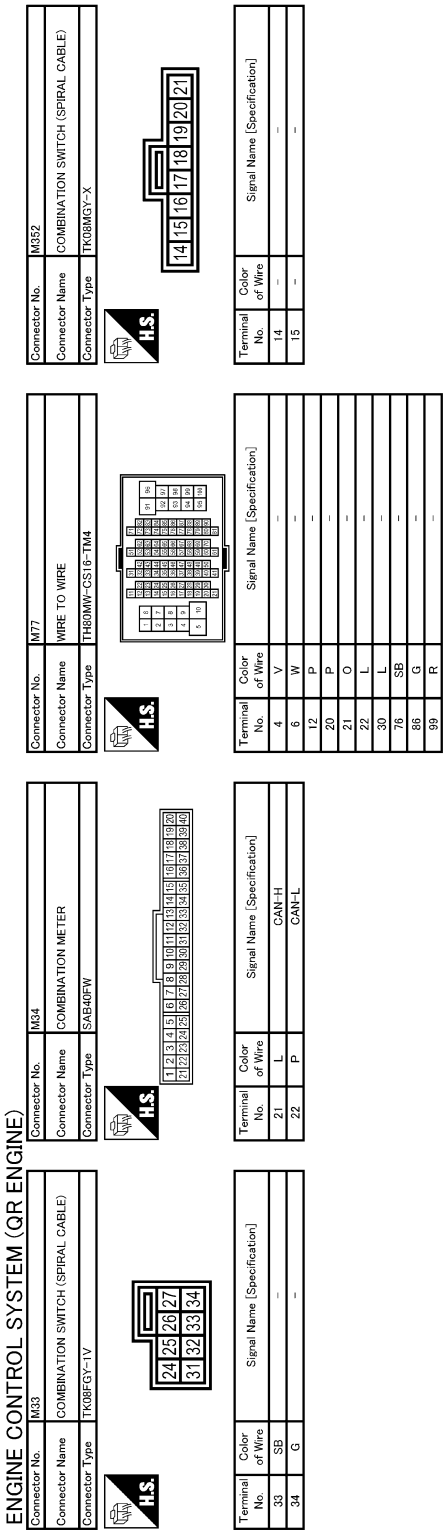


JCBWA0243GE

Fail Safe

INFOID:0000000001310034

NON DTC RELATED ITEM

Engine operating condition in fail-safe mode	Detected items	Remarks	Reference page
Engine speed will not rise more than 2,500 rpm due to the fuel cut	Malfunction indicator lamp circuit	When there is an open circuit on MI circuit, the ECM cannot warn the driver by lighting up MI 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 MI circuit is open by means of operating fail-safe function. The fail-safe function also operates when above diagnoses except MI circuit are detected and demands the driver to repair the malfunction.	ECQ-310

DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail-safe mode	
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.	
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 temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after following condition. CONSULT-III displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT-III display)
		Just as ignition switch is turned ON or START	40°C (104°F)
		Approx. 4 minutes after engine starting	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
		When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	
P0122 P0123 P0222 P0223 P2132 P2133 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.	
P0500	Vehicle speed sensor	When the fail-safe system for vehicle speed sensor is activated, the cooling fan operates (Highest) while engine is running.	
P0643	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P0605	ECM	(When ECM calculation function is malfunctioning:) ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. ECM deactivates ASCD operation.	
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 control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P2101	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	

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

INFOID:0000000001310035

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	• U1000 U1001 CAN communication line • U1010 CAN communication • P0101 P0102 P0103 Mass air flow sensor • P0112 P0113 Intake air temperature sensor • P0117 P0118 P0125 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1299 P2109 P2135 Throttle position sensor • P0327 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0500 Vehicle speed sensor • P0562 P0563 Battery voltage • P0605 ECM • P1610 - P1615 NATS • P1706 Park/neutral position (PNP) switch • P0201, P0202, P0203, P0204 FUEL INJECTOR • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor

Priority	Detected items (DTC)
2	• P0031 Air fuel ratio (A/F) sensor 1 heater • P0036 P0037 P0038 Heated oxygen sensor 2 heater • P0130 P0131 P0132 P0133 P2A00 Air fuel ratio (A/F) sensor 1 • P0136 P0137 P0138 P0139 Heated oxygen sensor 2 • P0444 P0445 EVAP canister purge volume control solenoid valve • P0710 P0715 P0720 P0740 P0744 P0776 P0778 P0840 P0845 P1740 P1777 P1778 CVT related sensors, solenoid valves and switches • P1111 Intake valve timing control solenid • P1217 Engine over temperature (OVERHEAT) • P1805 Brake switch • P2101 Electric throttle control function • P2100 P2103 Throttle control motor relay
3	• P0011 Intake valve timing control • P0171 P0172 Fuel injection system function • P0300 - P0304 Misfire • P0420 Three way catalyst function • P1212 TCS connuniation line • P1320 Ignition coil • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD vehicle speed sensor • P1715 Primary speed sensor • P2119 Electric throttle control actuator

DTC Index

INFOID:0000000001310036

×:Applicable —: Not applicable

DTC*1		Items (CONSULT-III screen terms)	SRT code	Test value/ Test limit (GST only)	Trip	MI	Reference page
CONSULT-III GST*2	ECM*3						
U1000	1000*4	CAN COMM CIRCUIT	—	—	1	×	ECQ-110
U1001	1001*4	CAN COMM CIRCUIT	—	—	2	—	ECQ-110
U1010	1010	CONTROL UNIT(CAN)	—	—	1	×	ECQ-111
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	—	**Flashing***7	**—**
P0011	0011	INT/V TIM CONT-B1	—	—	2	—	ECQ-112
P0031	0031	A/F SEN1 HTR (B1)	—	×	2	×	ECQ-115
P0036	0036	HO2S2 HTR (B1)	—	×	2	×	ECQ-118
P0037	0037	HO2S2 HTR (B1)	—	×	2	×	ECQ-118
P0038	0038	HO2S2 HTR (B1)	—	×	2	×	ECQ-118
P0101	0101	MAF SEN/CIRCUIT-B1	—	—	1	×	ECQ-121
P0102	0102	MAF SEN/CIRCUIT-B1	—	—	2	×	ECQ-126
P0103	0103	MAF SEN/CIRCUIT-B1	—	—	1	×	ECQ-126
P0112	0112	IAT SEN/CIRCUIT-B1	—	—	2	×	ECQ-131
P0113	0113	IAT SEN/CIRCUIT-B1	—	—	2	×	ECQ-131
P0117	0117	ECT SEN/CIRC	—	—	1	×	ECQ-134
P0118	0118	ECT SEN/CIRC	—	—	1	×	ECQ-134
P0122	0122	TP SEN 2/CIRC-B1	—	—	1	×	ECQ-137
P0123	0123	TP SEN 2/CIRC-B1	—	—	1	×	ECQ-137
P0125	0125	ECT SENSOR	—	—	2	×	ECQ-141
P0130	0130	A/F SENSOR1 (B1)	—	×	2	×	ECQ-144
P0131	0131	A/F SENSOR1 (B1)	—	×	2	×	ECQ-148

DTC*1		Items (CONSULT-III screen terms)	SRT code	Test value/ Test limit (GST only)	Trip	MI	Reference page
CONSULT-III GST*2	ECM*3						
P0132	0132	A/F SENSOR1 (B1)	—	×	2	×	ECQ-151
P0133	0133	A/F SENSOR1 (B1)	×	×	2	×	ECQ-154
P0136	0136	HO2S2 (B1)	×	×	2	×	ECQ-159
P0137	0137	HO2S2 (B1)	×	×	2	×	ECQ-163
P0138	0138	HO2S2 (B1)	×	×	2	×	ECQ-171
P0139	0139	HO2S2 (B1)	×	×	2	×	ECQ-179
P0171	0171	FUEL SYS-LEAN-B1	—	—	2	×	ECQ-183
P0172	0172	FUEL SYS-RICH-B1	—	—	2	×	ECQ-187
P0201	0201	INJECTOR CIRC-CYL1	—	—	2	—	ECQ-191
P0202	0202	INJECTOR CIRC-CYL2	—	—	2	—	ECQ-191
P0203	0203	INJECTOR CIRC-CYL3	—	—	2	—	ECQ-191
P0204	0204	INJECTOR CIRC-CYL4	—	—	2	—	ECQ-191
P0222	0222	TP SEN 1/CIRC-B1	—	—	1	×	ECQ-194
P0223	0223	TP SEN 1/CIRC-B1	—	—	1	×	ECQ-194
P0300	0300	MULTI CYL MISFIRE	—	—	2	×	ECQ-198
P0301	0301	CYL 1 MISFIRE	—	—	2	×	ECQ-198
P0302	0302	CYL 2 MISFIRE	—	—	2	×	ECQ-198
P0303	0303	CYL 3 MISFIRE	—	—	2	×	ECQ-198
P0304	0304	CYL 4 MISFIRE	—	—	2	×	ECQ-198
P0327	0327	KNOCK SEN/CIRC-B1	—	—	2	—	ECQ-204
P0335	0335	CKP SEN/CIRCUIT	—	—	2	×	ECQ-206
P0340	0340	CMP SEN/CIRC-B1	—	—	2	×	ECQ-210
P0420	0420	TW CATALYST SYS-B1	×	×	2	×	ECQ-214
P0444	0444	PURG VOLUME CONT/V	—	—	2	×	ECQ-219
P0445	0445	PURG VOLUME CONT/V	—	—	2	×	ECQ-219
P0500	0500	VEH SPEED SEN/CIRC*5	—	—	2	×	ECQ-222
P0562	0562	SYSTEM VOLTAGE	—	—	2	—	ECQ-224
P0563	0563	SYSTEM VOLTAG	—	—	2	—	ECQ-225
P0605	0605	ECM	—	—	1 or 2	× or —	ECQ-226
P0705	0705	PNP SW/CIRC	—	—	2	×	TM-403
P0710	0710	ATF TEMP SEN/CIRC	—	—	1	×	TM-406
P0715	0715	PNP SW/CIRC	—	—	2	×	TM-408
P0720	0720	VEH SPD SEN/CIR AT	—	—	2	×	TM-411
P0740	0740	TCC SOLENOID/CIRC	—	—	2	×	TM-417
P0744	0744	A/T TCC S/V FNCTN	—	—	2	×	TM-419
P0746	0746	PRS CNT SOL/A FCTN	—	—	1	×	TM-423
P0776	0776	PRS CNT SOL/B FCT	—	—	2	×	TM-425
P0778	0778	PRS CNT SOL/B CIRC	—	—	2	×	TM-427
P0840	0840	TR PRS SENS/A CIRC	—	—	2	×	TM-432
P0845	0845	TR PRS SENS/B CIRC	—	—	2	×	TM-437
P1111	1111	INJECTOR CIRC-CYL1	—	—	2	×	ECQ-228
P1212	1212	TCS/CIRC	—	—	2	—	ECQ-231

DTC*1		Items (CONSULT-III screen terms)	SRT code	Test value/ Test limit (GST only)	Trip	MI	Reference page
CONSULT-III GST*2	ECM*3						
P1217	1217	ENG OVER TEMP	—	—	1	×	ECQ-232
P1225	1225	CTP LEARNING-B1	—	—	1	×	ECQ-272
P1299	1299	CTP LEARNING	—	—	1	×	ECQ-238
P1320	1320	IGN SIGNAL PRIMARY	—	—	2	—	ECQ-241
P1564	1564	ASCD SW	—	—	1	—	ECQ-246
P1572	1572	ASCD BRAKE SW	—	—	1	—	ECQ-249
P1574	1574	ASCD VHL SPD SEN	—	—	1	—	ECQ-256
P1610	1610	LOCK MODE	—	—	2	—	SEC-41
P1611	1611	ID DISCARD IMM-ECM	—	—	2	—	SEC-38
P1612	1612	CHAIN OF ECM-IMMU	—	—	2	—	SEC-40
P1614	1614	CHAIN OF IMMU-KEY	—	—	2	—	SEC-53
P1615	1615	DIFFERENCE OF KEY	—	—	2	—	SEC-43
P1706	1706	P-N POS SW/CIRCUIT	—	—	2	×	ECQ-258
P1715	1715	IN PULY SPEED	—	—	2	—	ECQ-261
P1805	1805	BRAKE SW/CIRCUIT	—	—	1	—	ECQ-263
P2100	2100	ETC MOT PWR-B1	—	—	1	×	ECQ-266
P2101	2101	ETC FNCTN/CIRC-B1	—	—	1	×	ECQ-268
P2103	2103	ETC MOT PWR	—	—	1	×	ECQ-266
P2109	2109	CTP LEARNING	—	—	1	×	ECQ-272
P2119	2119	ETC ACTR-B1	—	—	1	×	ECQ-273
P2122	2122	APP SEN 1/CIRC	—	—	1	×	ECQ-275
P2123	2123	APP SEN 1/CIRC	—	—	1	×	ECQ-275
P2127	2127	APP SEN 2/CIRC	—	—	1	×	ECQ-279
P2128	2128	APP SEN 2/CIRC	—	—	1	×	ECQ-279
P2135	2135	TP SENSOR-B1	—	—	1	×	ECQ-283
P2138	2138	APP SENSOR	—	—	1	×	ECQ-287
P2A00	2A00	A/F SENSOR1 (B1)	—	×	2	×	ECQ-291

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: The troubleshooting for this DTC needs CONSULT-III.

*5: When the fail-safe operations for both self-diagnoses occur, the MI illuminates.

*6: SRT code will not be set if the self-diagnostic result is NG.

*7: When the ECM is in the mode of displaying SRT status, MI may flash. For the details, refer to “How to Display SRT Status”.

How to Set SRT Code

INFOID:0000000001310037

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

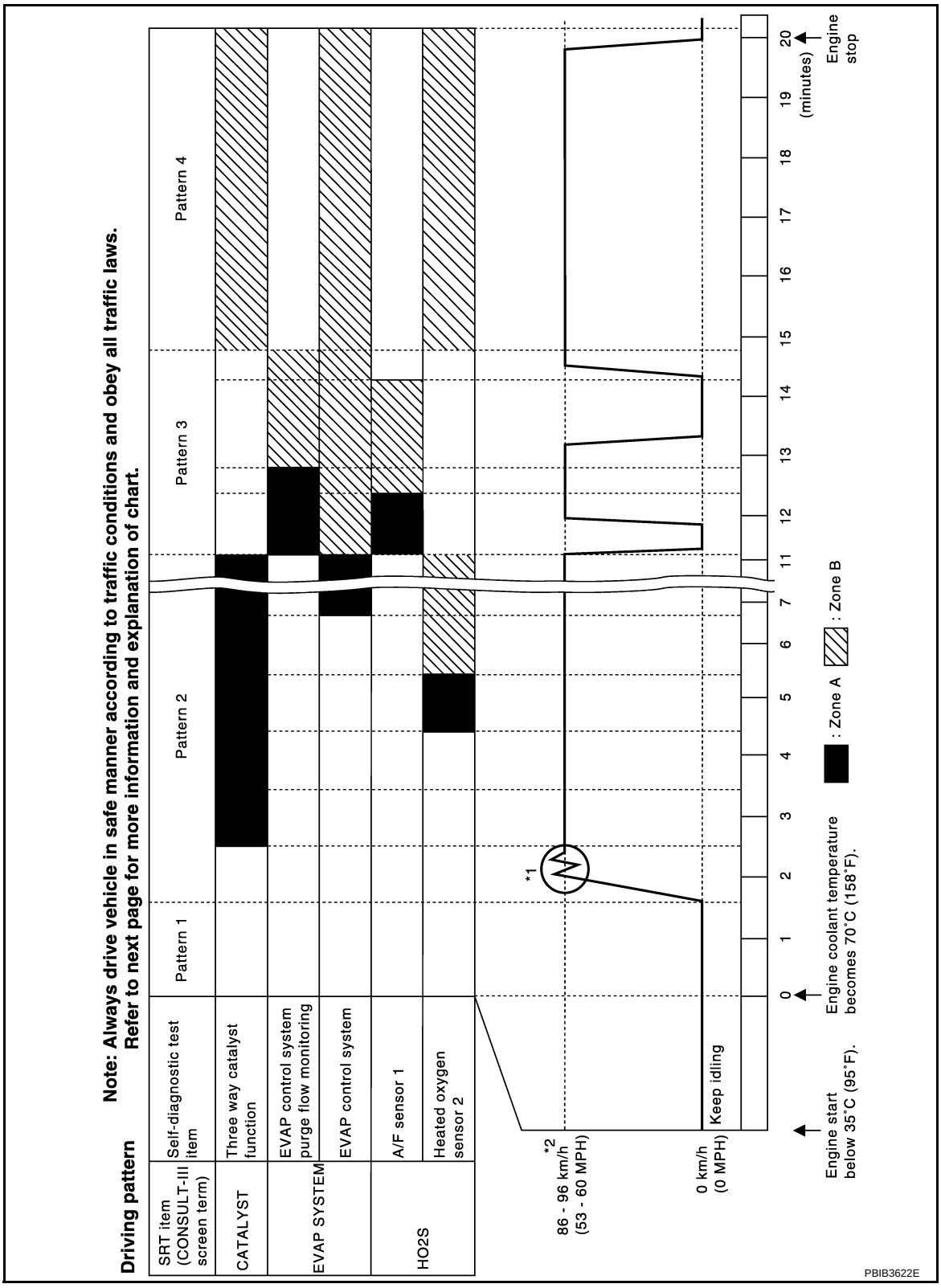
WITH CONSULT-III

Perform corresponding DTC CONFIRMATION PROCEDURE one by one based on Performance Priority in the table on “SRT Item”.

WITHOUT CONSULT-III

The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.

DRIVING PATTERN



- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
  Zone A refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.
  Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

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

Pattern 1:

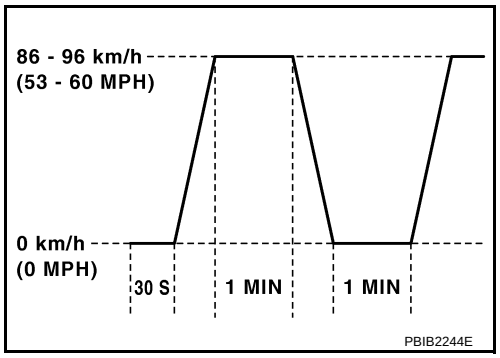
- **The engine is started at the engine coolant temperature of −10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 46 and ground is 3.0 - 4.3V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 46 and ground is lower than 1.4V).**
- **The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 95 and ground is less than 4.1V).**

Pattern 2:

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

Pattern 3:

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



Pattern 4:

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

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

Suggested Transmission Gear Position for CVT Models

Set the selector lever in the D position.

Suggested Upshift Speeds for M/T Models

Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:		For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:
Gear change	ACCEL shift position km/h (MPH)	CRUISE shift point km/h (MPH)	km/h (MPH)
1st to 2nd	24 (15)	13 (8)	13 (8)
2nd to 3rd	40 (25)	27 (17)	27 (17)
3rd to 4th	53 (33)	40 (25)	40 (25)
4th to 5th	71 (44)	58 (36)	58 (36)
5th to 6th	82 (51)	82 (51)	82 (51)

Test Value and Test Limit

INFOID:0000000001310038

The following is the information specified in Service $06 of 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 Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

Item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit	Conversion
			TID	CID		
CATALYST	Three way catalyst function	P0420	01H	81H	Min.	1/128
		P0420	02H	81H	Min.	1
HO2S	Air fuel ratio (A/F) sensor 1	P0131	41H	8EH	Min.	5mV
		P0132	42H	0EH	Max.	5mV
		P2A00	43H	0EH	Max.	0.002
		P2A00	44H	8EH	Min.	0.002
		P0130	46H	0EH	Max.	5mV
		P0130	47H	8EH	Min.	5mV
		P0133	45H	8EH	Min.	0.004
		P0133	48H	8EH	Min.	0.004
	Heated oxygen sensor 2	P0139	19H	86H	Min.	10mV/500 ms
		P0137	1AH	86H	Min.	10 mV
		P0138	1BH	06H	Max.	10 mV
		P0138	1CH	06H	Max.	10mV
HO2S HEATER	A/F sensor 1 heater	P0032	57H	10H	Max.	5 mV
		P0031	58H	90H	Min.	5 mV
	Heated oxygen sensor 2 heater	P0038	2DH	0AH	Max.	20 mV
		P0037	2EH	8AH	Min.	20 mV

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:0000000001310039

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		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)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	ECQ-307
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			ECQ-356
	Fuel injector circuit	1	1	2	3	2		2	2			2			ECQ-191
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			ECQ-65
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		ECQ-311
	Incorrect idle speed adjustment						1	1	1	1		1			ECQ-17
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	ECQ-268, ECQ-273
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			ECQ-18
	Ignition circuit	1	1	2	2	2		2	2			2			ECQ-242
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			ECQ-106
Mass air flow sensor circuit		1			2										ECQ-121, ECQ-126
Engine coolant temperature sensor circuit					3		3			3					ECQ-134, ECQ-141
Air fuel ratio (A/F) sensor 1 circuit			1	2	3	2		2	2			2			ECQ-144, ECQ-148, ECQ-151, ECQ-154, ECQ-291
Throttle position sensor circuit							2			2					ECQ-137, ECQ-194, ECQ-272, ECQ-236, ECQ-283
Accelerator pedal position sensor circuit				3	2	1									ECQ-275, ECQ-279, ECQ-287
Knock sensor circuit				2								3			ECQ-204

	SYMPTOM													Reference page
	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)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Crankshaft position sensor (POS) circuit	2	2												ECQ-206
Camshaft position sensor (PHASE) circuit	3	2												ECQ-210
Vehicle speed signal circuit		2	3		3						3			ECQ-222
ECM	2	2	3	3	3	3	3	3	3	3	3			ECQ-226, ECQ-226
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			ECQ-112
PNP switch circuit			3		3		3	3			3			ECQ-258
Refrigerant pressure sensor circuit		2				3			3		4			ECQ-312
Electrical load signal circuit							3							ECQ-305
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-179
ABS actuator and electric unit (control unit)			4											BRC-59

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

		SYMPTOM													Reference page
		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)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FL-9
	Fuel piping			5	5	5		5	5			5			EM-166
	Vapor lock														—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—
Air	Air duct	5	5	5	5	5	5	5	5	5		5			EM-152
	Air cleaner														EM-150
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)														EM-152
	Electric throttle control actuator														EM-152
	Air leakage from intake manifold/ Collector/Gasket														EM-152
Cranking	Battery	1	1	1		1		1	1			1		1	PG-133
	Generator circuit														CHG-6
	Starter circuit	3													STR-5
	Signal plate	6													EM-182
	PNP switch	4													TM-403 or TM-511
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-202
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-211
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mecha-nism	Timing chain	5	5	5	5	5		5	5			5			EM-193
	Camshaft														EM-170
	Intake valve timing control														EM-193
	Intake valve												3		EM-193
	Exhaust valve														

		SYMPTOM													Reference page
		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)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			EM-155, EX-10
	Three way catalyst														
	HC adsorption catalyst														
Lubrica-tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-161, LU-22, LU-19, LU-20
	Oil level (Low)/Filthy oil														LU-16
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-48
	Thermostat									5					CO-58
	Water pump														CO-55
	Water gallery														CO-33
	Cooling fan									5					CO-53
	Coolant level (Low)/Contaminat-ed coolant														CO-41
NATS (NISSAN Vehicle Immobilizer System)		1	1												SEC-16

1 - 6: The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

Description

INFOID:0000000001310040

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 1,800 rpm under no load (for example, the selector lever position is neutral and engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, ECQ-28, "System Description".

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000001555408

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the “SRS AIRBAG” and “SEAT BELT” of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the “SRS AIRBAG”.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:0000000001583161

NOTE:

- This Procedure is applied only to models with Intelligent Key system and NATS (NISSAN ANTI-THEFT SYSTEM).
- Remove and install all control units after disconnecting both battery cables with the ignition knob in the ″LOCK″ position.
- Always use CONSULT-III to perform self-diagnosis as a part of each function inspection after finishing work. If DTC is detected, perform trouble diagnosis according to self-diagnostic results.

For models equipped with the Intelligent Key system and NATS, an electrically controlled steering lock mechanism is adopted on the key cylinder.

For this reason, if the battery is disconnected or if the battery is discharged, the steering wheel will lock and steering wheel rotation will become impossible.

If steering wheel rotation is required when battery power is interrupted, follow the procedure below before starting the repair operation.

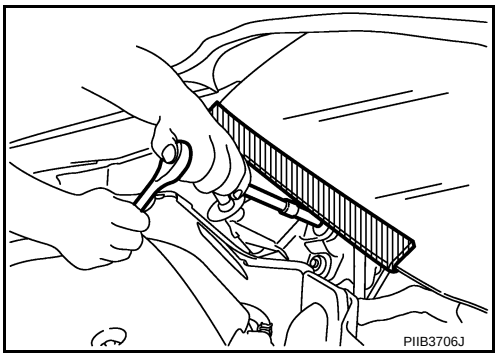
OPERATION PROCEDURE

1. Connect both battery cables.
   NOTE:
   Supply power using jumper cables if battery is discharged.
2. Use the Intelligent Key or mechanical key to turn the ignition switch to the ″ACC″ position. At this time, the steering lock will be released.
3. Disconnect both battery cables. The steering lock will remain released and the steering wheel can be rotated.
4. Perform the necessary repair operation.
5. When the repair work is completed, return the ignition switch to the ″LOCK″ position before connecting the battery cables. (At this time, the steering lock mechanism will engage.)
6. Perform a self-diagnosis check of all control units using CONSULT-III.

Precaution for Procedure without Cowl Top Cover

INFOID:0000000001555416

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



Precautions For Xenon Headlamp Service

INFOID:0000000001583157

WARNING:

Comply with the following warnings to prevent any serious accident.

- **Disconnect the battery cable (negative terminal) or the power supply fuse before installing, removing, or touching the xenon headlamp (bulb included). The xenon headlamp contains high-voltage generated parts.**
- **Never work with wet hands.**
- **Check the xenon headlamp ON-OFF status after assembling it to the vehicle. Never turn the xenon headlamp ON in other conditions. Connect the power supply to the vehicle-side connector. (Turning it ON outside the lamp case may cause fire or visual impairments.)**
- **Never touch the bulb glass immediately after turning it OFF. It is extremely hot.**

CAUTION:

Comply with the following cautions to prevent any error and malfunction.

- **Install the xenon bulb securely. (Insufficient bulb socket installation may melt the bulb, the connector, the housing, etc. by high-voltage leakage or corona discharge.)**
- **Never perform HID circuit inspection with a tester.**
- **Never touch the xenon bulb glass with hands. Never put oil and grease on it.**
- **Dispose of the used xenon bulb after packing it in thick vinyl without breaking it.**
- **Never wipe out dirt and contamination with organic solvent (thinner, gasoline, etc.).**

On Board Diagnostic (OBD) System of Engine and CVT

INFOID:0000000001310044

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MI) to warn the driver of a malfunction causing emission deterioration.

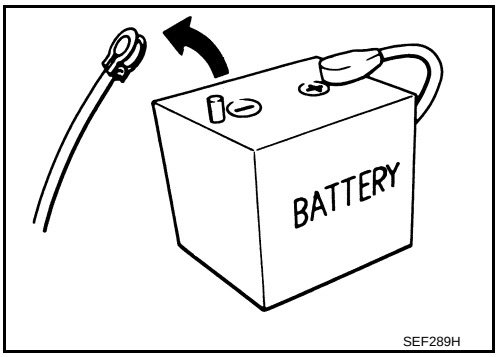
CAUTION:

- **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 MI to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI 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-120, "Description".**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MI 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 MI to light up due to the malfunction of the EVAP system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

General Precautions

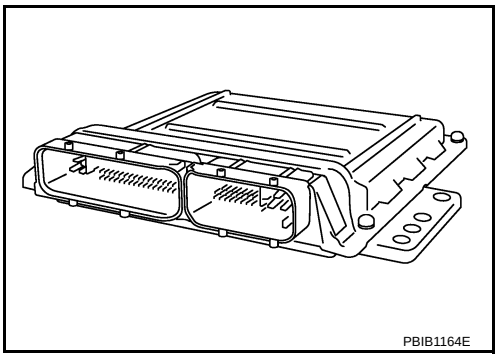
INFOID:0000000001310045

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.**



SEF289H

- **Do not disassemble ECM.**
- **If a battery cable is disconnected, the memory will return to the ECM value.**
  The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- **If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.**
  - **Diagnostic trouble codes**
  - **1st trip diagnostic trouble codes**
  - **Freeze frame data**
  - **1st trip freeze frame data**
  - **System readiness test (SRT) codes**
  - **Test values**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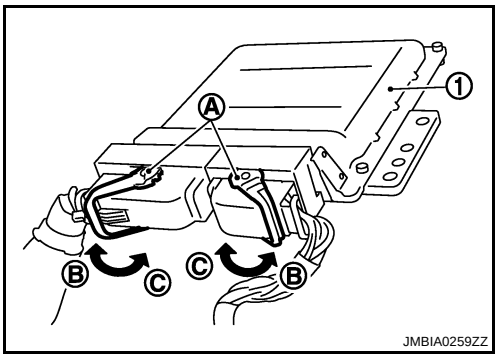
- **When connecting ECM harness connector (A), fasten (B) it securely with a lever as far as it will go as shown in the figure.**

1. ECM
B. Loosen
C. fasten



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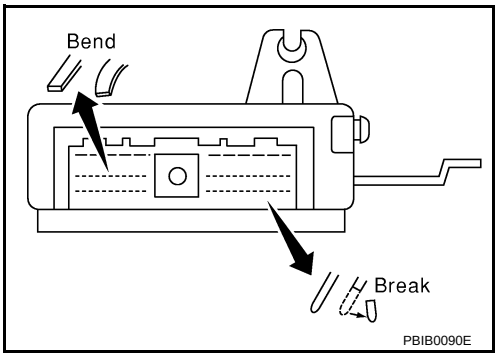
- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep engine control system harness at least 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.**



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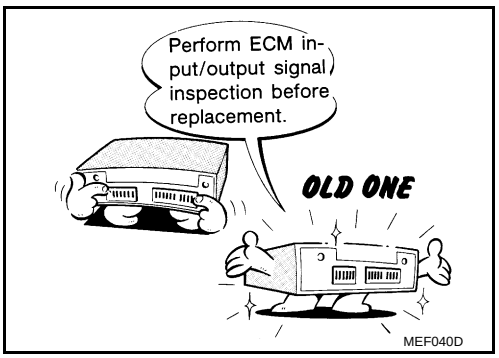
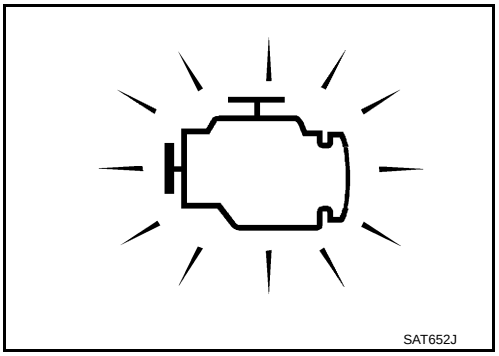
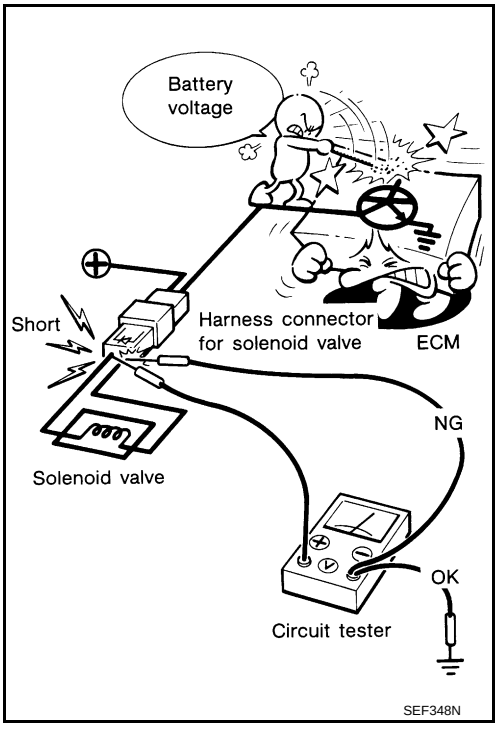
- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to ECQ-314, "Reference Value".**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**



- **After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check.** The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.

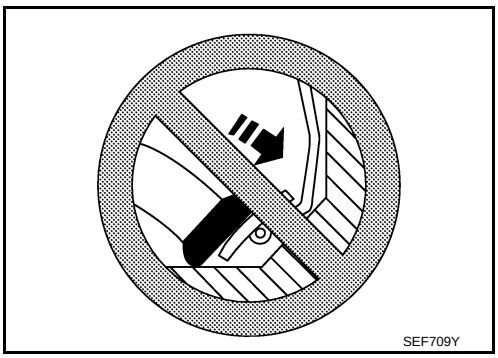


- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**



- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**

- **Do not depress accelerator pedal when starting.**
- **Immediately after starting, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**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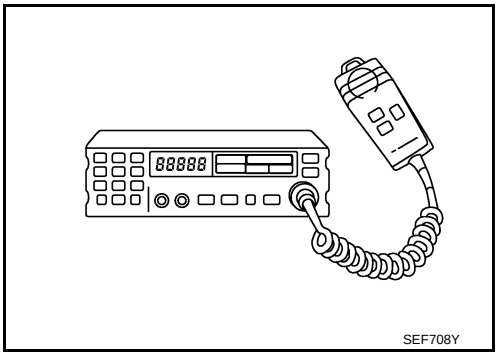
- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
- **Keep the antenna as far as possible from the electronic control units.**
- **Keep the antenna feeder line more than 20 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.**



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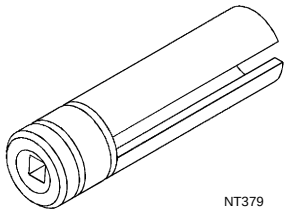
PREPARATION

PREPARATION

Special Service Tools

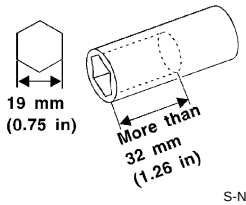
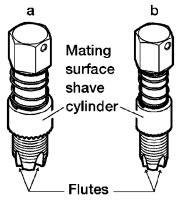
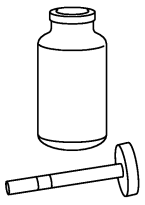
INFOID:0000000001310046

NOTE:
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number Tool name	Description
KV10117100 Heated oxygen sensor wrench  NT379	Loosening or tightening heated oxygen sensors with 22 mm (0.87 in) hexagon nut

Commercial Service Tools

INFOID:0000000001310047

Tool name	Description
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner  AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor** **b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor**
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)  S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

ON-VEHICLE REPAIR

FUEL PRESSURE

Inspection

INFOID:0000000001310048

FUEL PRESSURE RELEASE

With CONSULT-III

1. Turn ignition switch ON.
2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode with CONSULT-III.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.

With CONSULT-III

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.
5. Reinstall fuel pump fuse after servicing fuel system.

FUEL PRESSURE CHECK

CAUTION:

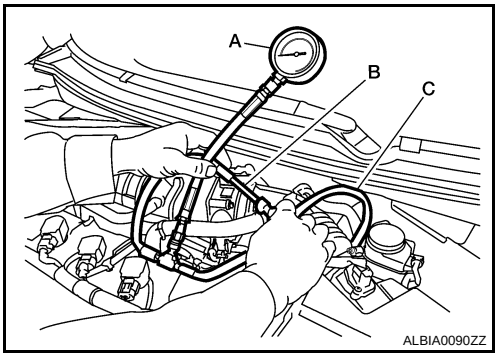
Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

NOTE:

- **Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because T31 models do not have fuel return system.**
- **Use Fuel Pressure Gauge Kit to check fuel pressure.**

1. Release fuel pressure to zero.
2. Connect fuel tube (B) adapter to quick connector.

   A : Fuel pressure gauge
   C : Fuel feed hose



3. Turn ignition switch ON and check for fuel leakage.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

At idling : Approximately 350 kPa (3.5bar, 3.57 kg/cm^2, 51 psi)

6. If result is unsatisfactory, check fuel hoses and fuel tubes for clogging.
   If OK, Replace “fuel filter and fuel pump assembly”.
   If NG, Repair or replace.

EVAPORATIVE EMISSION SYSTEM

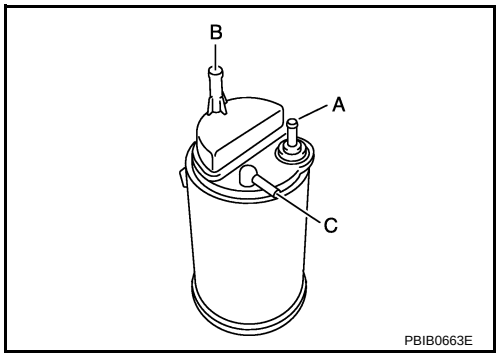
Inspection

INFOID:0000000001315643

1. Visually inspect EVAP vapor lines for improper attachment and for cracks, damage, loose connections, chafing and deterioration.
2. Check EVAP canister as follows:

a. Block port (B). Orally blow air through port (A). Check that air flows freely through port (C).

b. Block port (A). Orally blow air through port (B). Check that air flows freely through port (C).

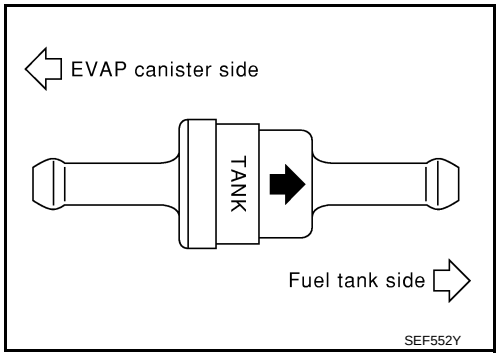


3. Visually inspect the fuel check valve for cracks, damage, loose connections chafing and deterioration.
4. Check fuel check valve as follows:

a. Blow air through connector on the fuel tank side. A considerable resistance should be felt and a portion of air flow should be directed toward the EVAP canister side.

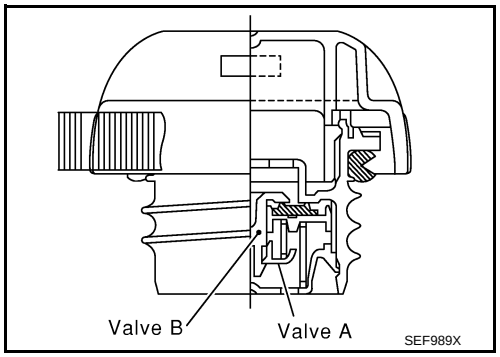
b. Blow air through connector on EVAP canister side. Air flow should be smoothly directed toward fuel tank side.

c. If fuel check valve is suspected or not properly functioning in step 1 and 2 above, replace it.



5. Inspect fuel tank filler cap vacuum relief valve for clogging, sticking, etc.

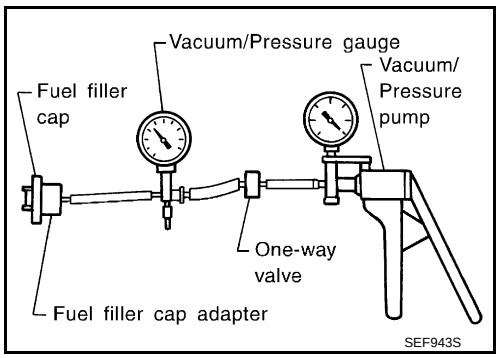
a. Wipe clean valve housing.



b. Check valve opening pressure and vacuum.

Pressure:	15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:	–6.0 to –3.4 kPa (–0.06 bar to –-0.034bar, –0.061 to –0.035 kg/cm^2, –0.87 to –0.49 psi)

c. If out of specification, replace fuel filler cap as an assembly.



SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000001312078

Transmission	Condition	Specification
CVT	No load* (in P or N position)	650 ± 50 rpm
M/T	No load* (in Neutral position)	650 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Timing

INFOID:0000000001312079

Transmission	Condition	Specification
CVT	No load* (in P or N position)	9.75 ± 5° BTDC
M/T	No load* (in Neutral position)	9.75 ± 5° BTDC

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

INFOID:0000000001312080

Condition	Specification (Using CONSULT-III or GST)
At idle	10 – 35 %
At 2,500 rpm	10 – 35 %

Mass Air Flow Sensor

INFOID:0000000001312081

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	0.8 – 1.2V*
Mass air flow (Using CONSULT-III or GST)	1.0 – 4.0 g·m/sec at idle* 2.0 – 10.0 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.

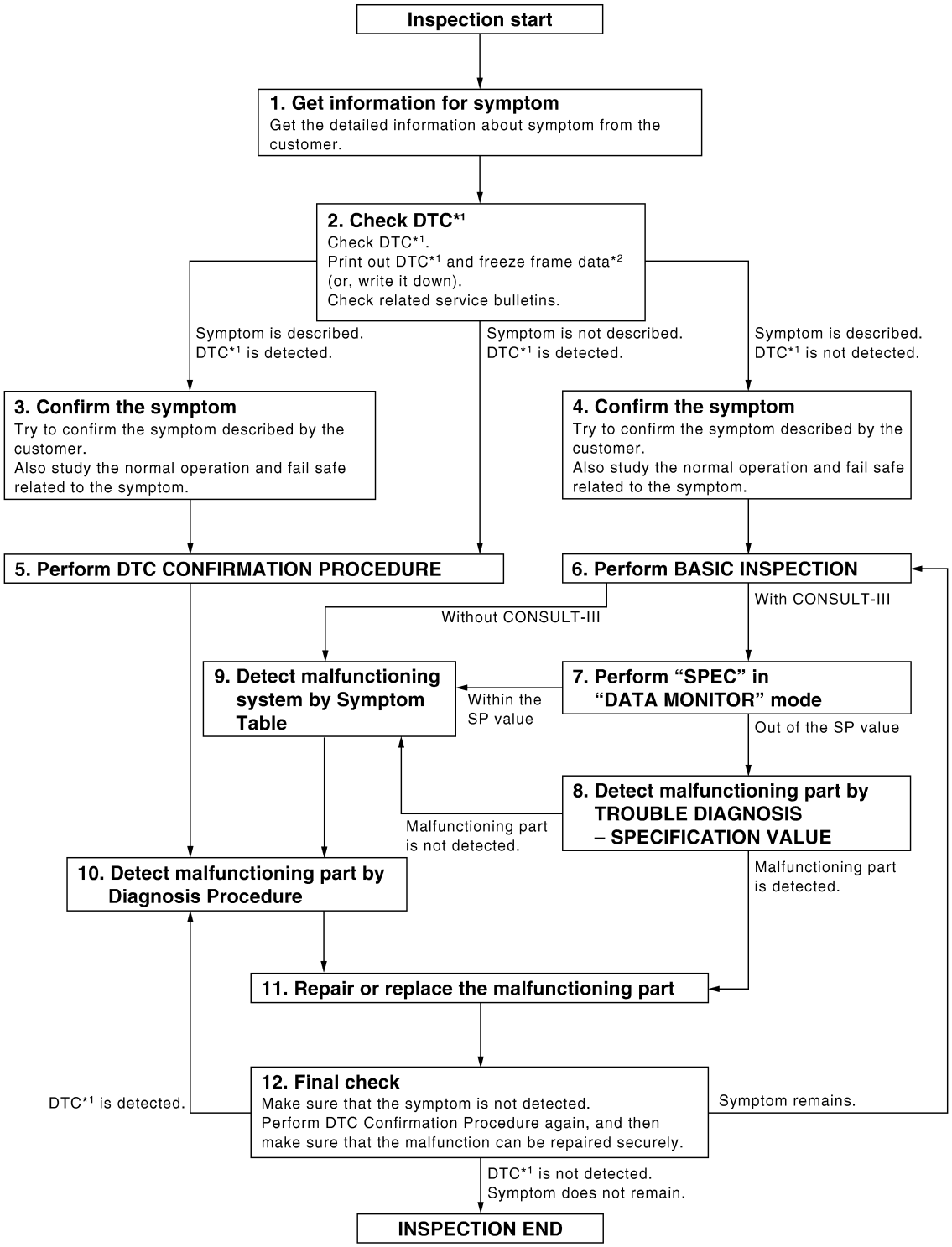
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000001528044

OVERALL SEQUENCE



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

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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 ECQ-361, "Diagnostic Work Sheet".)

>> GO TO 2.

2.CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is displayed.

- Record DTC and freeze frame data. (Print them out with CONSULT-III .)
- Erase DTC. (Refer to ECQ-428, "Diagnosis Description".)
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to ECQ-631, "Symptom Table".)

3. Check related service bulletins for information.

Is any symptom described and is any DTC detected?

Symptom is described, DTC is detected>>GO TO 3.
Symptom is described, DTC is not detected>>GO TO 4.
Symptom is not described, DTC is detected>>GO TO 5.

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MI ON).
Also study the normal operation and fail safe related to the symptom. Refer to ECQ-635, "Description" and ECQ-626, "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 ECQ-635, "Description" and ECQ-626, "Fail Safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then make sure that DTC is detected again.
If two or more DTCs are detected, refer to ECQ-628, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

- Freeze frame data is useful if the DTC is not detected.
- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.
  If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIRMATION PROCEDURE.

Is DTC detected?

YES >> GO TO 10.
NO >> Check according to ECQ-629, "DTC Index".

6.PERFORM BASIC INSPECTION

Perform ECQ-363, "BASIC INSPECTION : Special Repair Requirement".

Do you have CONSULT-III?

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

7. PERFORM SPEC IN DATA MONITOR MODE

With CONSULT-III

Make sure that “MAS A/F SE-B1”, “B/FUEL SCHDL” and “A/F ALPHA-B1” are within the SP value using CONSULT-III in “SPEC” of “DATA MONITOR” mode. Refer to ECQ-439, "Component Function Check".

Is the measurement value within the SP value?

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

8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to ECQ-440, "Diagnosis Procedure".

Is malfunctioning part detected?

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

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to ECQ-631, "Symptom Table" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> 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 Circuit Inspection in GI-41, "Circuit Inspection".

Is malfunctioning part detected?

YES >> GO TO 11.
NO >> Monitor input data from related sensors or check the voltage of related ECM terminals using CONSULT-III. Refer to ECQ-605, "Reference Value".

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it. Refer to ECQ-428, "Diagnosis Description".

>> GO TO 12.

12. FINAL CHECK

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then make sure that the malfunction have been repaired securely.
When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 10.
YES-2 >> Symptom remains: GO TO 6.
NO >> Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM and TCM (Transmission Control Module). (Refer to ECQ-428, "Diagnosis Description".)

Diagnostic Work Sheet

INFOID:0000000001528045

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 a incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.
Some conditions may cause the MI to come on steady or blink and DTC to be detected. Examples:

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

KEY POINTS

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

SEF907L

WORKSHEET SAMPLE

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

MTBL0017

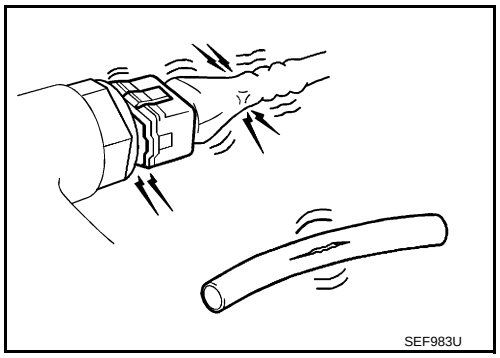
INSPECTION AND ADJUSTMENT
BASIC INSPECTION

BASIC INSPECTION : Special Repair Requirement

INFOID:0000000001528046

1.INSPECTION START

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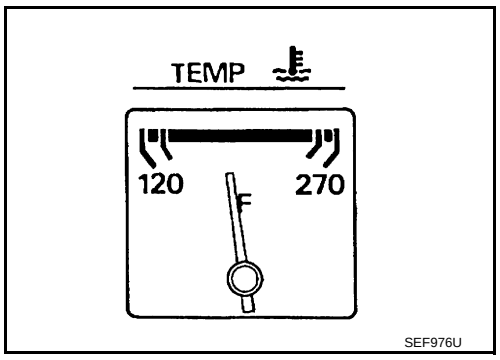
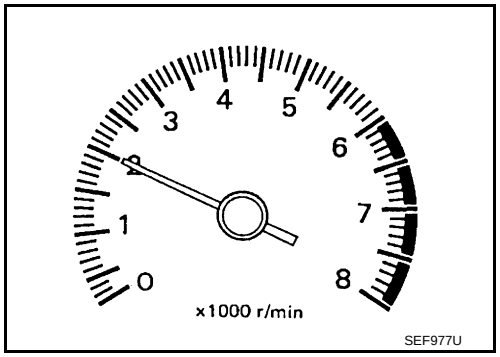


SEF976U

5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT-III or ECM [Diagnostic Test Mode II (self-diagnostic results)].

Is any DTC detected?

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



SEF977U

2.REPAIR OR REPLACE

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

>> GO TO 3

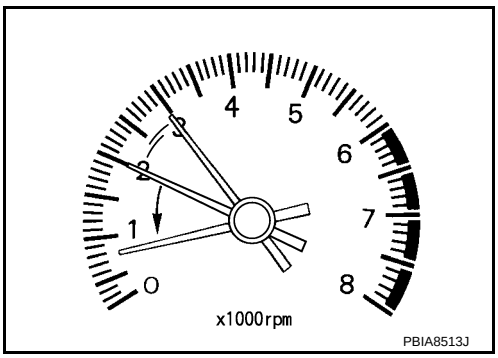
3.CHECK TARGET IDLE SPEED

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

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 ECQ-366, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to ECQ-644, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 4.



4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform ECQ-368, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform ECQ-368, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 6.

6. CHECK TARGET IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   For procedure, refer to "IDLE SPEED" ECQ-366, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to ECQ-644, "Idle Speed".

Is the inspection result normal?

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

7. DETECT MALFUNCTIONING PART

Check the Following.
- Check camshaft position sensor (PHASE) and circuit. Refer to ECQ-510, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to ECQ-506, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace. Then GO TO 4.

8. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to ECQ-366, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

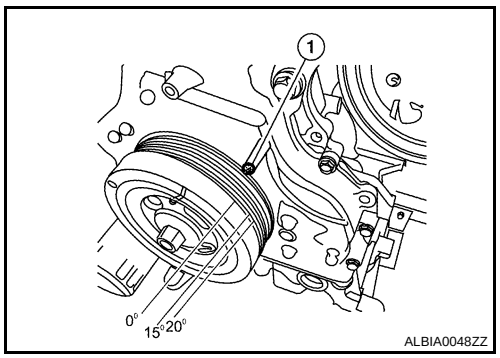
>> GO TO 4.

9. CHECK IGNITION TIMING

1. Run engine at idle.

2. Check ignition timing with a timing light.
For procedure, refer to ECQ-367, "IGNITION TIMING : Special Repair Requirement".
For specification, refer to ECQ-644, "Ignition Timing".

1 : Timing indicator



Is the inspection result normal?

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

10. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform ECQ-368, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 11.

11. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform ECQ-368, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 12.

12. CHECK TARGET IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
For procedure, refer to ECQ-366, "IDLE SPEED : Special Repair Requirement".
For specification, refer to ECQ-644, "Idle Speed".

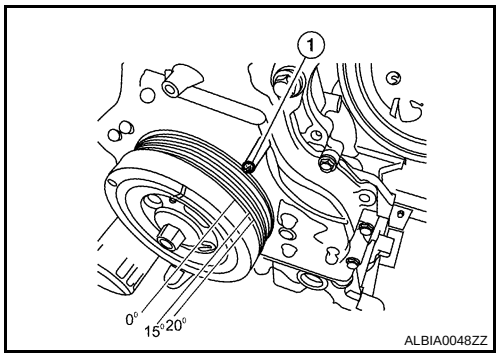
Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 15.

13. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.
For procedure, refer to ECQ-367, "IGNITION TIMING : Special Repair Requirement".
For specification, refer to ECQ-644, "Ignition Timing".

1 : Timing indicator



Is the inspection result normal?

YES >> GO TO 17.
NO >> GO TO 14.

14. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-193, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair the timing chain installation. Then GO TO 4.

15. DETECT MALFUNCTIONING PART

Check the following.
- Check camshaft position sensor (PHASE) and circuit. Refer to ECQ-510, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to ECQ-506, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Repair or replace. Then GO TO 4.

16.CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer toECQ-366, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 4.

17.INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, go to ECQ-366, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description

INFOID:0000000001528047

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement

INFOID:0000000001528048

1.PERFORM INITIALIZATION OF NATS SYSTEM AND REGISTRATION OF ALL NATS IGNITION KEY IDS

Refer to ECQ-366, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 2.

2.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to ECQ-368, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-368, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> END

IDLE SPEED

IDLE SPEED : Description

INFOID:0000000001528049

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

IDLE SPEED : Special Repair Requirement

INFOID:0000000001528050

1.CHECK IDLE SPEED

With CONSULT-III
Check idle speed in “DATA MONITOR” mode with CONSULT-III.

Without CONSULT-III
Check idle speed by installing the pulse type tachometer clamp on suitable high-tension wire whitch installed between No.4 ignition coil and No.4 Spark plug.

>> INSPECTION END

IGNITION TIMING

IGNITION TIMING : Description

INFOID:0000000001528051

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

IGNITION TIMING : Special Repair Requirement

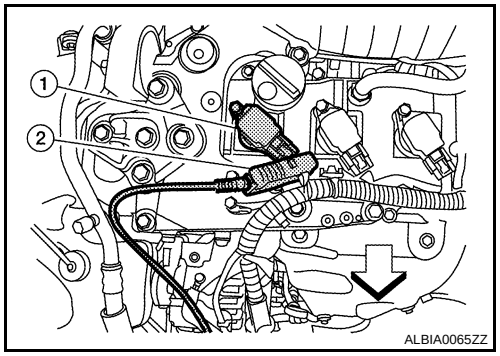
INFOID:0000000001528052

1.CHECK IGNITION TIMING

With CONSULT-III

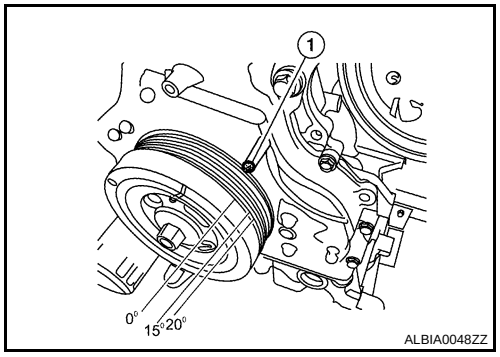
1. Attach timing light to No. 1 igniton coil (1) wire as shown.

2 : Timing light
⇦ : Vehicle front



2. Select "TARGET ING TIM HLD" in "WORK SUPPORT" mode.
3. Touch "START".
4. Check ignition timing.

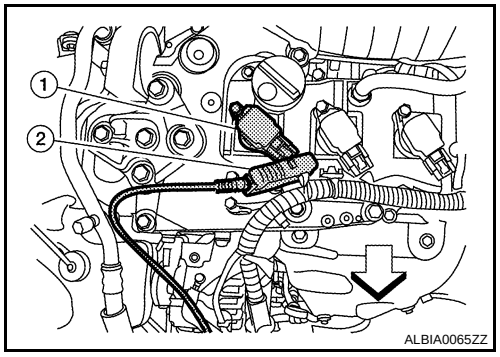
1 : Timing indicator



Without CONSULT-III

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

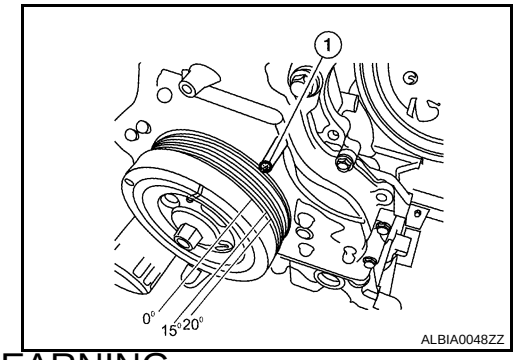
2 : Timing light
⇦ : Vehicle front



2. Set ECM in Diagnostic Test Mode II (Ignition timing hold). Refer to ECQ-79, "Diagnosis Description".

3. Check ignition timing.

1 : Timing indicator



>> INSPECTION END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description

INFOID:0000000001528055

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:0000000001528056

1.START

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

>> END

THROTTLE VALVE CLOSED POSITION LEARNING

THROTTLE VALVE CLOSED POSITION LEARNING : Description

INFOID:0000000001528057

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 electric throttle control actuator or ECM is replaced.

THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement

INFOID:0000000001528058

1.PRECONDITIONING

Make sure that all of the following conditions are satisfied.Learning will be cancelled if any of the following conditions are missed for even a moment.

NOTE:

If the throttle valve does not operate correctly (ex. frozen valve on housing), the learning may not be done successfully.

- Vehicle speed: 0 km/h (0 MPH)
- Accelerator pedal: Fully released
- Battery voltage: More than 10V (Ignition switch ON and engine stopped)
- Engine coolant temperature: -20 - 100°C
- Intake air temperature: More than -20°C

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

With CONSULT-III

1. Turn ignition switch ON.

2. Select “CLSD THL POS LEARN“ in “WORK SUPPORT“ mode.
3. Touch “START“ and wait at least 10 seconds.
4. Make sure that “CMPLT“ is displayed on CONSULT-III screen.

Without CONSULT-III

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

>> GO TO 3.

3.CHECK DTC

1. Turn ignition switch and wait at least 10 seconds.
2. Check DTC.

Is DTC P1299 or P2109 detected?

YES-1 >> DTC P1299: Refer to ECQ-533, "Description"
YES-2 >> DTC P2109: Refer to ECQ-567, "Description"
>> END.

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description

INFOID:0000000001528061

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:0000000001528062

1.START

With CONSULT-III

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

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector,idle speed.
4. Stop engine and reconnect mass air flow sensor
5. Make sure that DTC P0102 is displayed.
6. Erase the DTC memory. Refer to ECQ-629, "DTC Index",
7. Make sure that DTC P0000 is displayed.

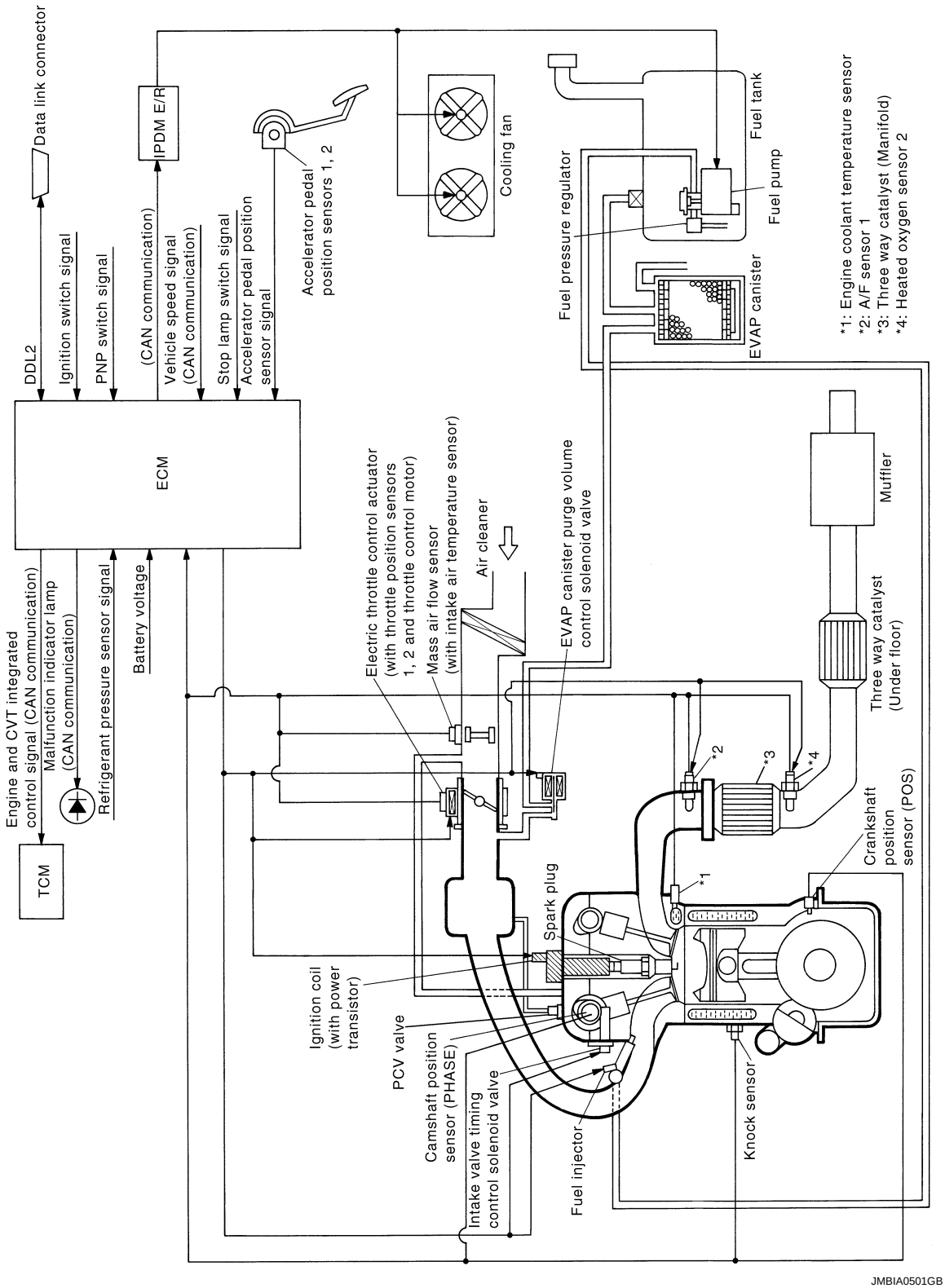
>> END

FUNCTION DIAGNOSIS

ENGINE CONTROL SYSTEM

System Diagram

INFOID:0000000001528063



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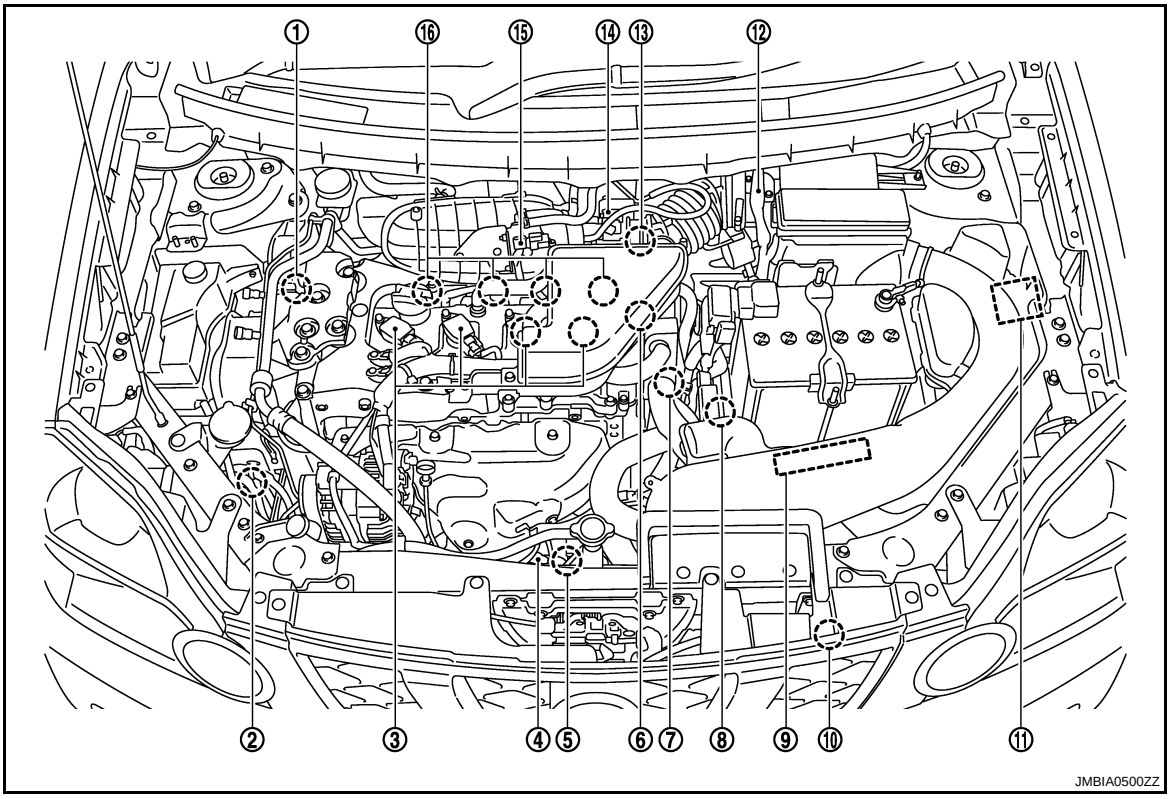
System Description

INFOID:0000000001528064

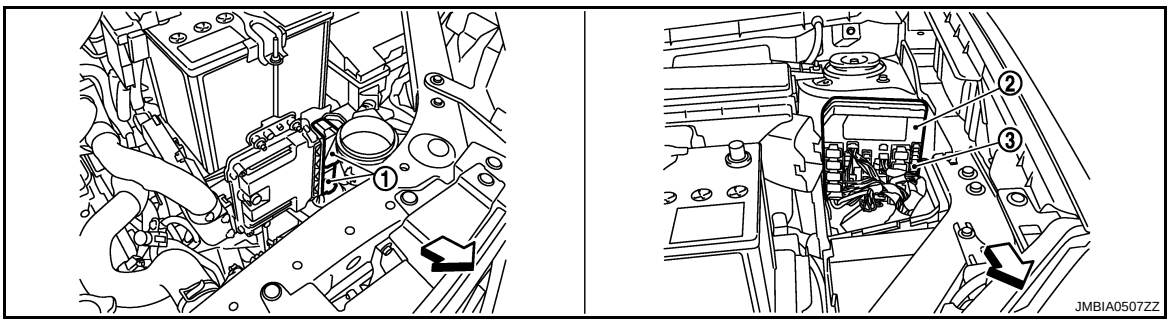
ECM performs various controls such as fuel injection control and ignition timing control.

Component Parts Location

INFOID:0000000001528066

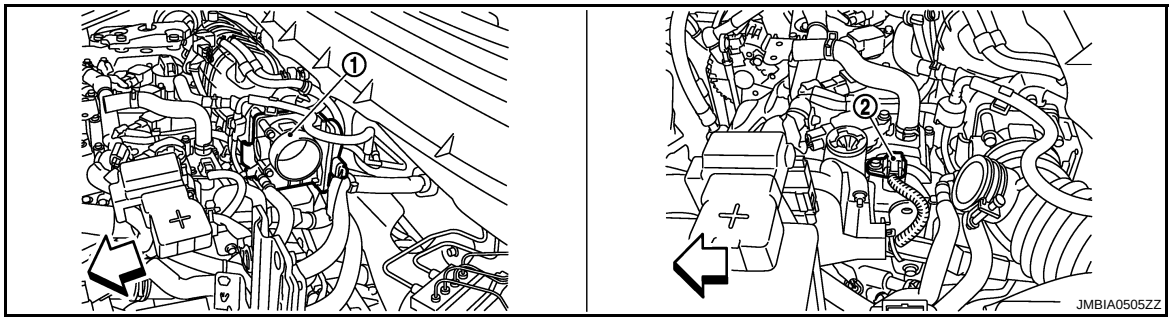


1. Intake valve timing control solenoid valve
2. EVAP canister
3. Ignition coil (with power transistor)
4. Air fuel ratio (A/F) sensor 1
5. Heated oxygen sensor 2
6. Camshaft position sensor (PHASE)
7. Engine coolant temperature sensor
8. Park/neutral position (PNP) switch
9. ECM
10. Refrigerant pressure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



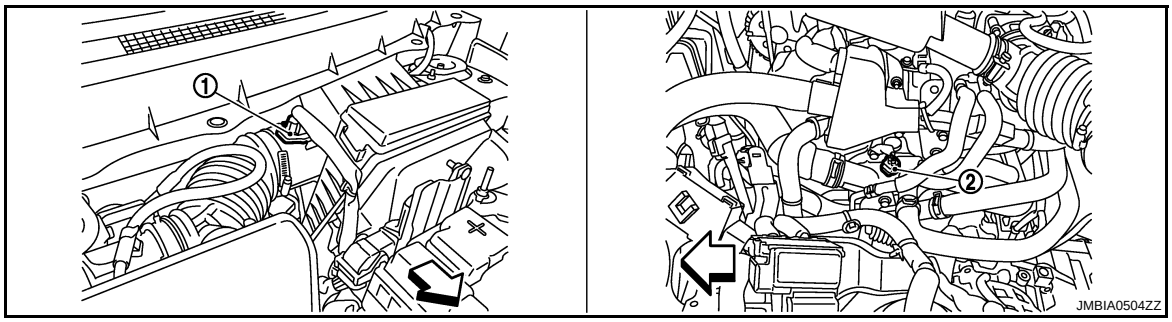
1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

⇦ : Vehicle front



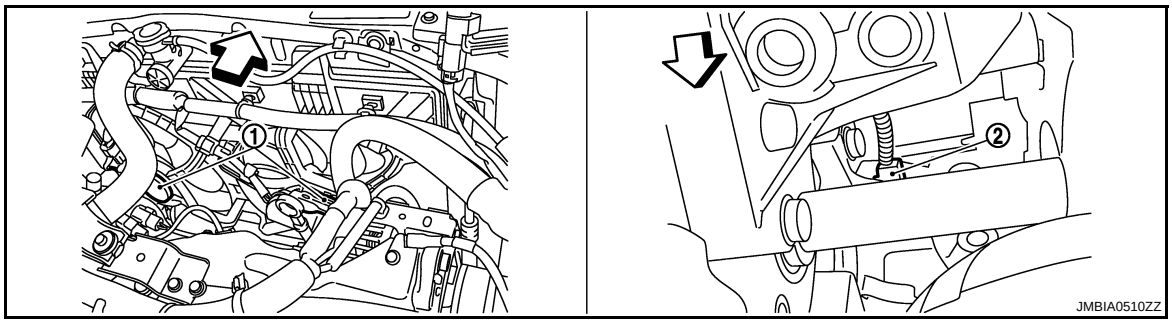
1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Camshaft position sensor (PHASE)

⇦ : Vehicle front



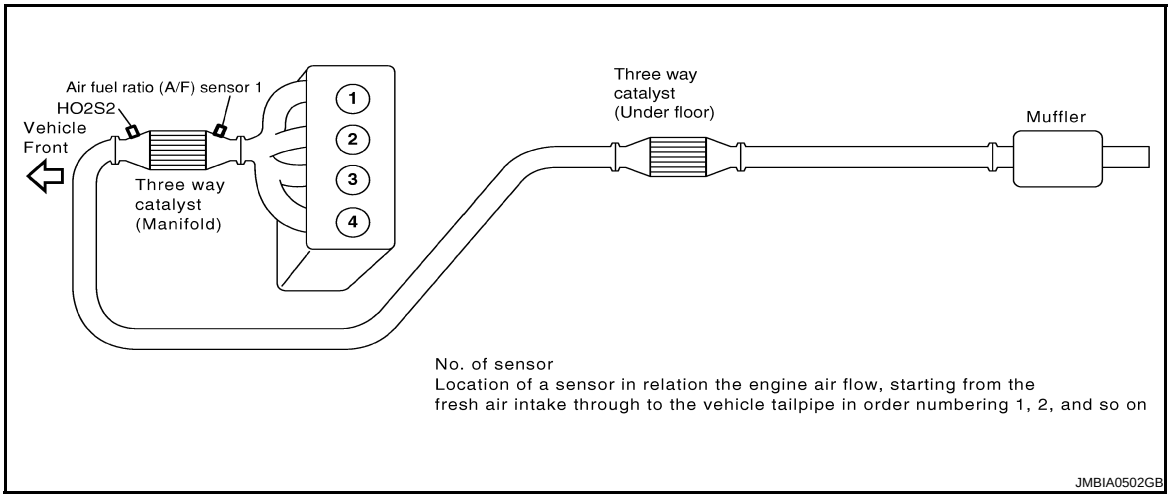
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

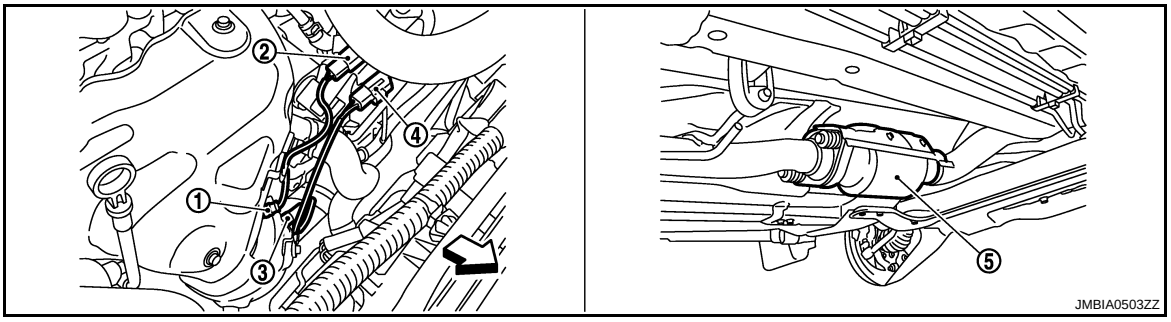
⇦ : Vehicle front



1. Cooling fan motor
2. Crankshaft position sensor (POS)

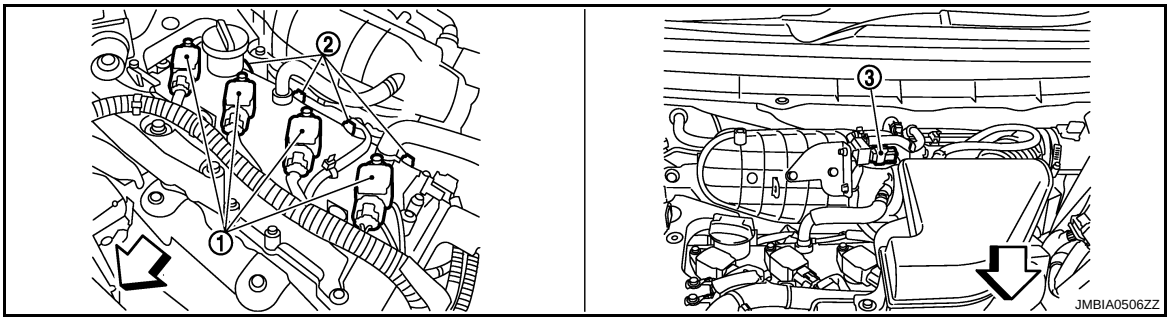
⇦ : Vehicle front





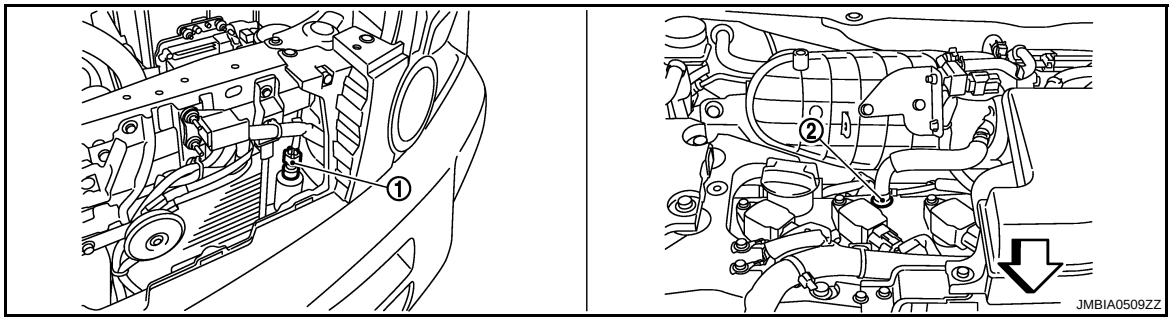
1. Air fuel ratio (A/F) sensor 1
2. Air fuel ratio (A/F) sensor 1 harness connector
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector
5. Three way catalyst (Under floor)

⇦ : Vehicle front



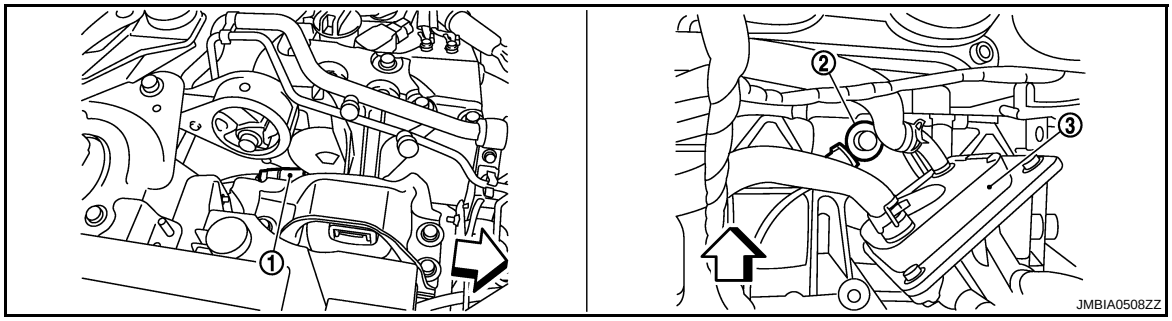
1. Ignition coil (with power transistor) and spark plug
2. Fuel injection
3. EVAP canister purge volume control solenoid valve

⇦ : Vehicle front



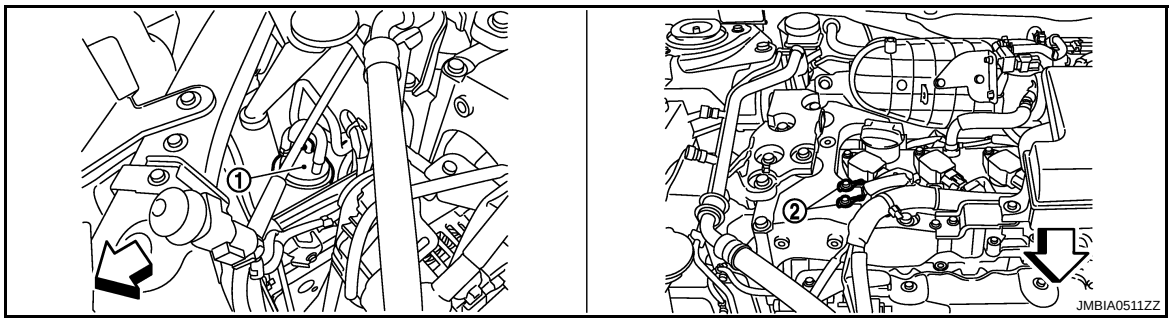
1. Refrigerant pressure sensor 2. PCV valve

⇦ : Vehicle front



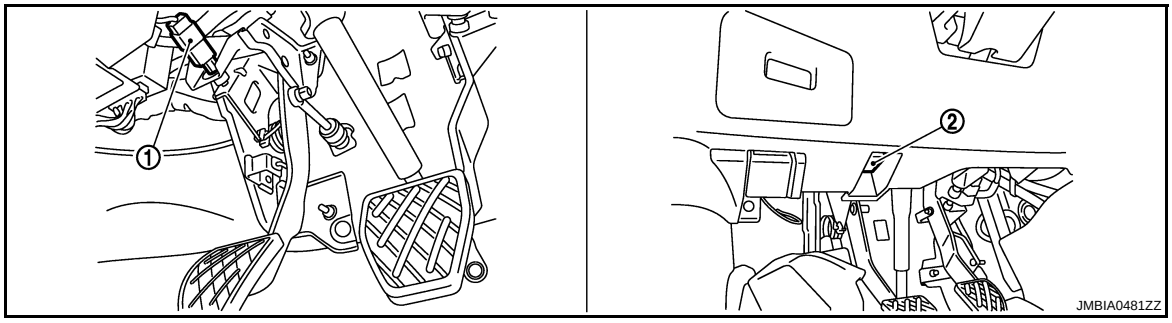
1. Intake valve timing control solenoid valve 2. Knock sensor 3. Engine oil cooler

⇦ : Vehicle front

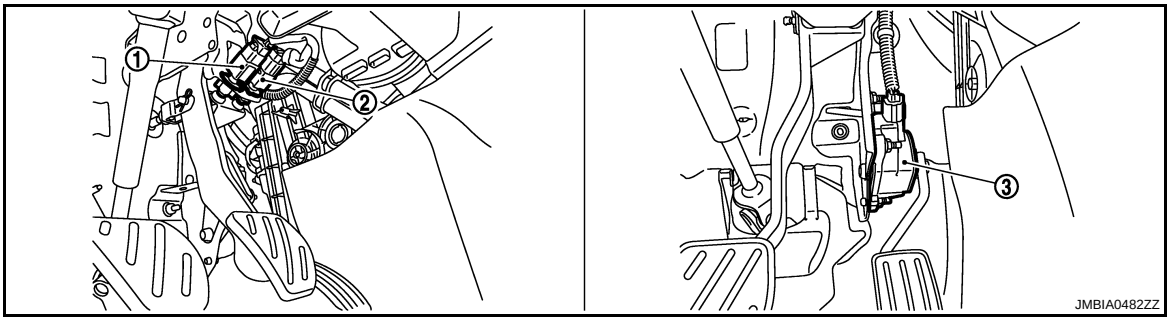


1. EVAP canister 2. Ground

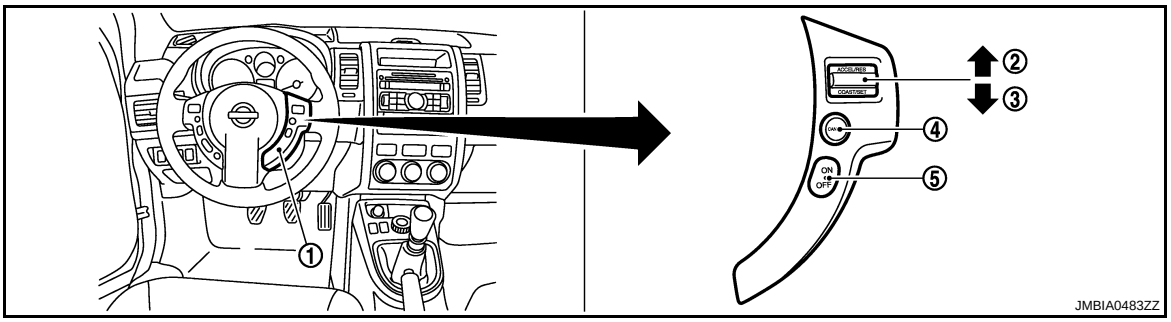
⇦ : Vehicle front



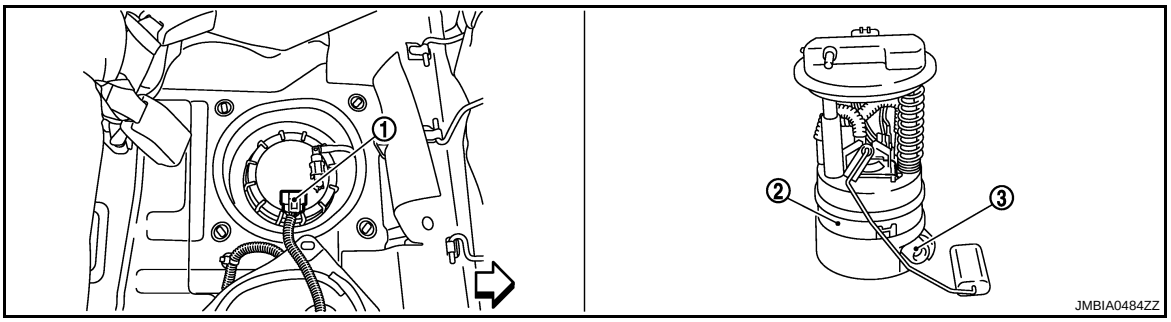
1. ASCD clutch switch 2. Data link connector



1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH



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

⇦ : Vehicle front

Component Description

INFOID:0000000001528067

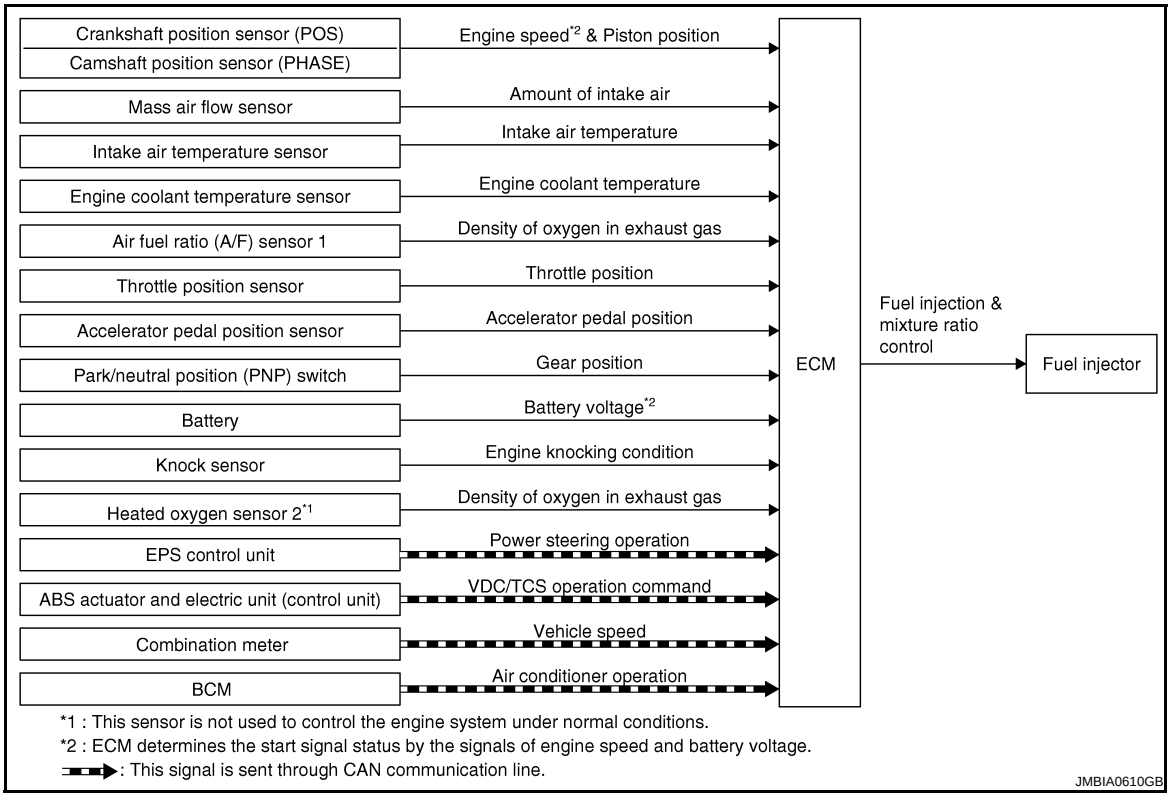
Component	Reference
A/F sensor 1	ECQ-484, "Description"
A/F sensor 1 heater	ECQ-456, "Description"
Accelerator pedal position sensor	ECQ-570, "Description"
ASCD brake switch	ECQ-544, "Description"
ASCD steering switch	ECQ-541, "Description"
ASCD vehicle speed sensor	ECQ-551, "Description"
Camshaft position sensor (PHASE)	ECQ-510, "Description"
Crankshaft position sensor (POS)	ECQ-506, "Description"

Component	Reference
Cooling fan motor	ECQ-407, "System Description"
Electric throttle control actuator	ECQ-568, "Description"
Engine coolant temperature sensor	ECQ-475, "Description"
EVAP canister purge volume control solenoid valve	ECQ-514, "Description"
Fuel injector	ECQ-497, "Description"
Fuel pump	ECQ-598, "Description"
Heated oxygen sensor 2	ECQ-493, "Description"
Heated oxygen sensor 2 heater	ECQ-459, "Description"
Ignition signal	ECQ-536, "Description"
Intake air temperature sensor	ECQ-472, "Description"
Intake valve timing control solenoid valve	ECQ-422, "System Description"
Knock sensor	ECQ-504, "Description"
Mass air flow sensor	ECQ-462, "Description"
Park/neutral position switch	ECQ-553, "Description"
PCV valve	ECQ-602, "Description"
Refrigerant pressure sensor	ECQ-603, "Description"
Stop lamp switch	ECQ-558, "Description"
Throttle control motor	ECQ-478, "Description"
Throttle control motor relay	ECQ-561, "Description"
Throttle position sensor	ECQ-478, "Description"
Vehicle speed sensor	ECQ-517, "Description"

MULTIPORT FUEL INJECTION SYSTEM

System Diagram

INFOID:0000000001528068



System Description

INFOID:0000000001528069

INPUT/OUTPUT SIGNAL CHART

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

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

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

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

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.

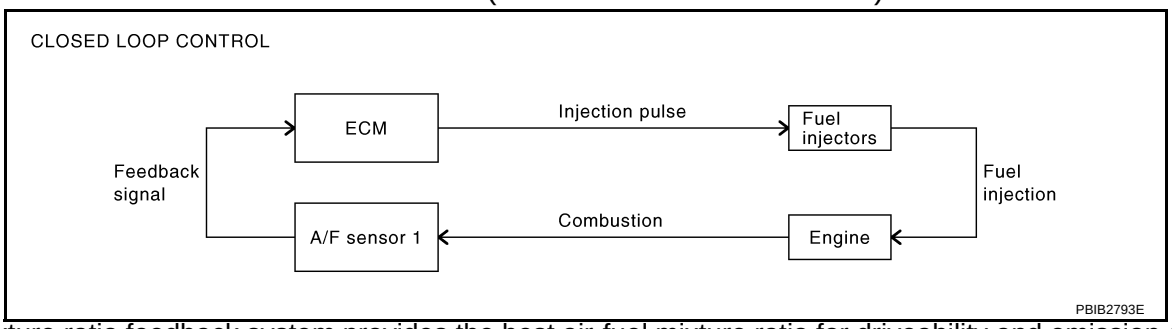
VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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
- High-load, high-speed operation

<Fuel decrease>
- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses A/F sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about A/F sensor 1, refer to ECQ-484, "DTC Logic". 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
- High engine coolant temperature
- During warm-up
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

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

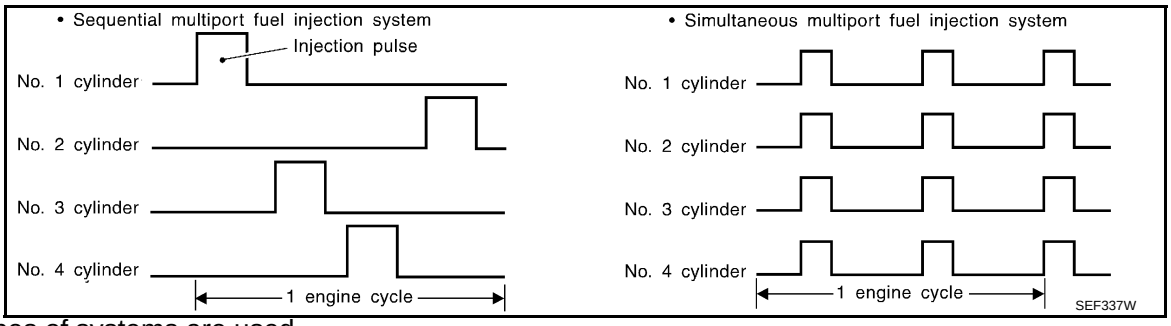
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios.

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

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

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

FUEL INJECTION TIMING



Two types of systems are used.

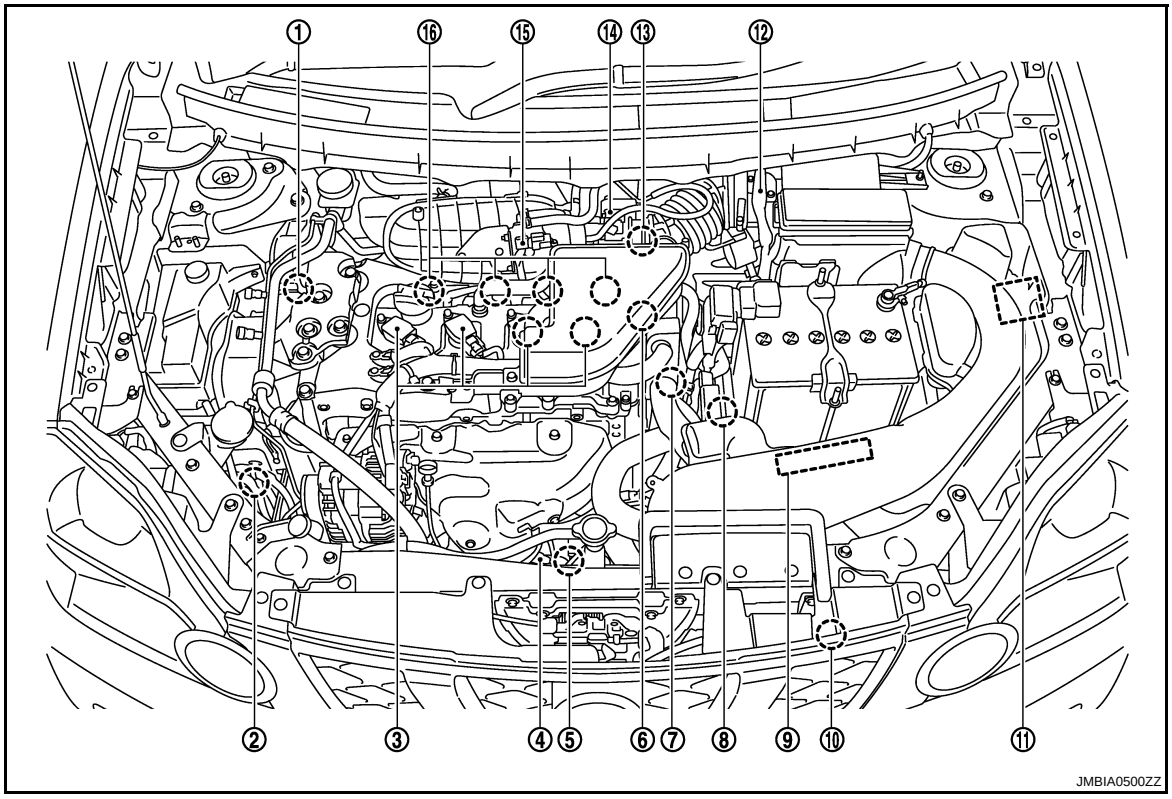
- Sequential Multiport Fuel Injection System
  Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.
- Simultaneous Multiport Fuel Injection System
  Fuel is injected simultaneously into all four cylinders twice each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

FUEL SHUT-OFF

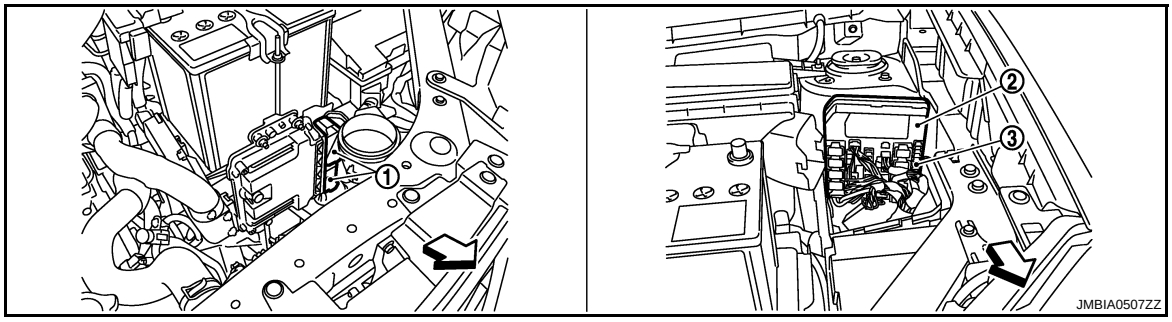
Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

Component Parts Location

INFOID:0000000001528070

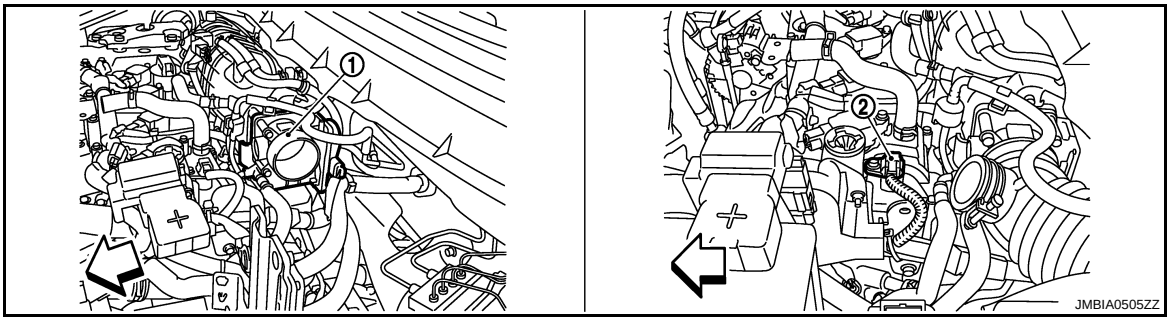


1. Intake valve timing control solenoid valve
2. EVAP canister
3. Ignition coil (with power transistor)
4. Air fuel ratio (A/F) sensor 1
5. Heated oxygen sensor 2
6. Camshaft position sensor (PHASE)
7. Engine coolant temperature sensor
8. Park/neutral position (PNP) switch
9. ECM
10. Refrigerant pressure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



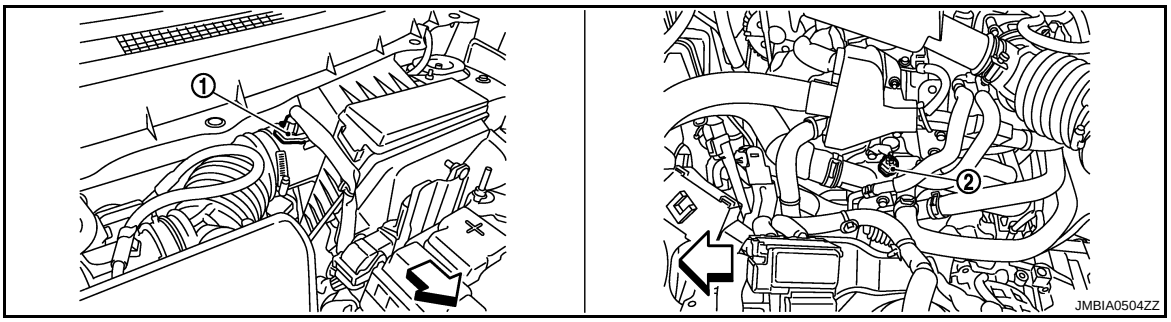
1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

⇦ : Vehicle front



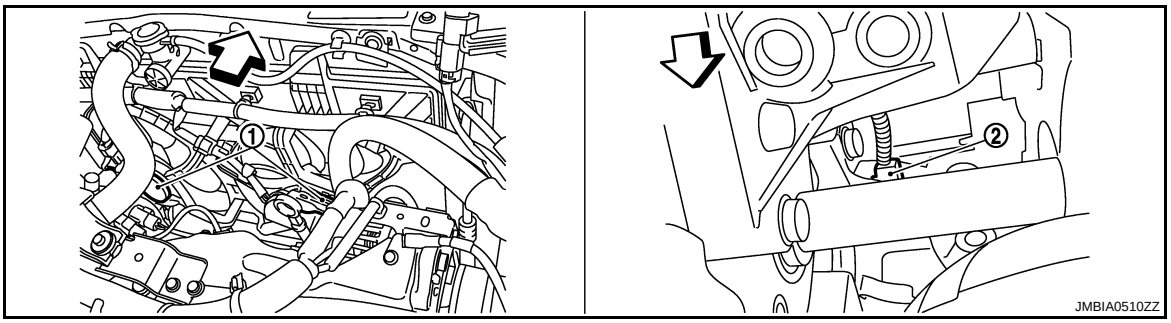
1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Camshaft position sensor (PHASE)

⇦ : Vehicle front



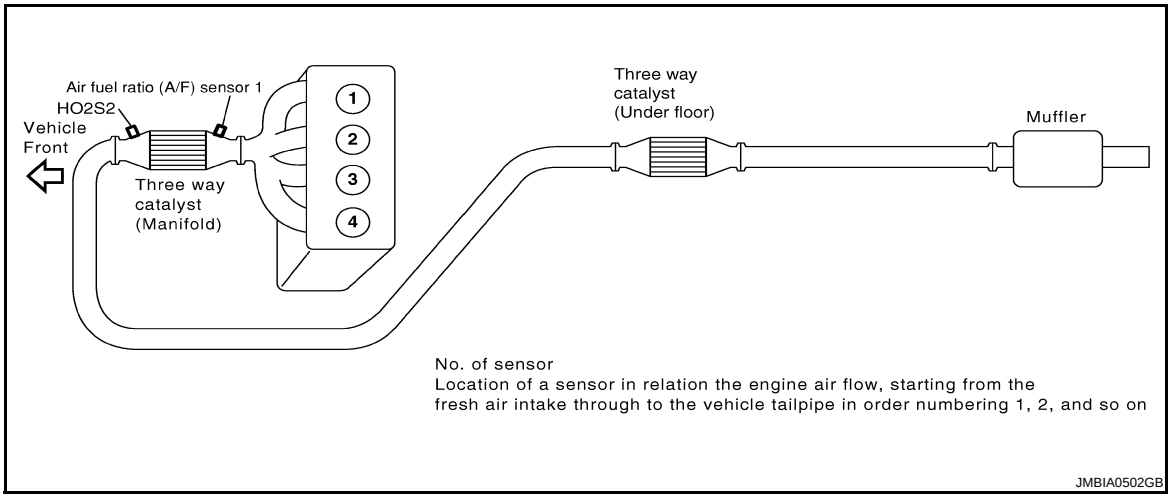
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

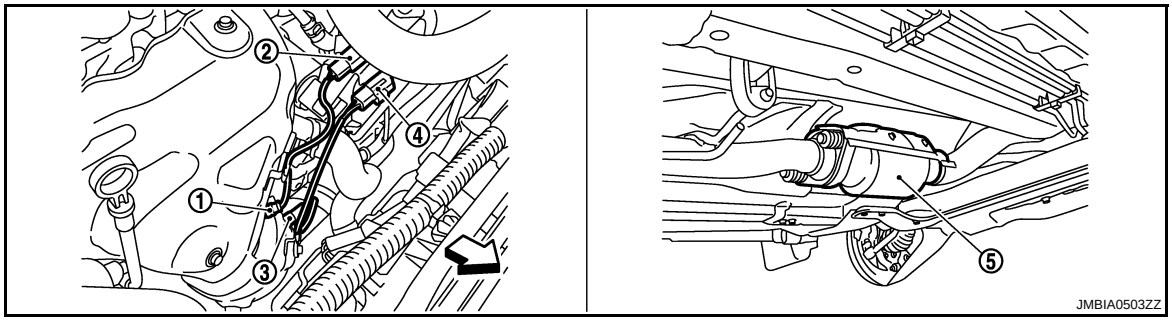
⇦ : Vehicle front



1. Cooling fan motor
2. Crankshaft position sensor (POS)

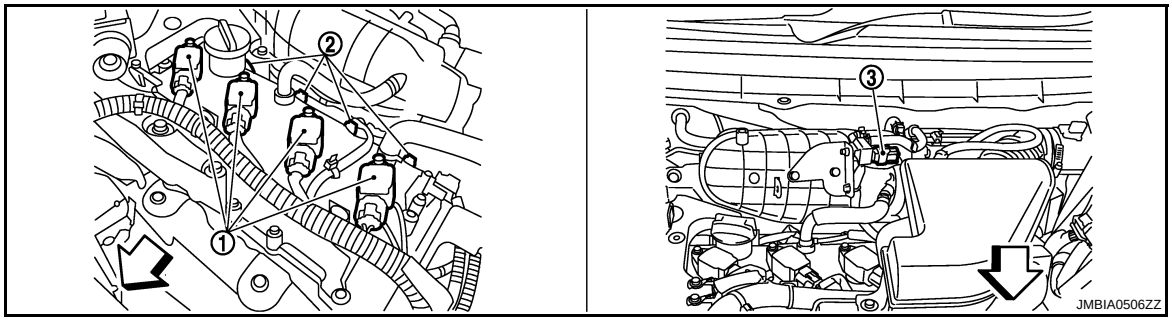
⇦ : Vehicle front





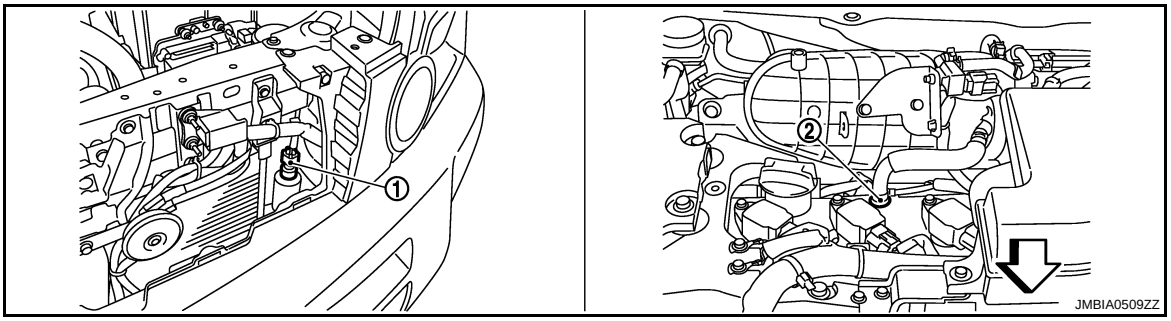
1. Air fuel ratio (A/F) sensor 1
2. Air fuel ratio (A/F) sensor 1 harness connector
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector
5. Three way catalyst (Under floor)

⇦ : Vehicle front



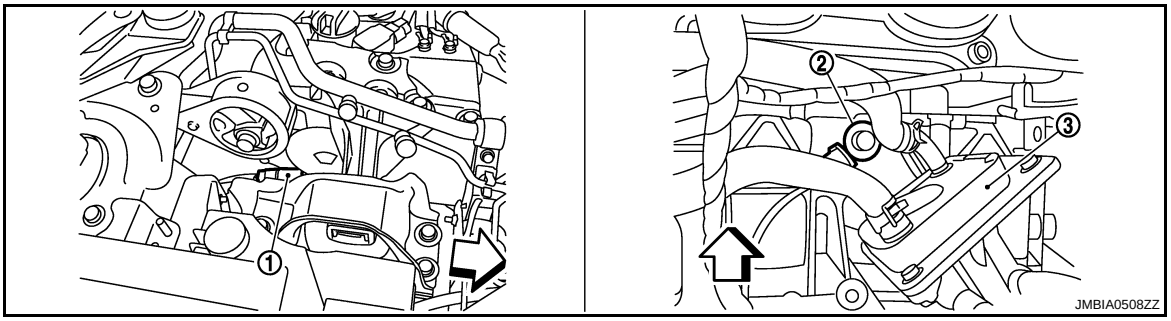
1. Ignition coil (with power transistor) and spark plug
2. Fuel injection
3. EVAP canister purge volume control solenoid valve

⇦ : Vehicle front



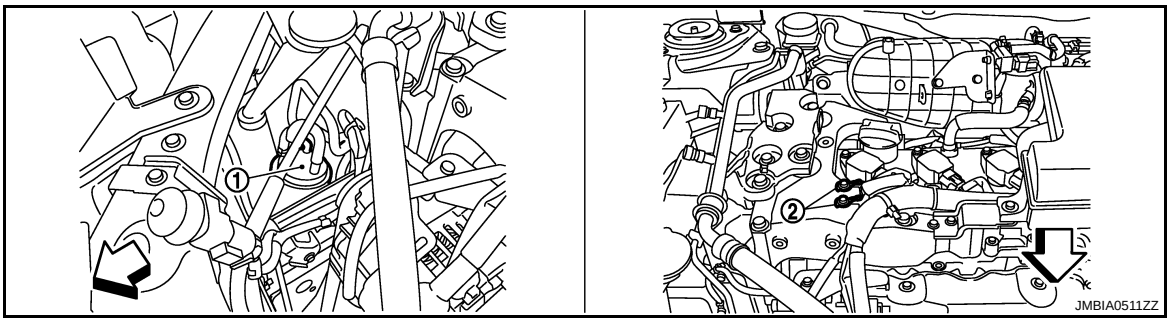
1. Refrigerant pressure sensor 2. PCV valve

⇦ : Vehicle front



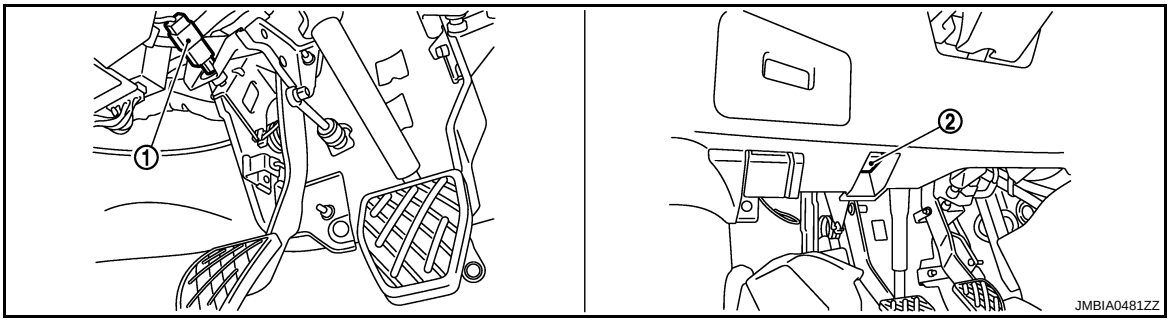
1. Intake valve timing control solenoid valve 2. Knock sensor 3. Engine oil cooler

⇦ : Vehicle front

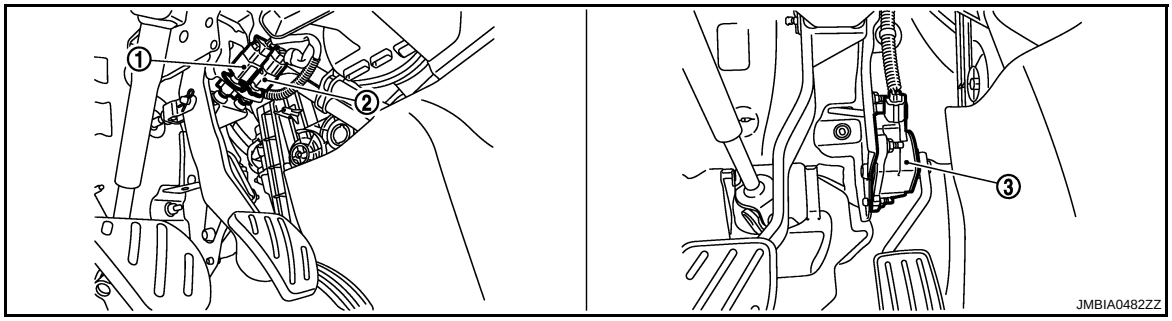


1. EVAP canister 2. Ground

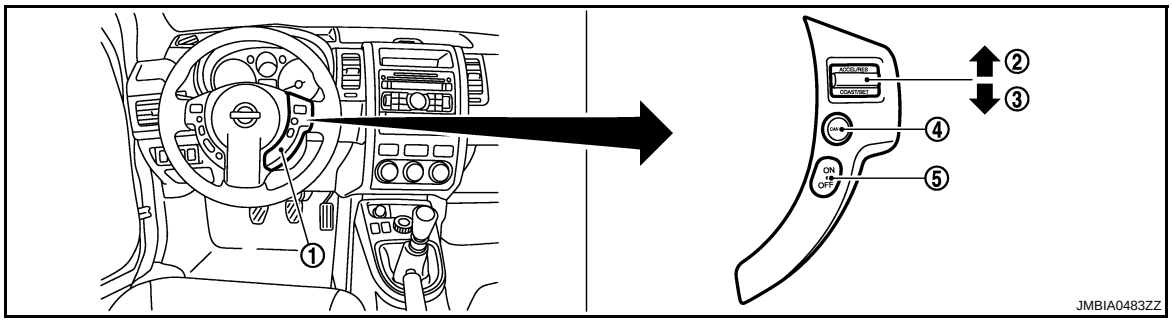
⇦ : Vehicle front



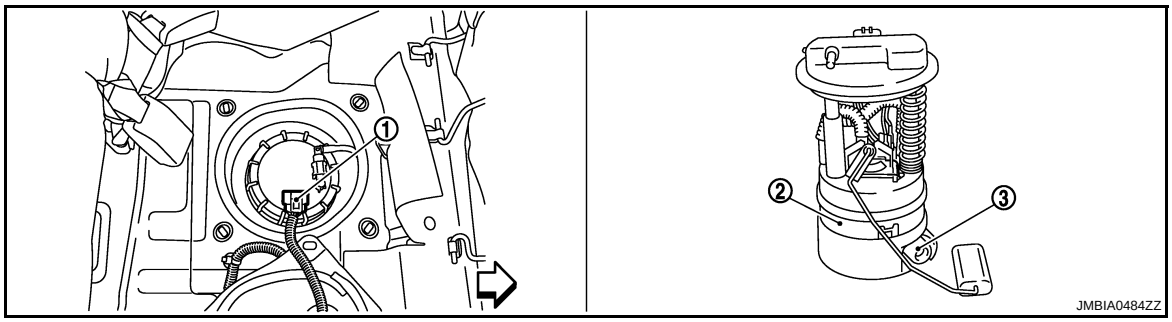
1. ASCD clutch switch 2. Data link connector



1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH



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

⇦ : Vehicle front

Component Description

INFOID:0000000001528074

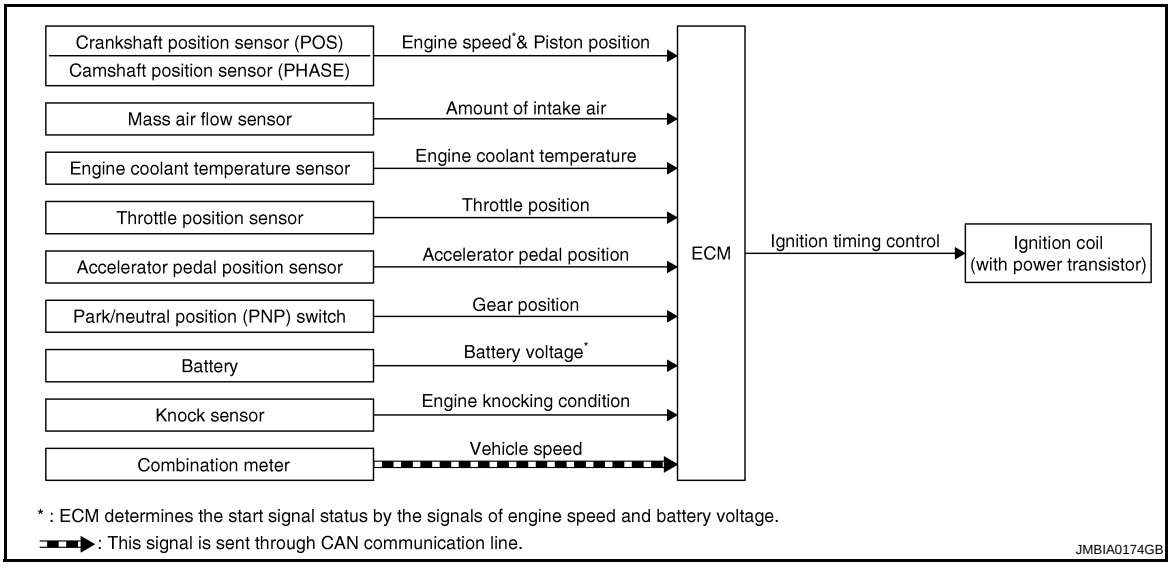
Component	Reference
A/F sensor 1	ECQ-484, "Description"
Accelerator pedal position sensor	ECQ-570, "Description"
Camshaft position sensor (PHASE)	ECQ-510, "Description"
Crankshaft position sensor (POS)	ECQ-506, "Description"
Engine coolant temperature sensor	ECQ-475, "Description"
Fuel injector	ECQ-497, "Description"
Heated oxygen sensor 2	ECQ-459, "Description"
Intake air temperature sensor	ECQ-472, "Description"

Component	Reference
Knock sensor	ECQ-504, "Description"
Mass air flow sensor	ECQ-462, "Description"
Park/neutral position switch	ECQ-553, "Description"
Throttle position sensor	ECQ-478, "Description"
Vehicle speed sensor	ECQ-517, "Description"

ELECTRIC IGNITION SYSTEM

System Diagram

INFOID:0000000001528075



System Description

INFOID:0000000001528076

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2 Piston position	Ignition timing control	Ignition coil (with power transistor)
Camshaft position sensor (PHASE)			
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		
Battery	Battery voltage*2		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Combination meter*1	Vehicle speed		

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

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

SYSTEM DESCRIPTION

Firing 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.

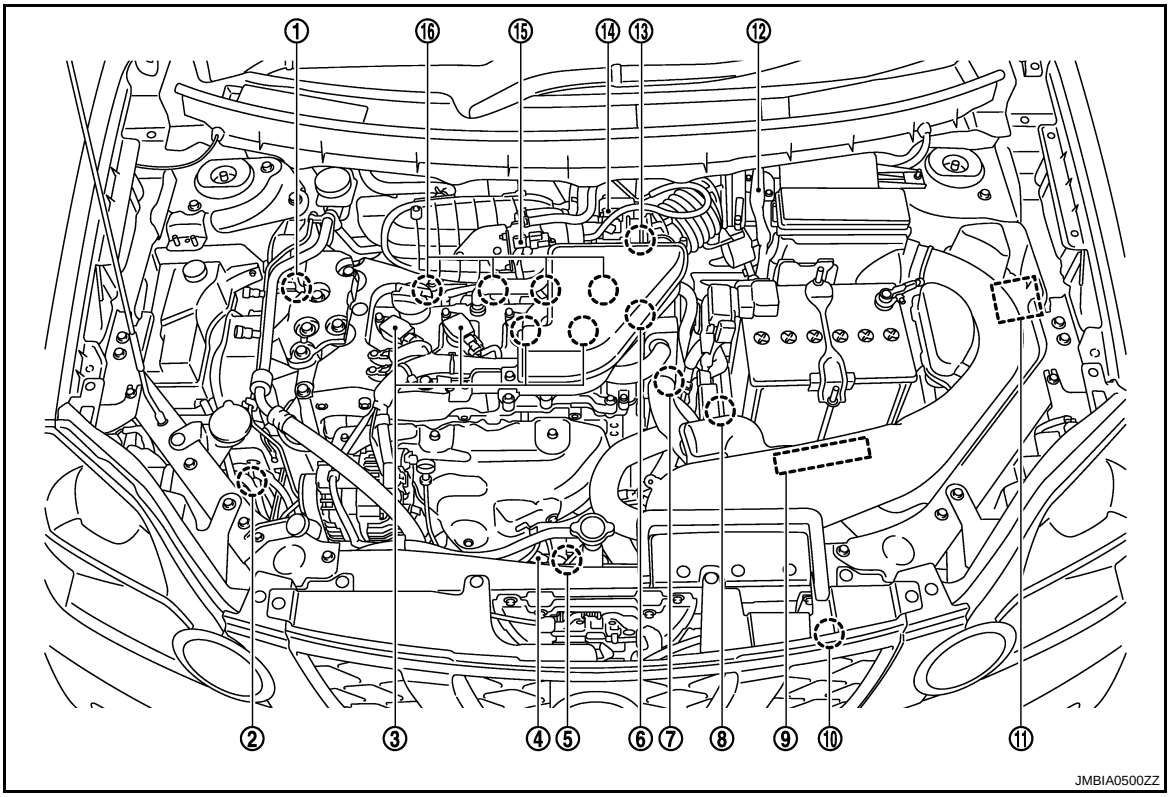
- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

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

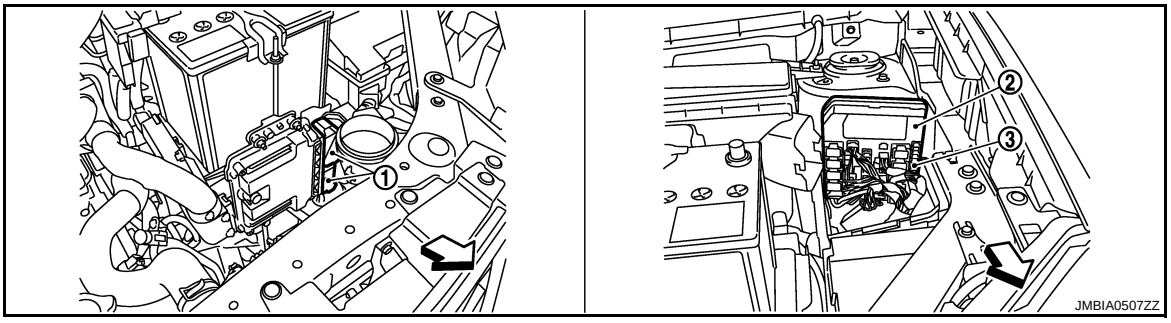
operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Component Parts Location

INFOID:0000000001528077

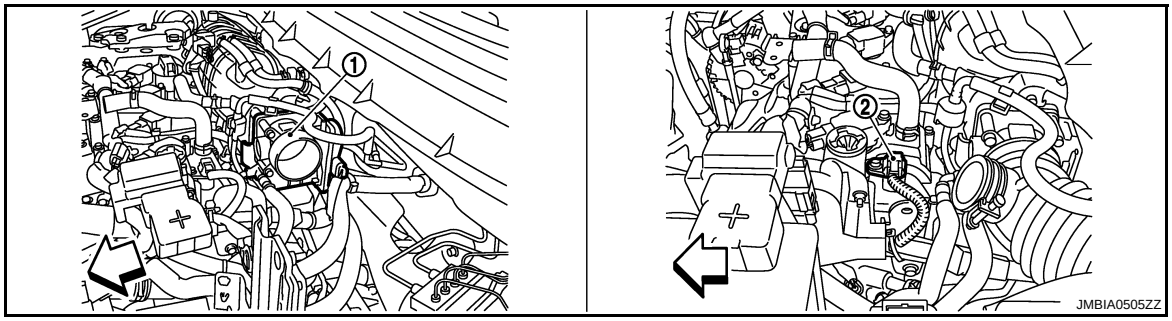


1. Intake valve timing control solenoid valve
2. EVAP canister
3. Ignition coil (with power transistor)
4. Air fuel ratio (A/F) sensor 1
5. Heated oxygen sensor 2
6. Camshaft position sensor (PHASE)
7. Engine coolant temperature sensor
8. Park/neutral position (PNP) switch
9. ECM
10. Refrigerant pressure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



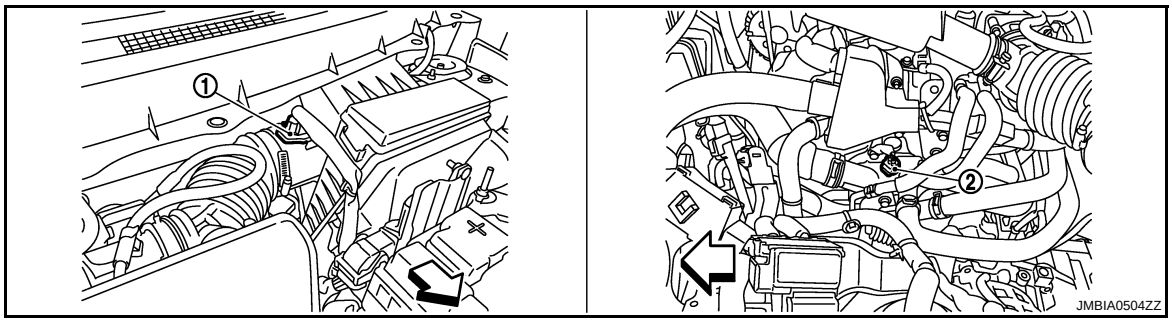
1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

⇦ : Vehicle front



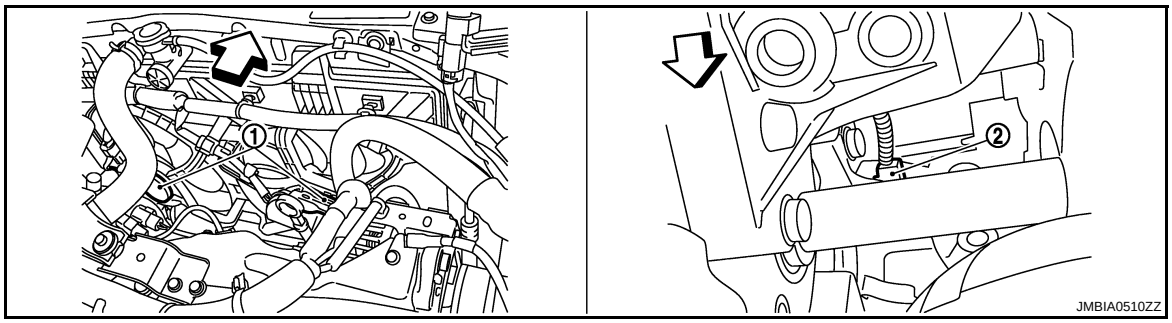
1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Camshaft position sensor (PHASE)

⇦ : Vehicle front



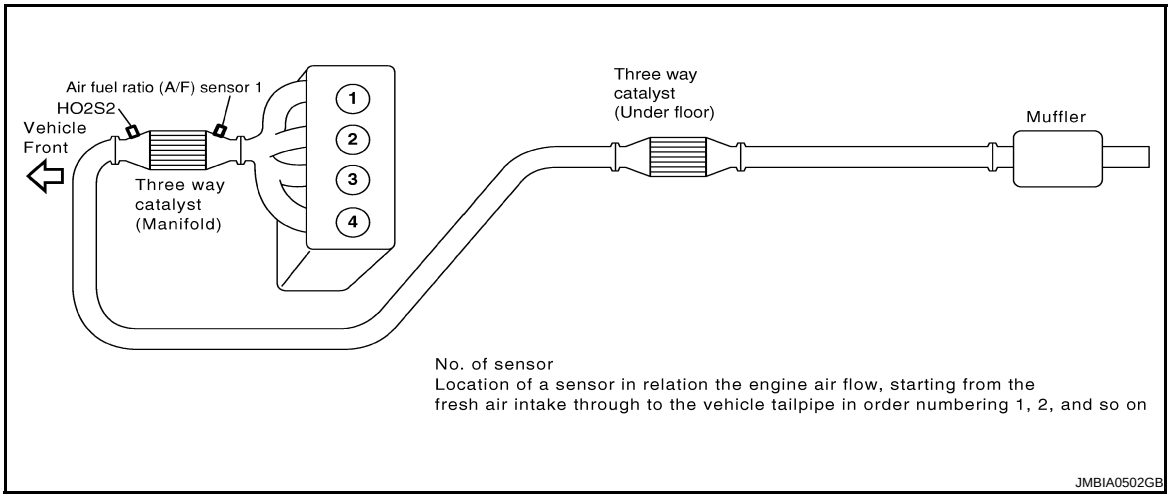
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

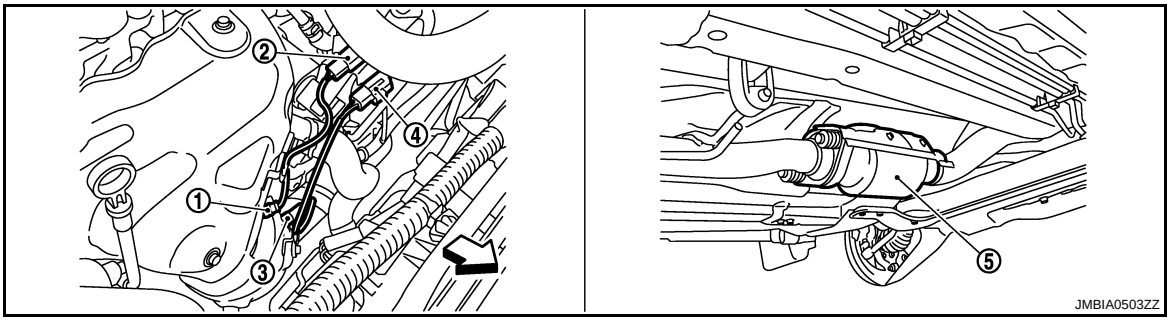
⇦ : Vehicle front



1. Cooling fan motor
2. Crankshaft position sensor (POS)

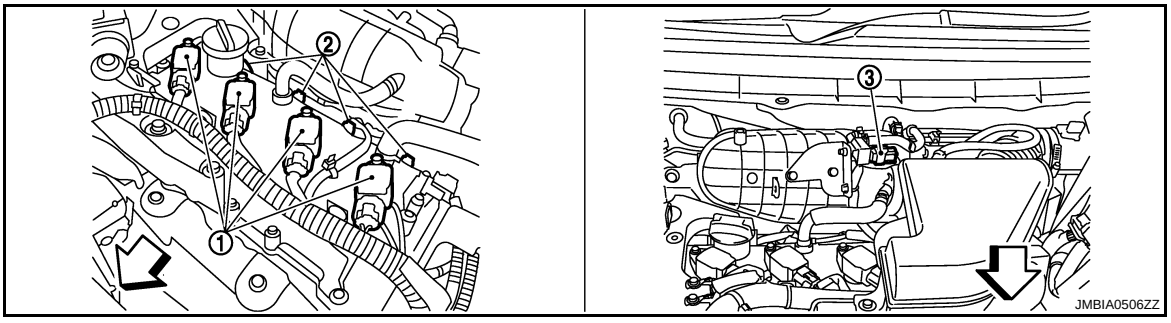
⇦ : Vehicle front





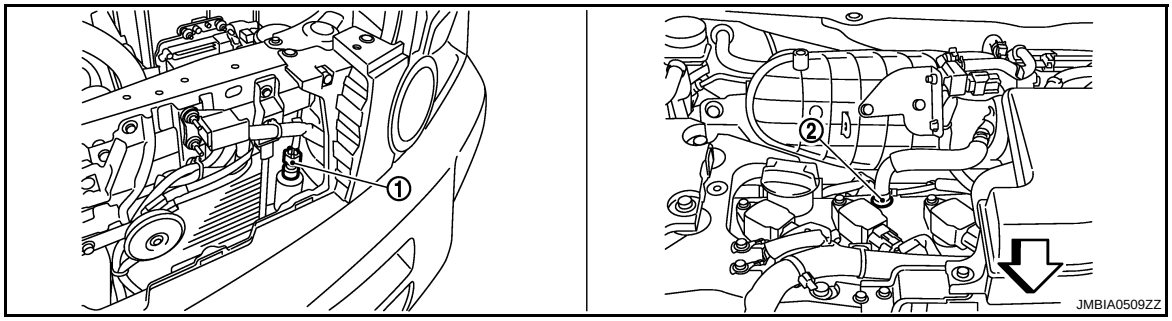
1. Air fuel ratio (A/F) sensor 1
2. Air fuel ratio (A/F) sensor 1 harness connector
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector
5. Three way catalyst (Under floor)

⇦ : Vehicle front



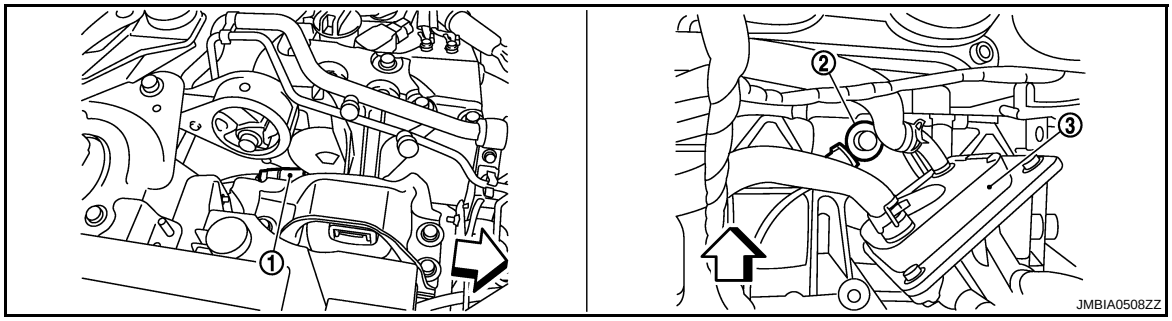
1. Ignition coil (with power transistor) and spark plug
2. Fuel injection
3. EVAP canister purge volume control solenoid valve

⇦ : Vehicle front



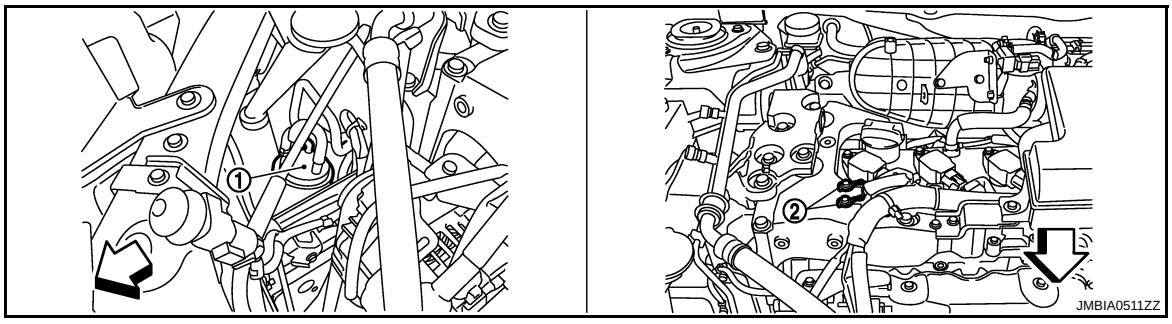
1. Refrigerant pressure sensor 2. PCV valve

⇦ : Vehicle front



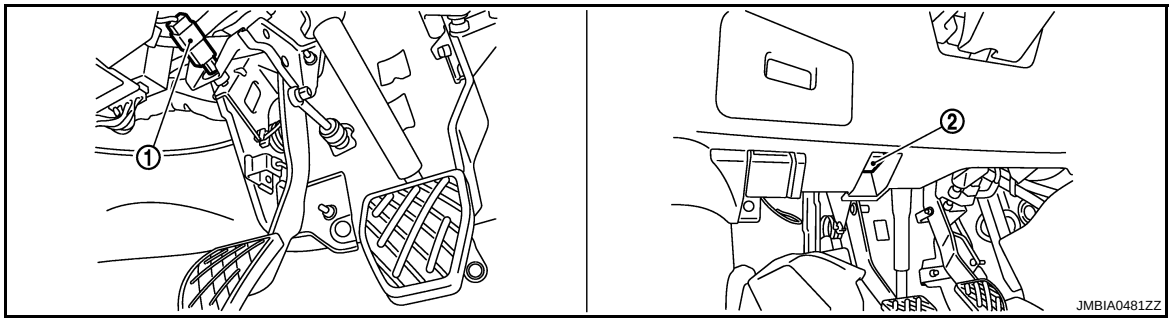
1. Intake valve timing control solenoid valve 2. Knock sensor 3. Engine oil cooler

⇦ : Vehicle front

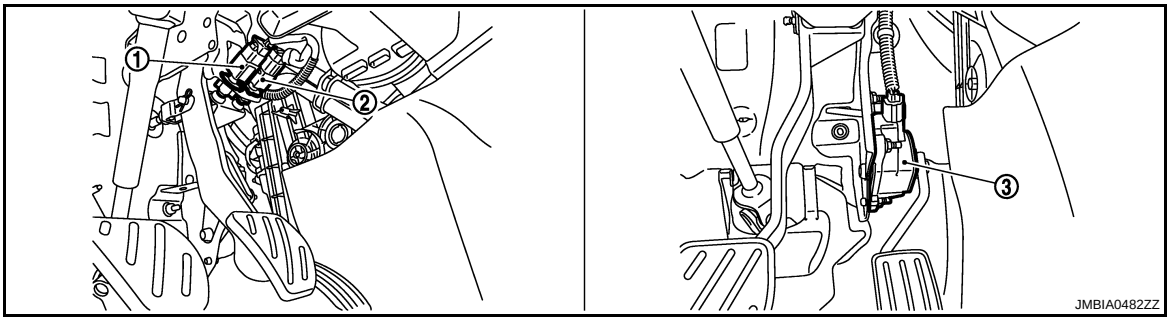


1. EVAP canister 2. Ground

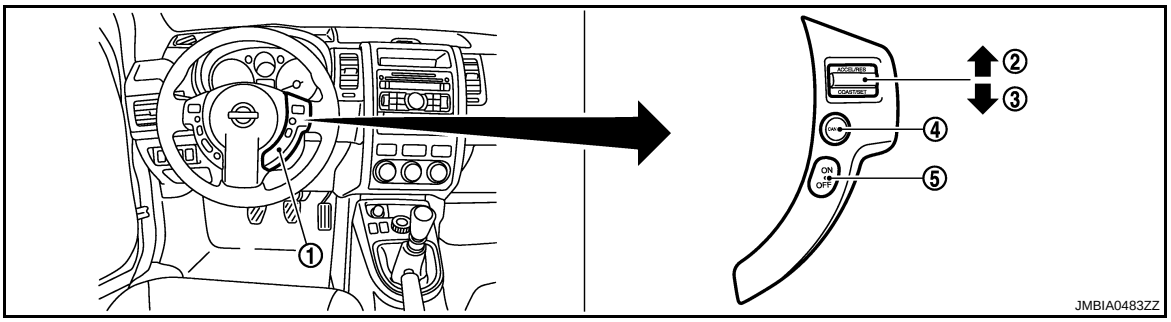
⇦ : Vehicle front



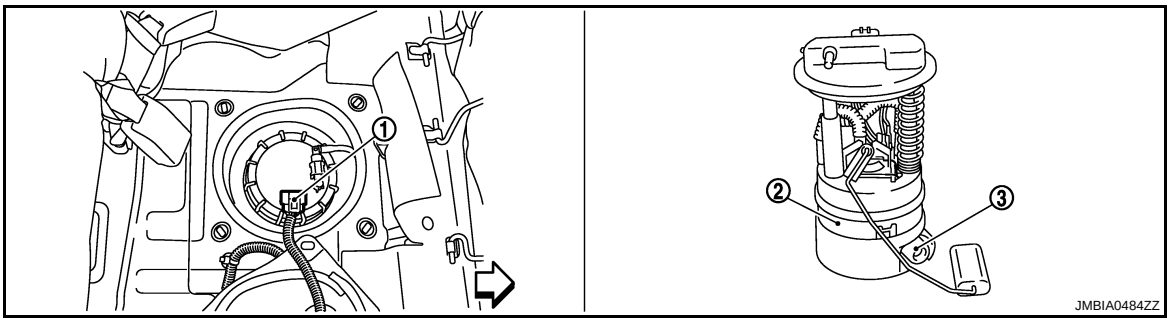
1. ASCD clutch switch 2. Data link connector



1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH



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

⇦ : Vehicle front

Component Description

INFOID:0000000001528081

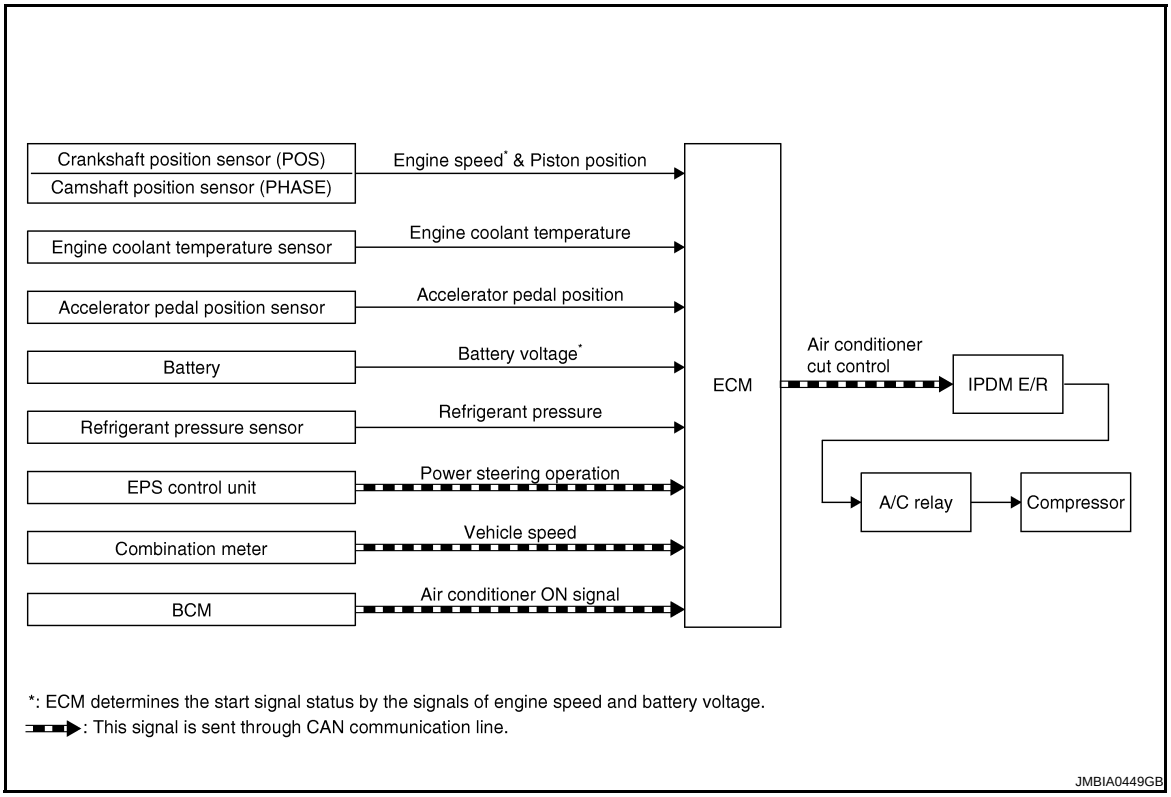
Component	Reference
Accelerator pedal position sensor	ECQ-570, "Description"
Camshaft position sensor (PHASE)	ECQ-510, "Description"
Crankshaft position sensor (POS)	ECQ-506, "Description"
Engine coolant temperature sensor	ECQ-475, "Description"
Ignition signal	ECQ-536, "Description"
Knock sensor	ECQ-504, "Description"
Mass air flow sensor	ECQ-462, "Description"
Park/neutral position switch	ECQ-553, "Description"

Component	Reference
Throttle position sensor	ECQ-478, "Description"
Vehicle speed sensor	ECQ-517, "Description"

AIR CONDITIONING CUT CONTROL

System Diagram

INFOID:0000000001528082



System Description

INFOID:0000000001528083

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
BCM*1	Air conditioner ON signal	Air conditioner cut control	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		
Battery	Battery voltage*2		
Refrigerant pressure sensor	Refrigerant pressure		
EPS control unit*1	Power steering operation		
Combination meter*1	Vehicle speed		

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

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

SYSTEM DESCRIPTION

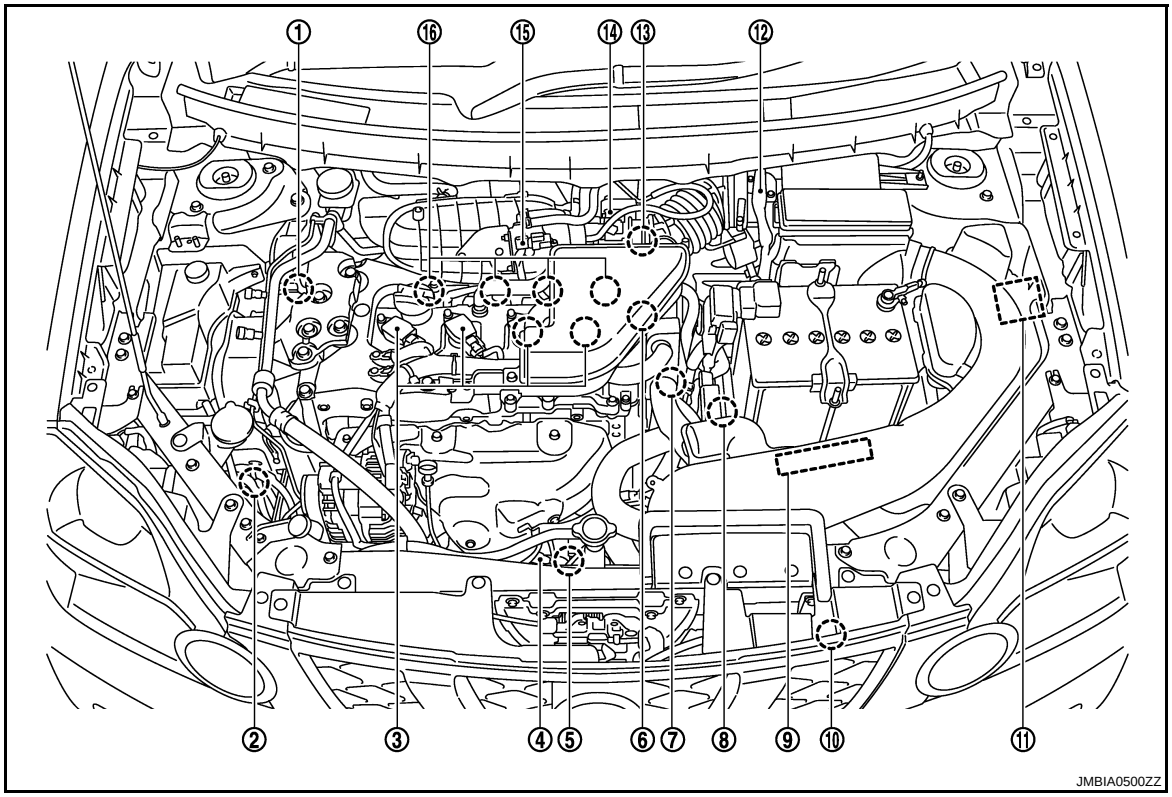
This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

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

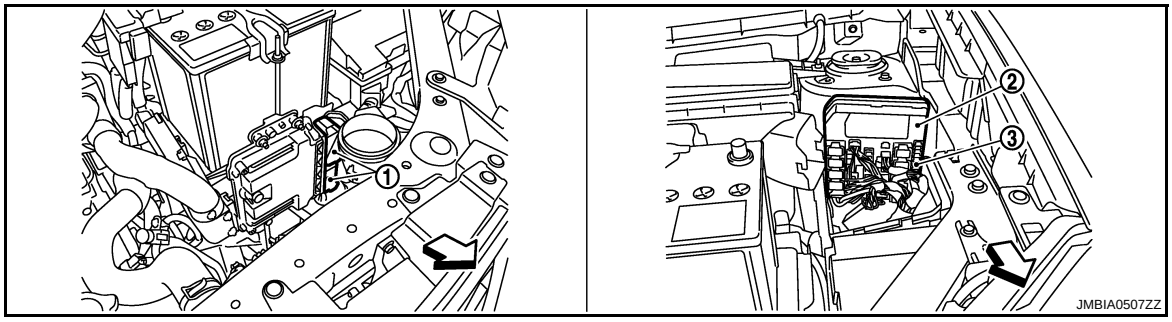
• When refrigerant pressure is excessively low or high.

Component Parts Location

INFOID:0000000001528084

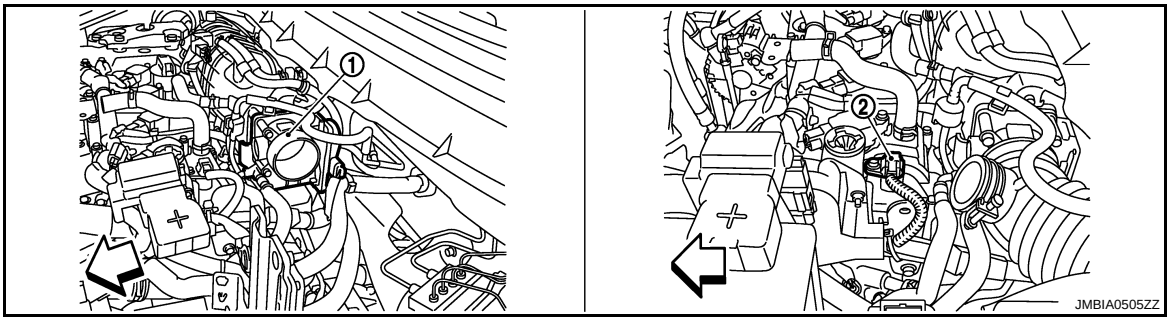


1. Intake valve timing control solenoid valve
2. EVAP canister
3. Ignition coil (with power transistor)
4. Air fuel ratio (A/F) sensor 1
5. Heated oxygen sensor 2
6. Camshaft position sensor (PHASE)
7. Engine coolant temperature sensor
8. Park/neutral position (PNP) switch
9. ECM
10. Refrigerant pressure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



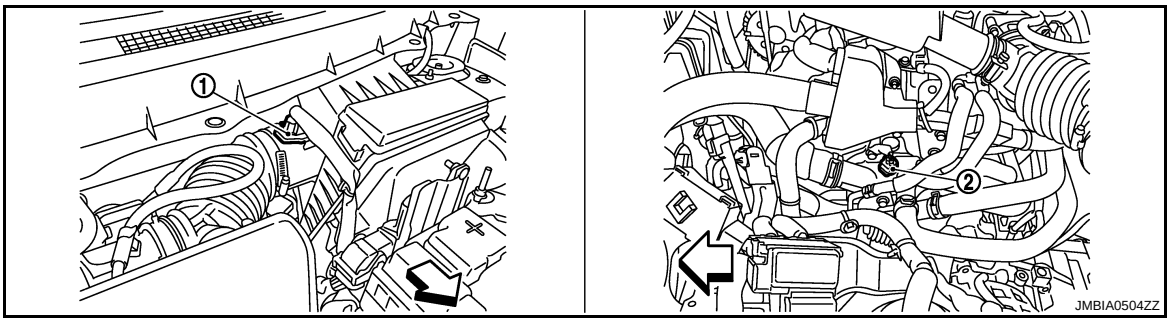
1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

⇦ : Vehicle front



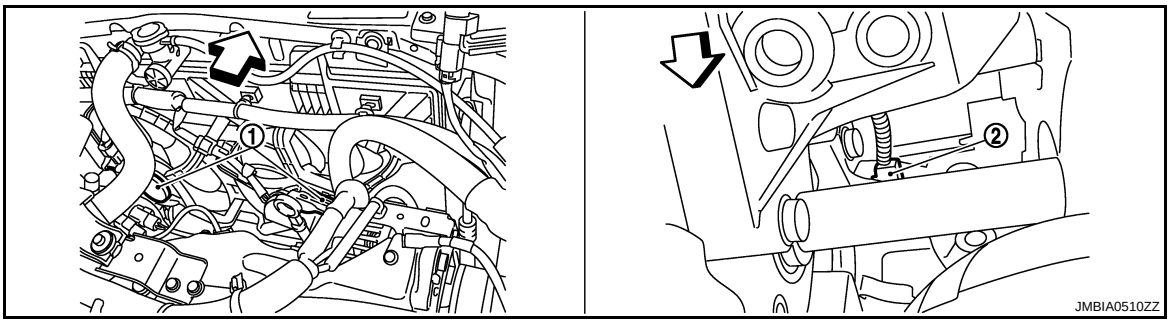
1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Camshaft position sensor (PHASE)

⇦ : Vehicle front



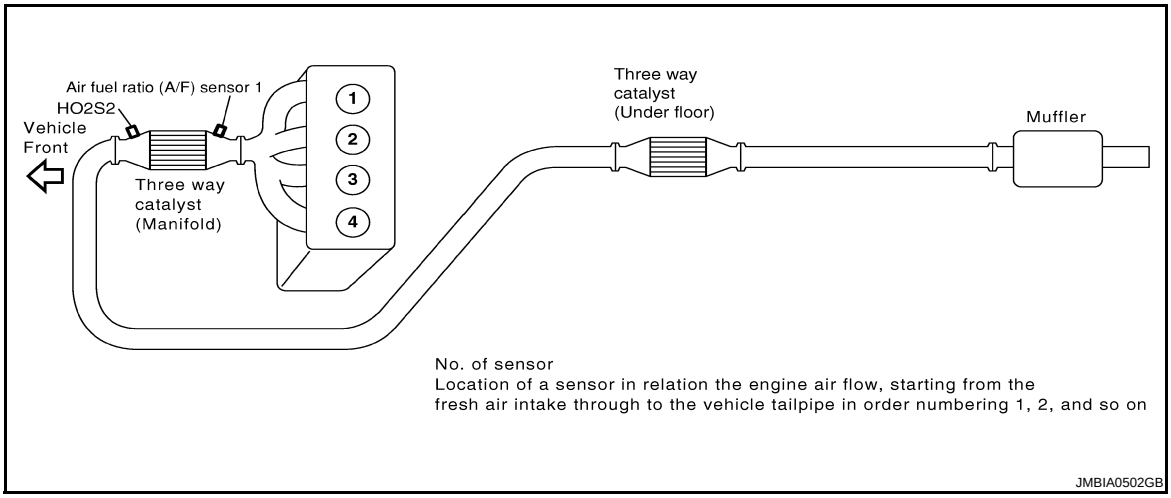
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

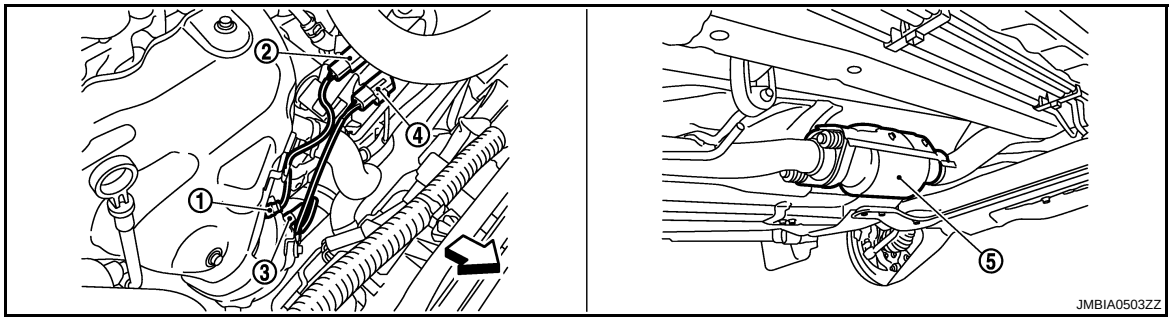
⇦ : Vehicle front



1. Cooling fan motor
2. Crankshaft position sensor (POS)

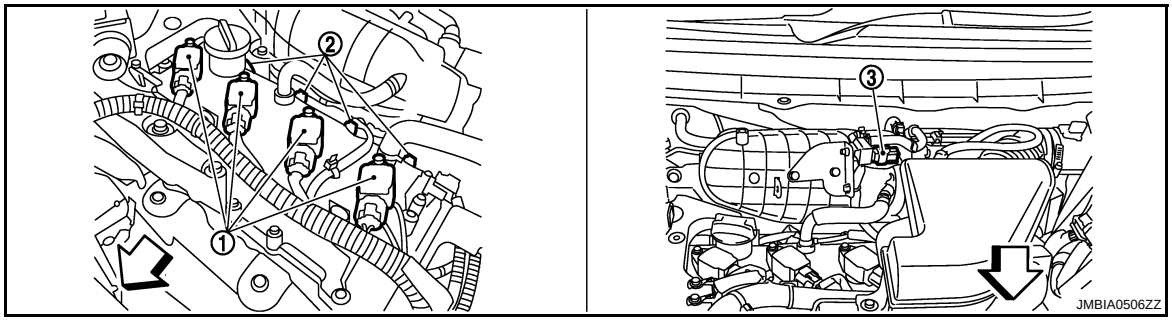
⇦ : Vehicle front





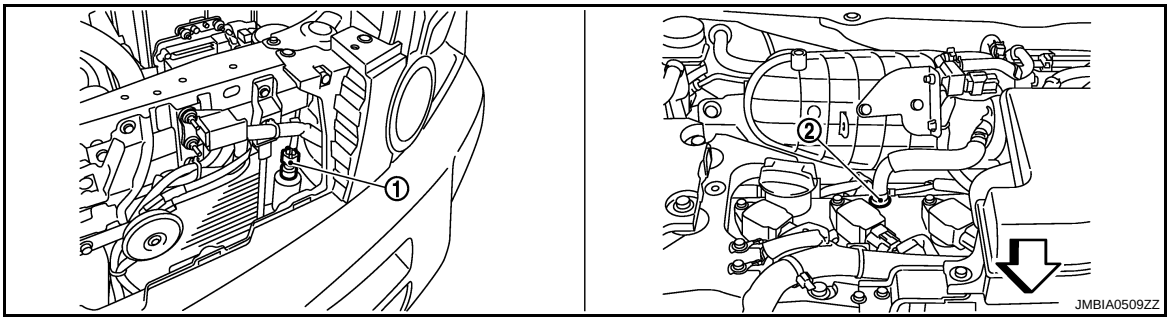
1. Air fuel ratio (A/F) sensor 1
2. Air fuel ratio (A/F) sensor 1 harness connector
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector
5. Three way catalyst (Under floor)

⇦ : Vehicle front



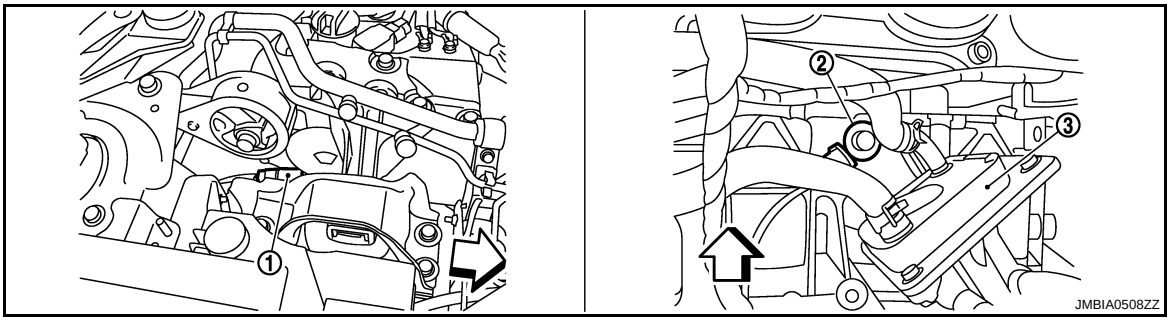
1. Ignition coil (with power transistor) and spark plug
2. Fuel injection
3. EVAP canister purge volume control solenoid valve

⇦ : Vehicle front



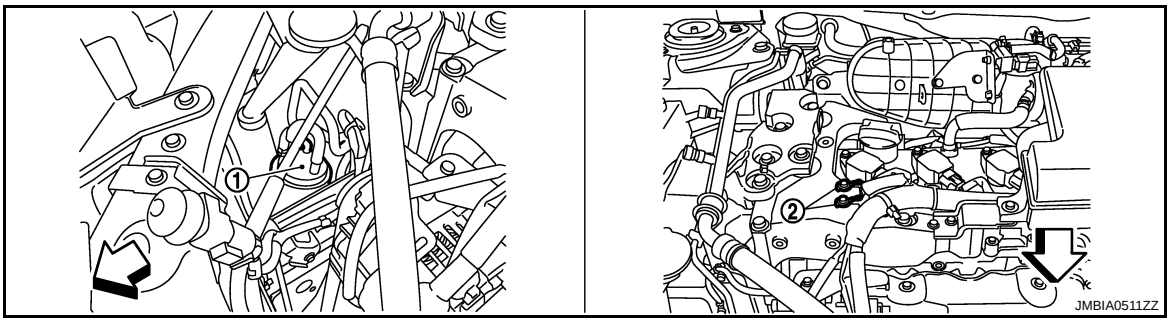
1. Refrigerant pressure sensor 2. PCV valve

⇦ : Vehicle front



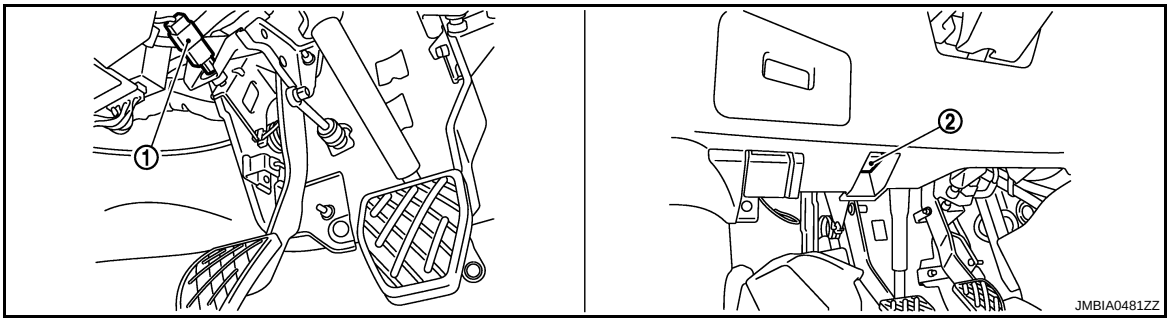
1. Intake valve timing control solenoid valve 2. Knock sensor 3. Engine oil cooler

⇦ : Vehicle front

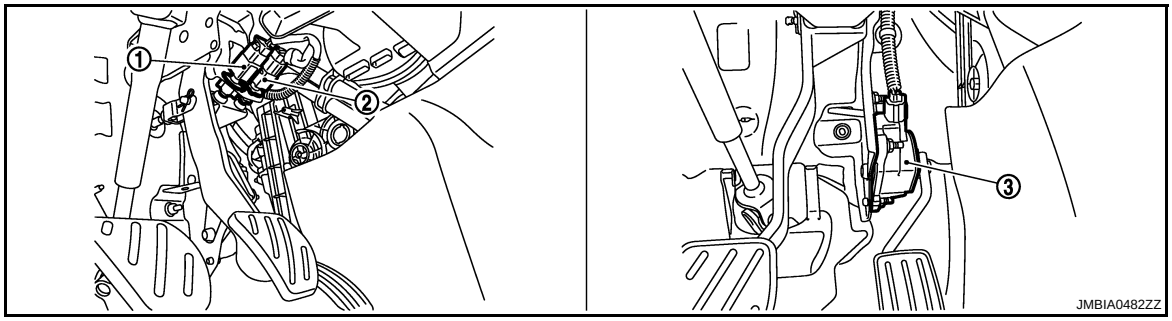


1. EVAP canister 2. Ground

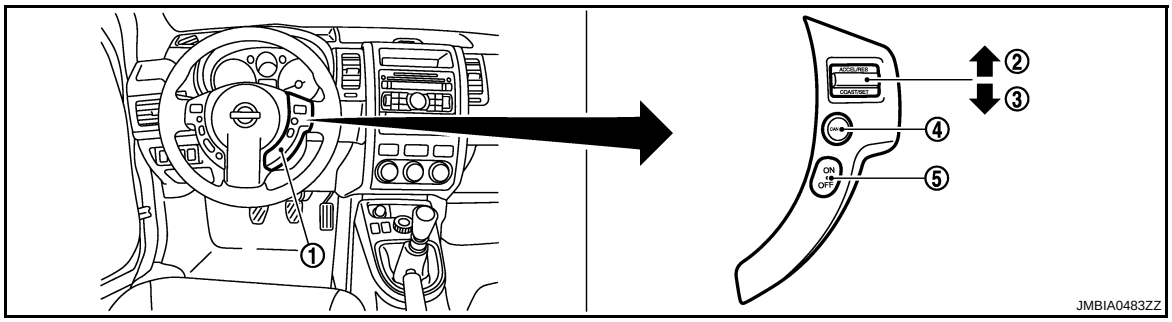
⇦ : Vehicle front



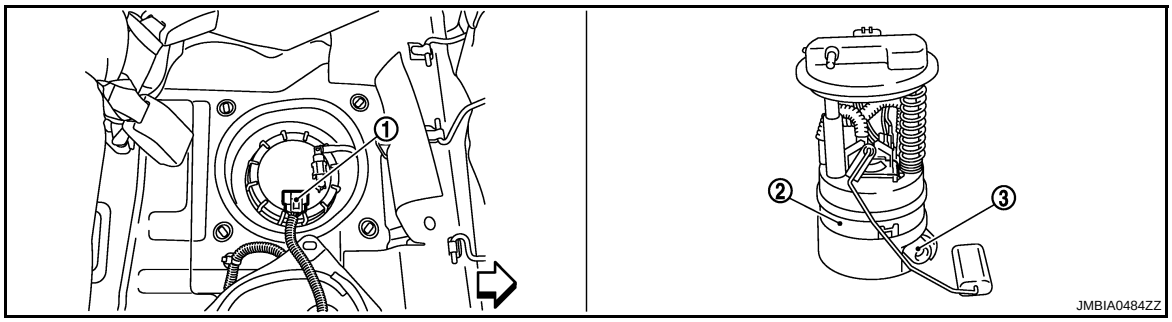
1. ASCD clutch switch 2. Data link connector



1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH



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

⇦ : Vehicle front

Component Description

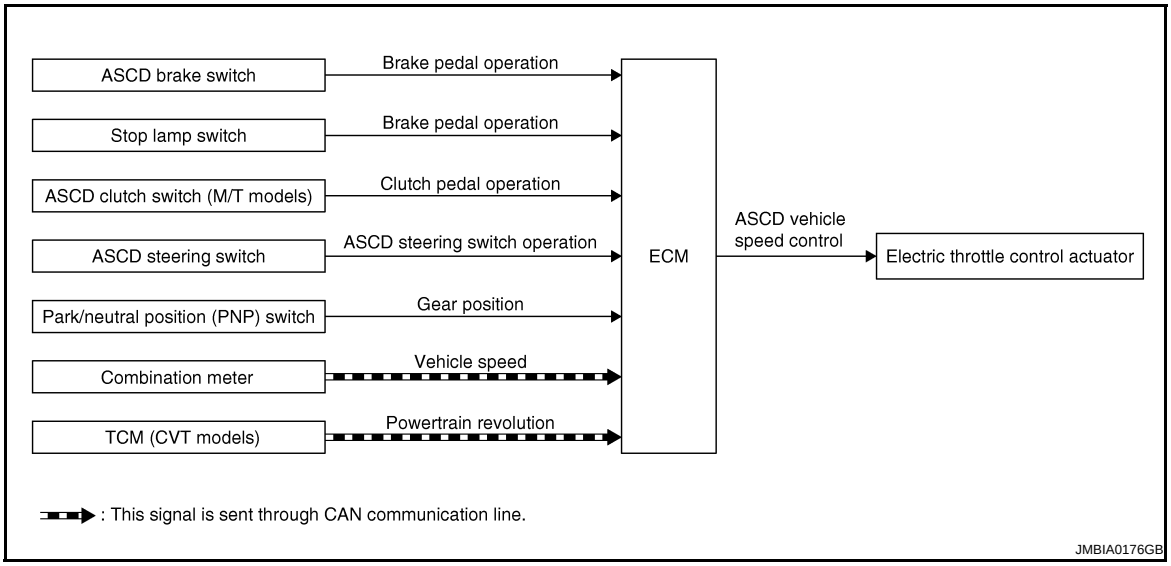
INFOID:0000000001528088

Component	Reference
Accelerator pedal position sensor	ECQ-570, "Description"
Camshaft position sensor (PHASE)	ECQ-510, "Description"
Crankshaft position sensor (POS)	ECQ-506, "Description"
Engine coolant temperature sensor	ECQ-475, "Description"
Refrigerant pressure sensor	ECQ-603, "Description"
Vehicle speed sensor	ECQ-517, "Description"

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram

INFOID:0000000001528089



System Description

INFOID:0000000001528090

INPUT/OUTPUT SIGNAL CHART

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

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

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and M/T models:171 km/h (106 MPH),CVT models:166 km/h (103 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 ASCD system, it automatically deactivates control.
NOTE:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (The CRUISE lamp in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and M/T models:171 km/h (106 MPH),CVT models:166 km/h (103 MPH). press SET/COAST switch. (Then SET lamp in combination meter illuminates.)

ACCELERATE OPERATION

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

CANCEL OPERATION

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

- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to neutral position. (M/T models)
- Selector lever is changed to N, P, R position (CVT models)
- Vehicle speed decreased to 12 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 during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

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

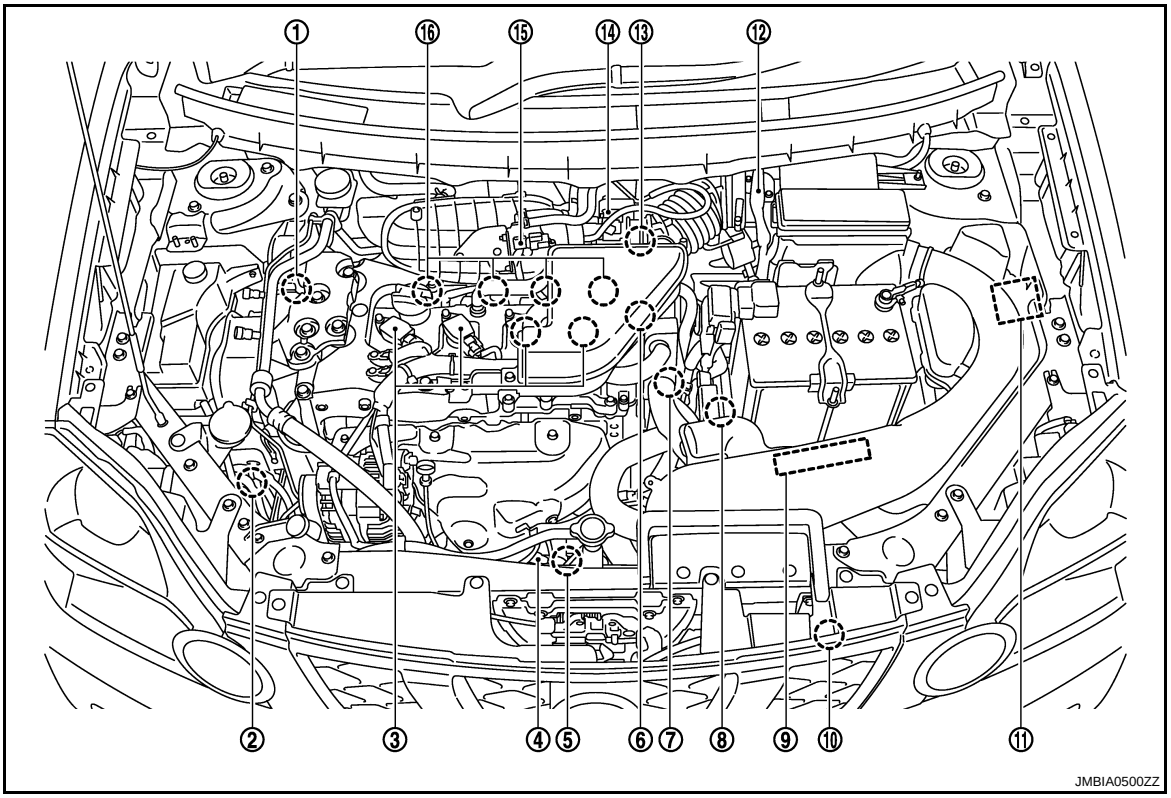
RESUME OPERATION

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

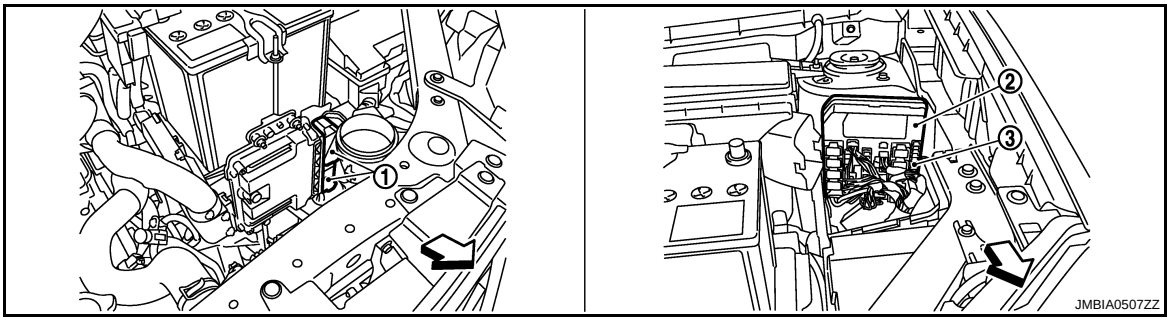
- Brake pedal is released
- Clutch pedal is released (M/T models)
- Selector lever is in other than P and N positions (CVT models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than M/T models:171 km/h (106 MPH),CVT models:166 km/h (103 MPH).

Component Parts Location

INFOID:0000000001528091

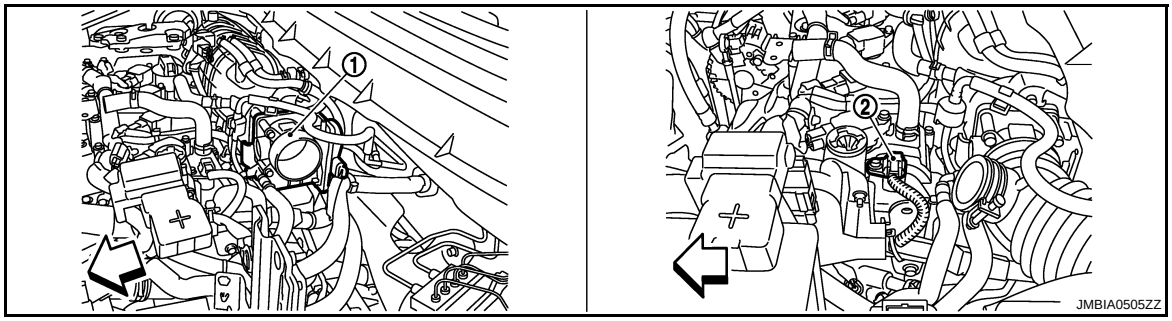


1. Intake valve timing control solenoid valve
2. EVAP canister
3. Ignition coil (with power transistor)
4. Air fuel ratio (A/F) sensor 1
5. Heated oxygen sensor 2
6. Camshaft position sensor (PHASE)
7. Engine coolant temperature sensor
8. Park/neutral position (PNP) switch
9. ECM
10. Refrigerant pressure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



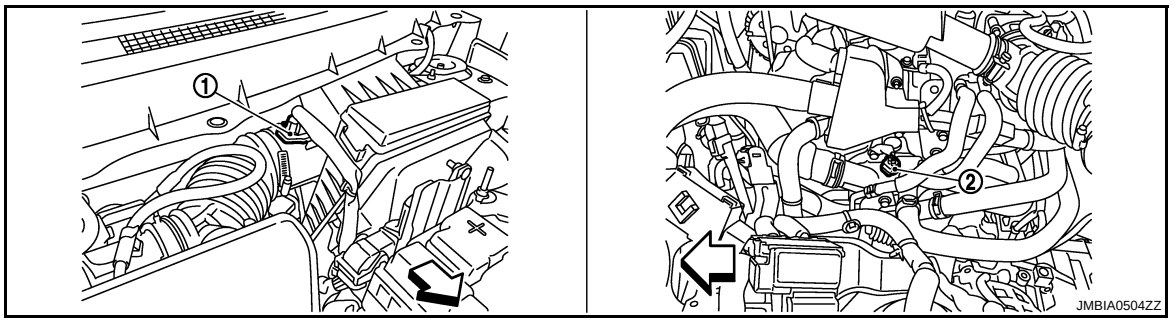
1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

⇦ : Vehicle front



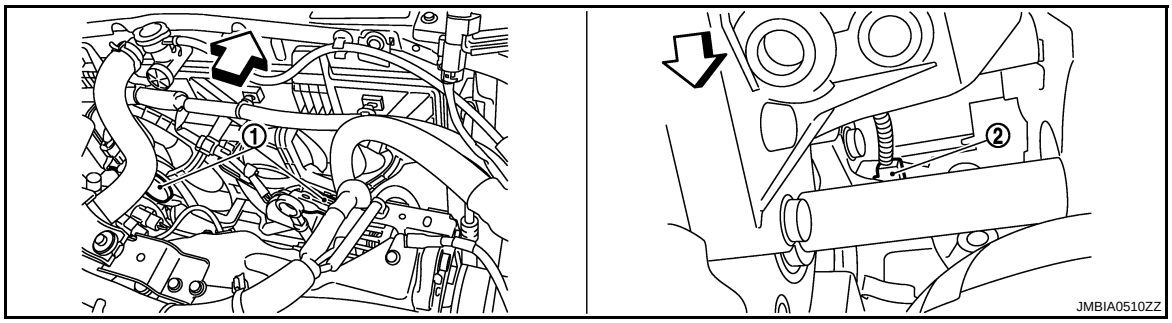
1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Camshaft position sensor (PHASE)

⇦ : Vehicle front



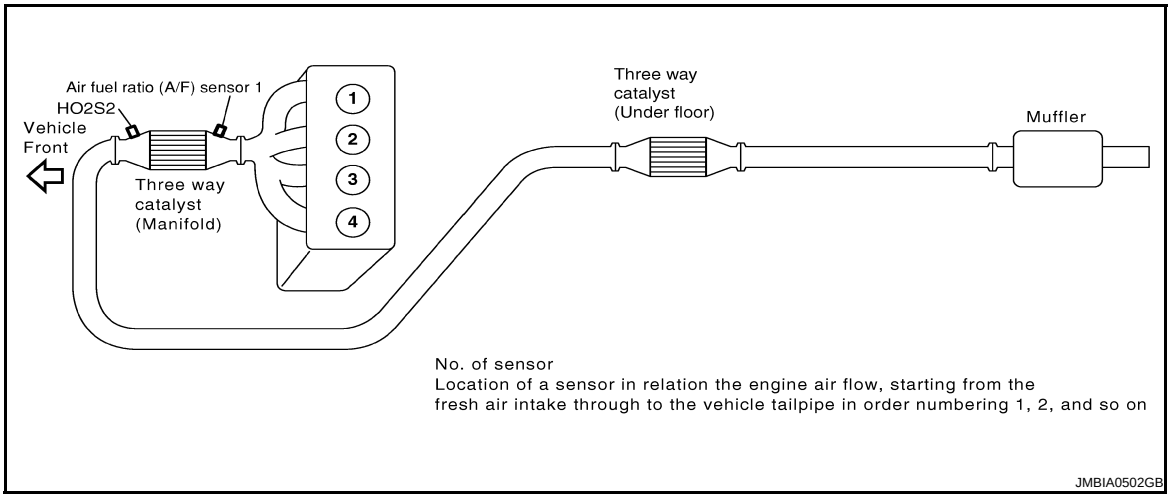
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

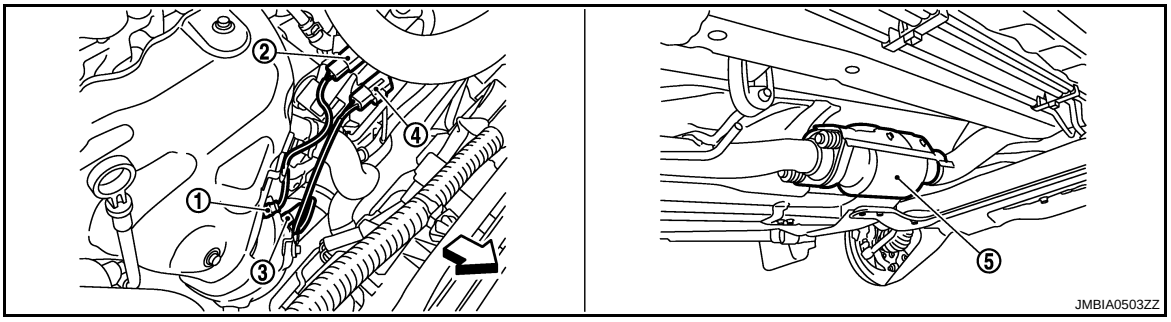
⇦ : Vehicle front



1. Cooling fan motor
2. Crankshaft position sensor (POS)

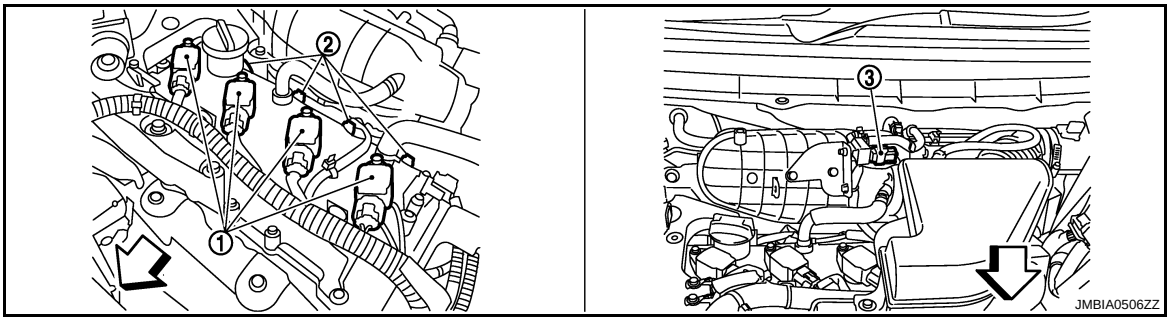
⇦ : Vehicle front





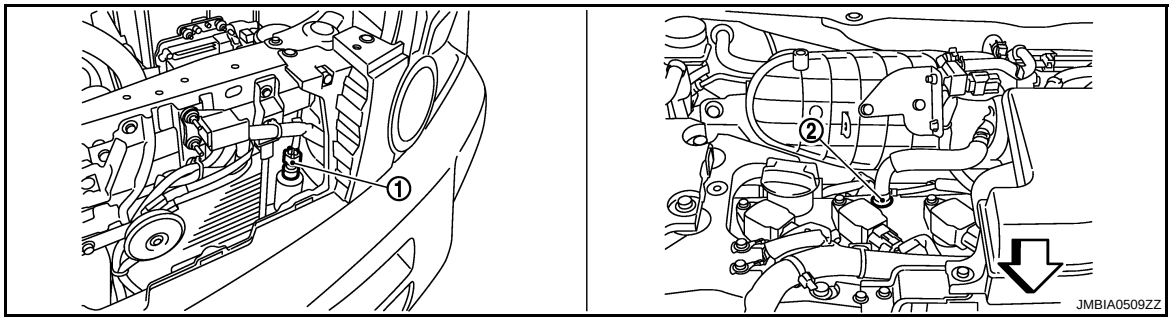
1. Air fuel ratio (A/F) sensor 1
2. Air fuel ratio (A/F) sensor 1 harness connector
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector
5. Three way catalyst (Under floor)

⇦ : Vehicle front



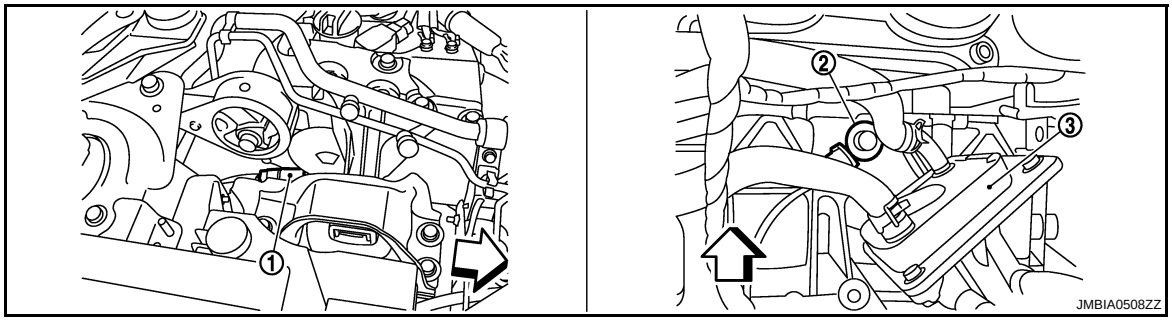
1. Ignition coil (with power transistor) and spark plug
2. Fuel injection
3. EVAP canister purge volume control solenoid valve

⇦ : Vehicle front



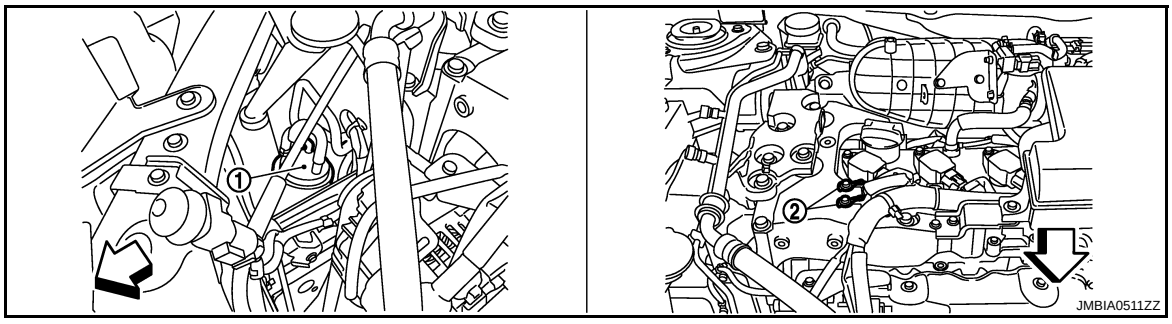
1. Refrigerant pressure sensor
2. PCV valve

⇦ : Vehicle front



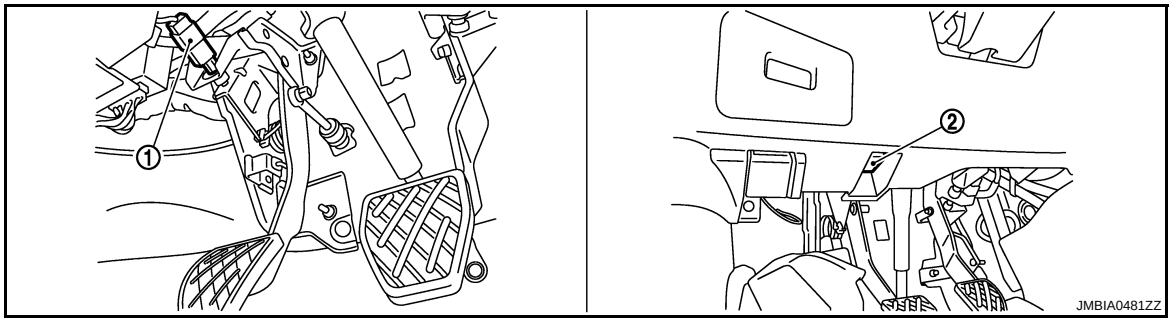
1. Intake valve timing control solenoid valve
2. Knock sensor
3. Engine oil cooler

⇦ : Vehicle front

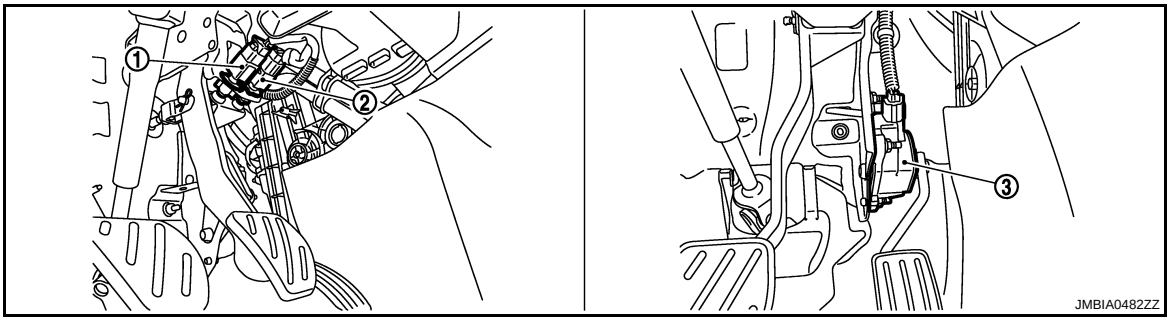


1. EVAP canister
2. Ground

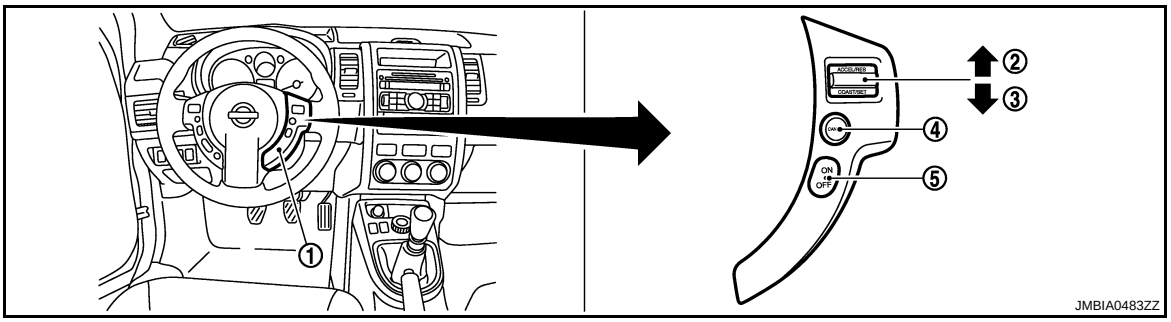
⇦ : Vehicle front



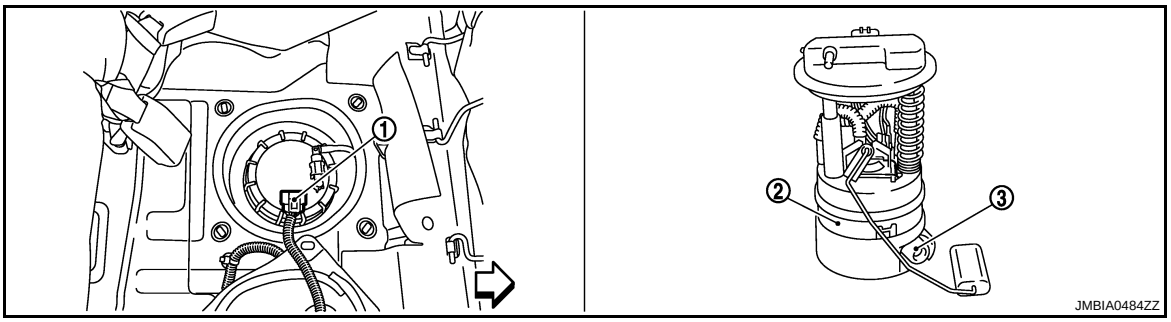
1. ASCD clutch switch
2. Data link connector



1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH



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

⇦ : Vehicle front

Component Description

INFOID:0000000001528095

Component	Reference
ASCD steering switch	ECQ-541, "Description"
ASCD clutch switch	ECQ-544, "Description"
ASCD brake switch	ECQ-544, "Description"
Stop lamp switch	ECQ-558, "Description"
Electric throttle control actuator	ECQ-568, "Description"
ASCD indicator	ECQ-590, "Description"

CAN COMMUNICATION

System Description

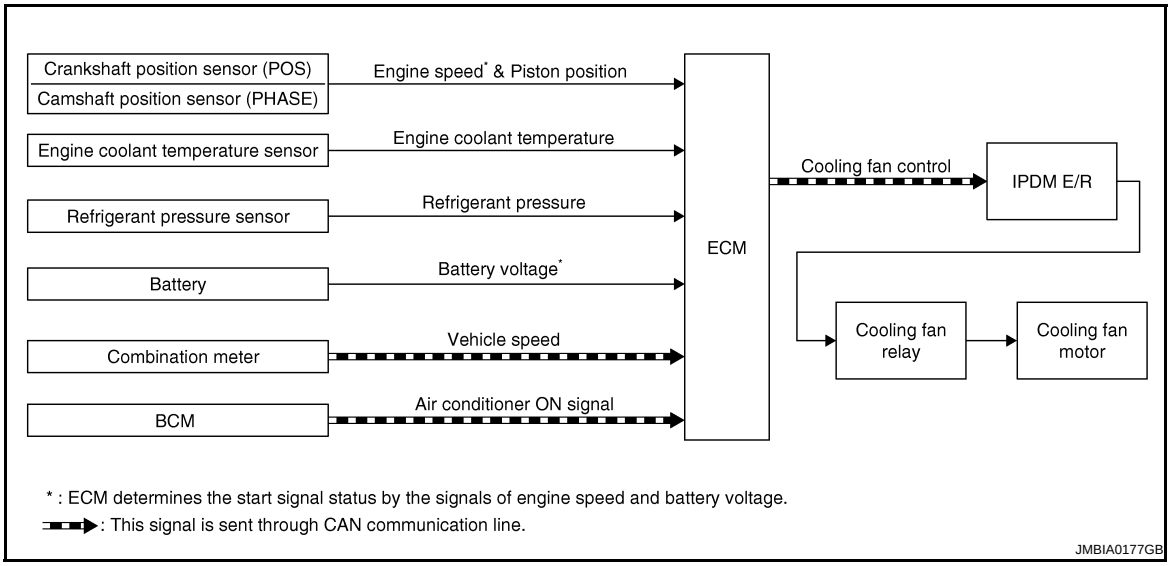
INFOID:0000000001528096

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

COOLING FAN CONTROL

System Diagram

INFOID:0000000001528097



System Description

INFOID:0000000001528098

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		
Combination meter	Vehicle speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
BCM	Air conditioner ON signal*2		
Refrigerant pressure sensor	Refrigerant pressure		

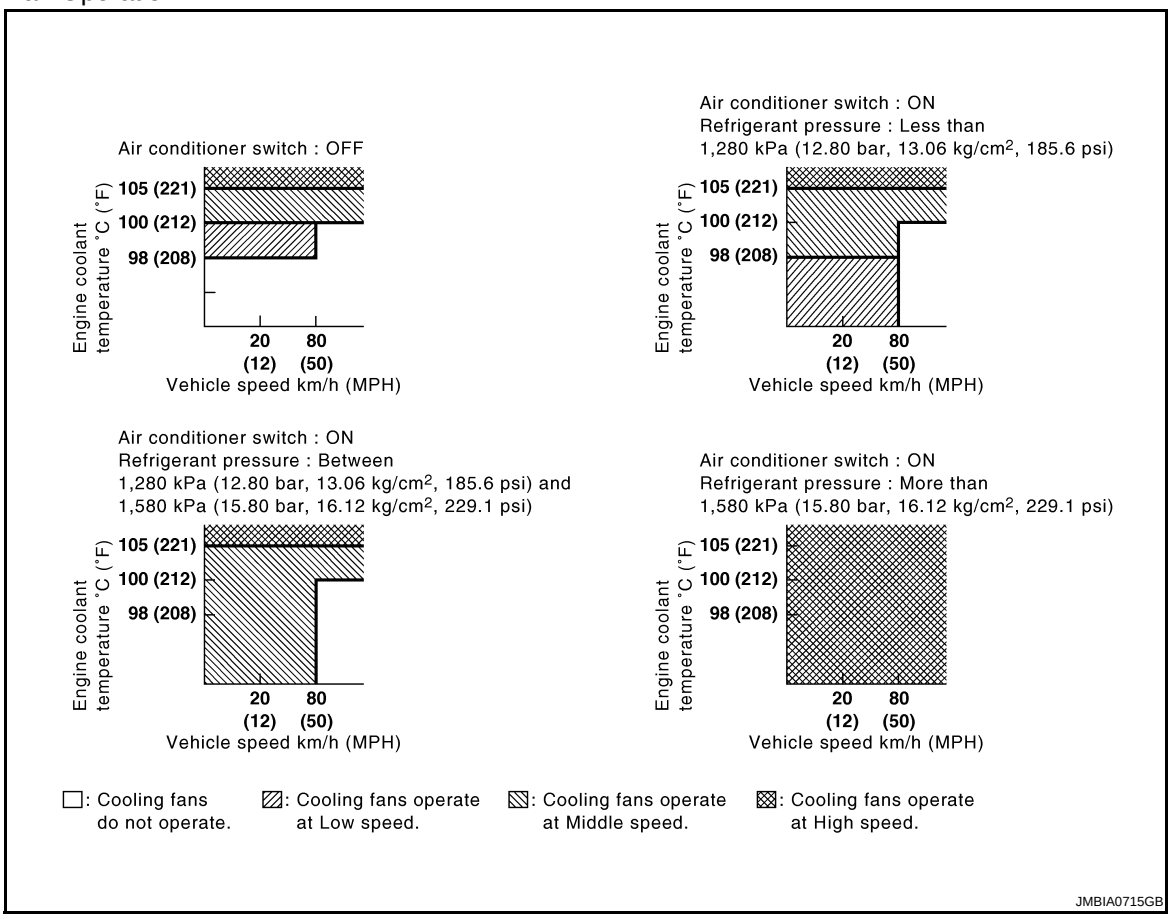
*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

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

SYSTEM DESCRIPTION

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pressure, air conditioner ON signal. Then control system has 4-step control [HIGH/MID/LOW/OFF].

Cooling Fan Operation



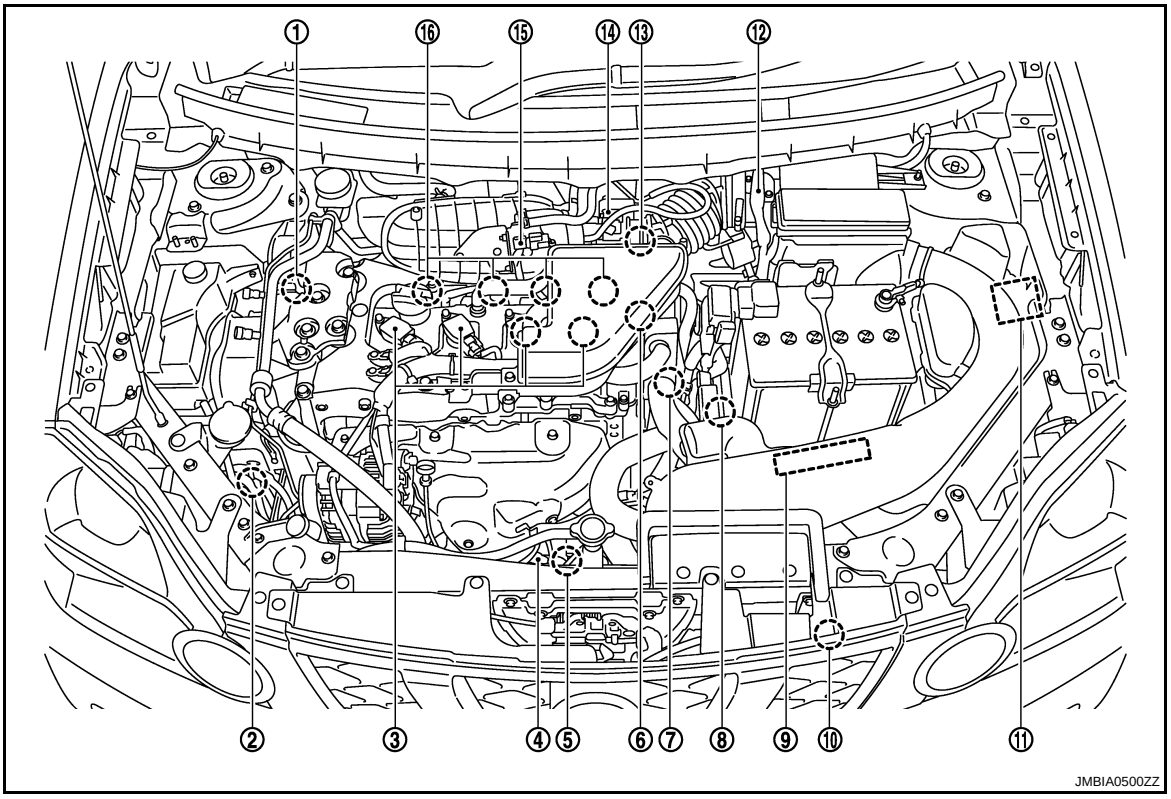
Cooling Fan Relay Operation

The ECM controls cooling fan relays through CAN communication line.

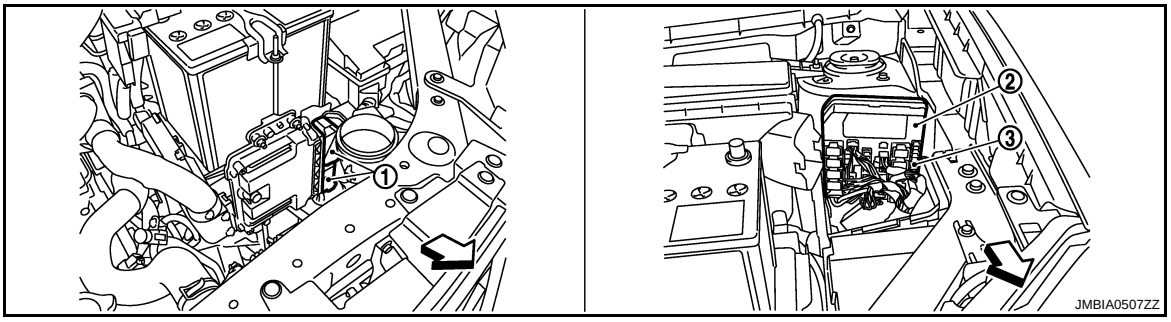
Cooling fan speed	Cooling fan relay				
	1	2	3	4	5
Stop (OFF)	OFF	OFF	OFF	OFF	OFF
Low (LOW)	OFF	OFF	OFF	ON	OFF
Middle (MID)	ON	OFF	OFF	OFF	ON
High (HI)	ON	ON	ON	OFF	ON

Component Parts Location

INFOID:0000000001528099

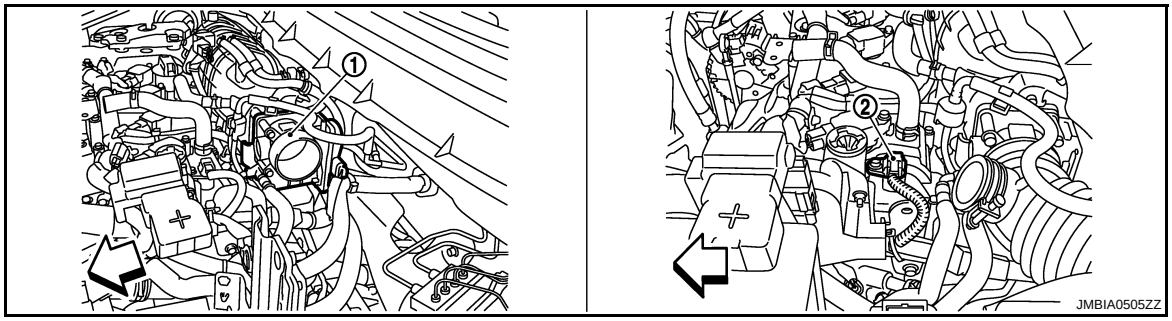


1. Intake valve timing control solenoid valve
2. EVAP canister
3. Ignition coil (with power transistor)
4. Air fuel ratio (A/F) sensor 1
5. Heated oxygen sensor 2
6. Camshaft position sensor (PHASE)
7. Engine coolant temperature sensor
8. Park/neutral position (PNP) switch
9. ECM
10. Refrigerant pressure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



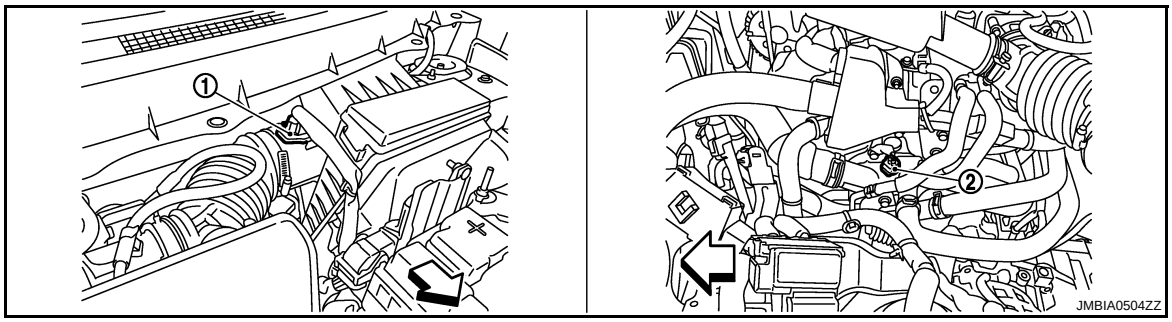
1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

⇦ : Vehicle front



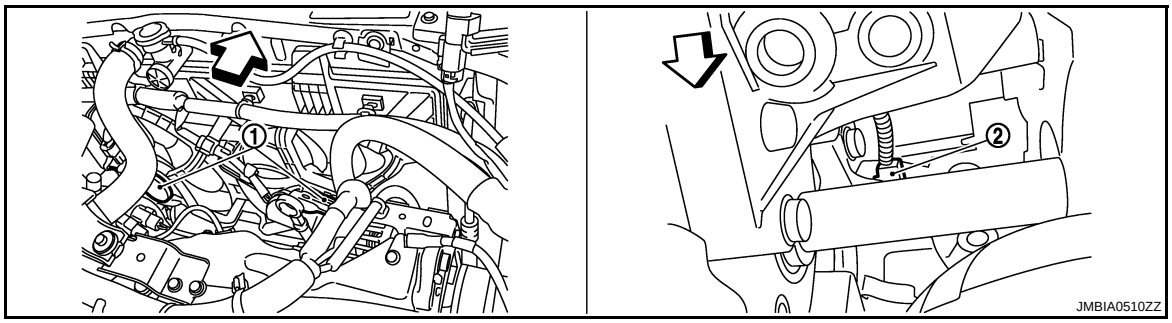
1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Camshaft position sensor (PHASE)

⇦ : Vehicle front



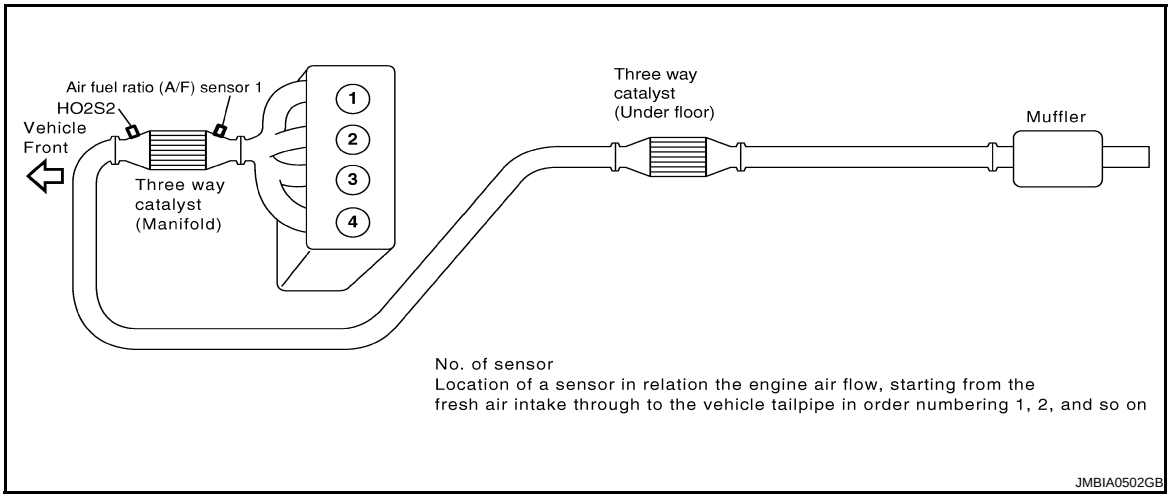
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

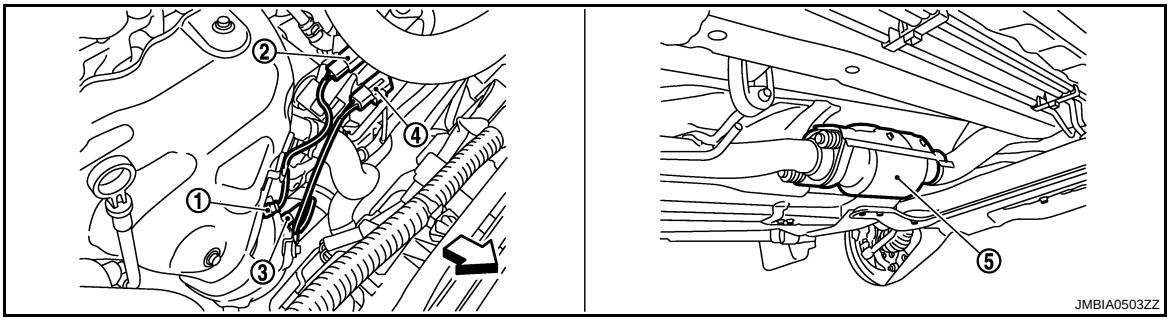
⇦ : Vehicle front



1. Cooling fan motor
2. Crankshaft position sensor (POS)

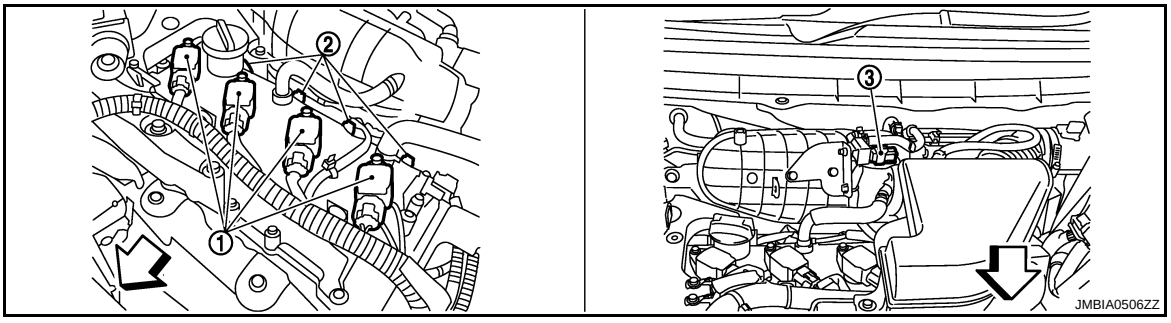
⇦ : Vehicle front





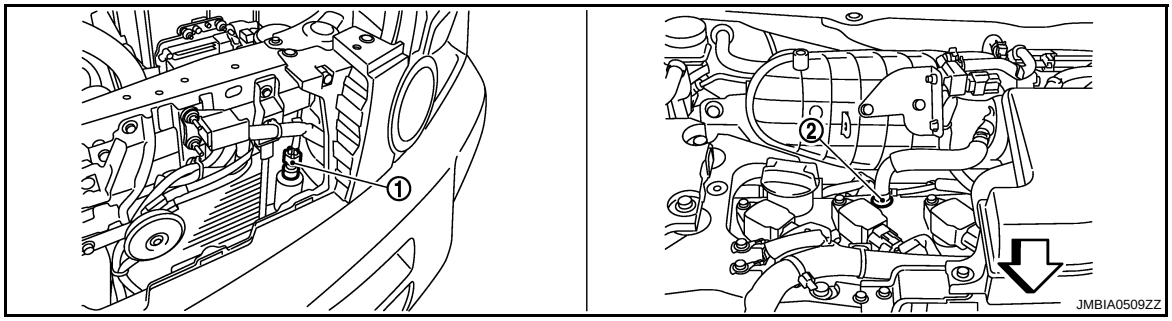
1. Air fuel ratio (A/F) sensor 1
2. Air fuel ratio (A/F) sensor 1 harness connector
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector
5. Three way catalyst (Under floor)

⇦ : Vehicle front



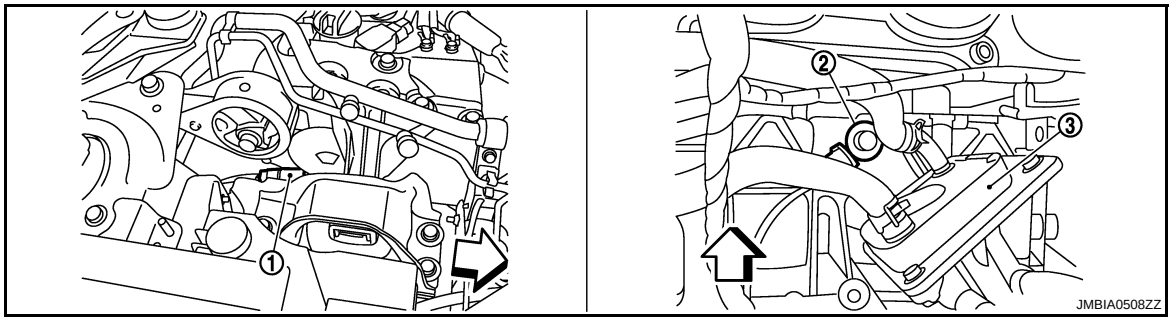
1. Ignition coil (with power transistor) and spark plug
2. Fuel injection
3. EVAP canister purge volume control solenoid valve

⇦ : Vehicle front



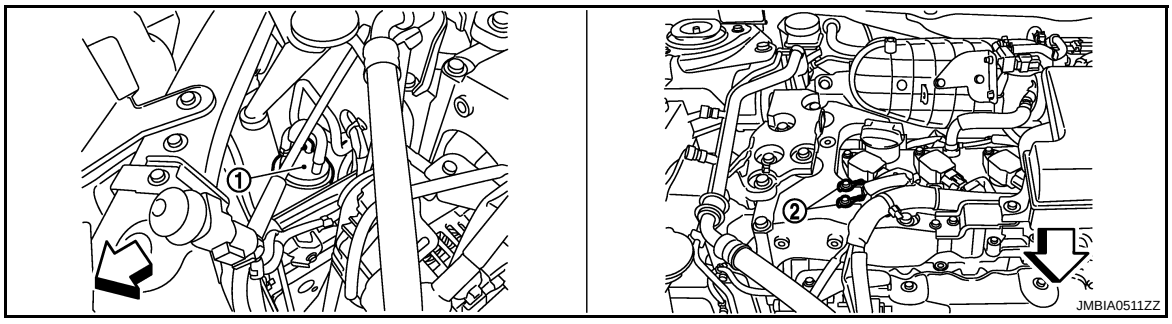
1. Refrigerant pressure sensor 2. PCV valve

⇦ : Vehicle front



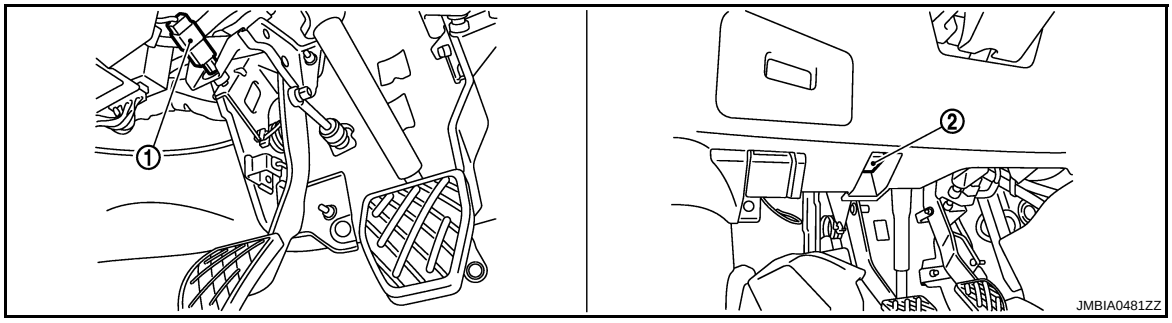
1. Intake valve timing control solenoid valve 2. Knock sensor 3. Engine oil cooler

⇦ : Vehicle front

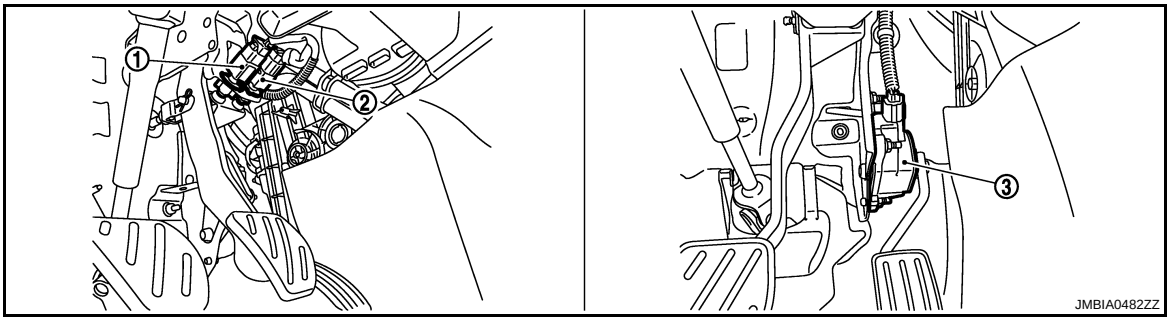


1. EVAP canister 2. Ground

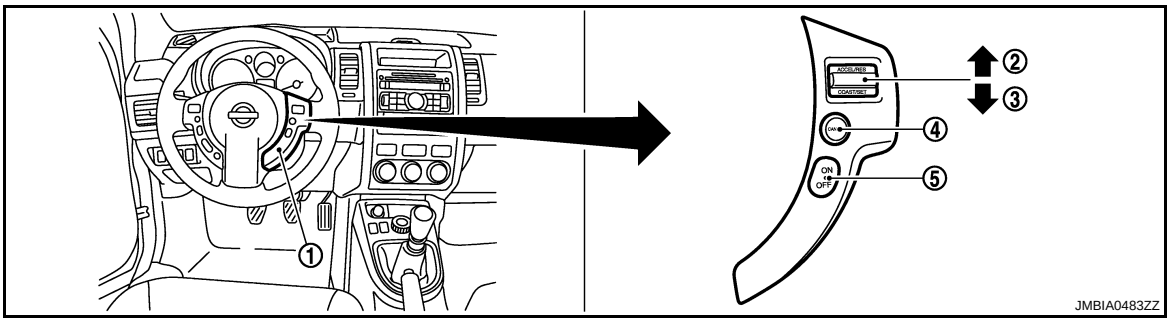
⇦ : Vehicle front



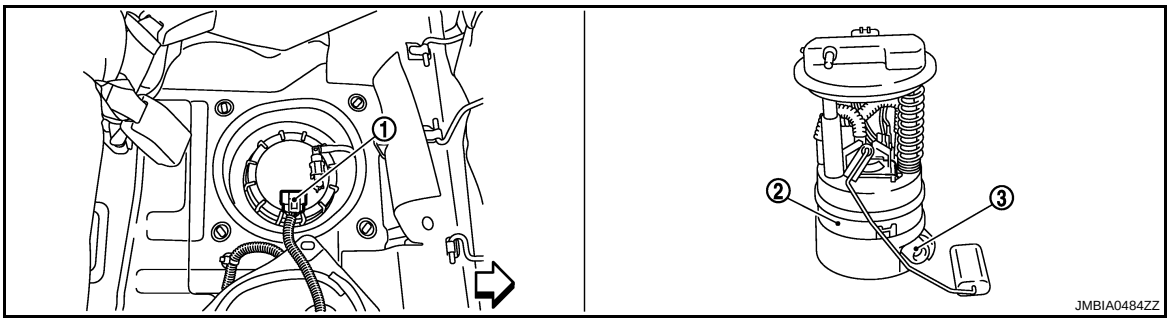
1. ASCD clutch switch 2. Data link connector



1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH



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

⇦ : Vehicle front

Component Description

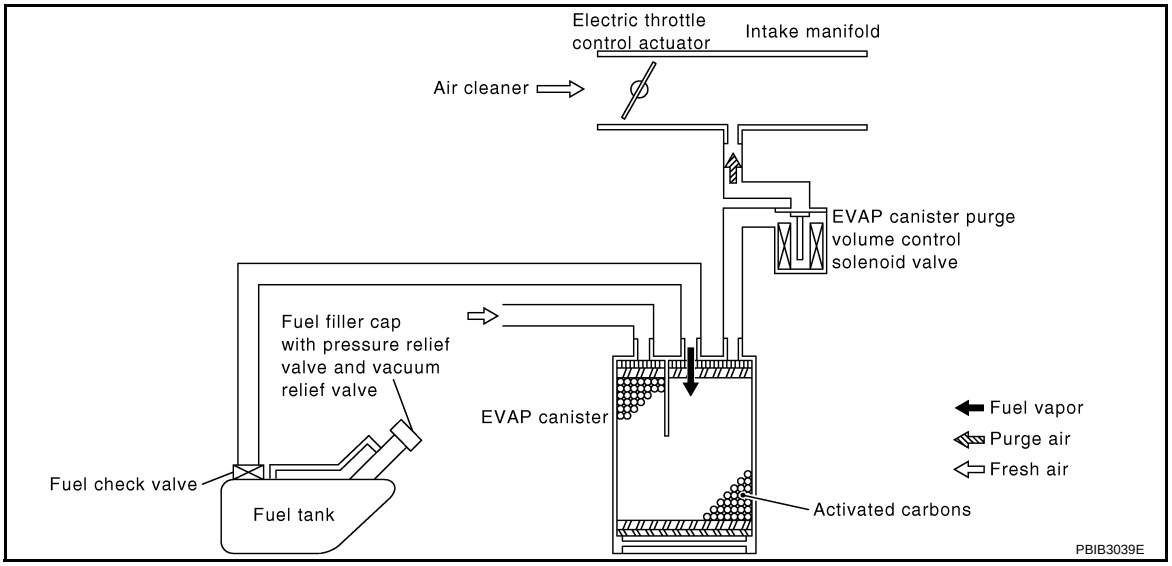
INFOID:0000000001528103

Component	Reference
Camshaft position sensor (PHASE)	ECQ-510, "Description"
Crankshaft position sensor (POS)	ECQ-506, "Description"
Cooling fan motor	ECQ-407, "System Description"
Engine coolant temperature sensor	ECQ-475, "Description"
Refrigerant pressure sensor	ECQ-603, "Description"

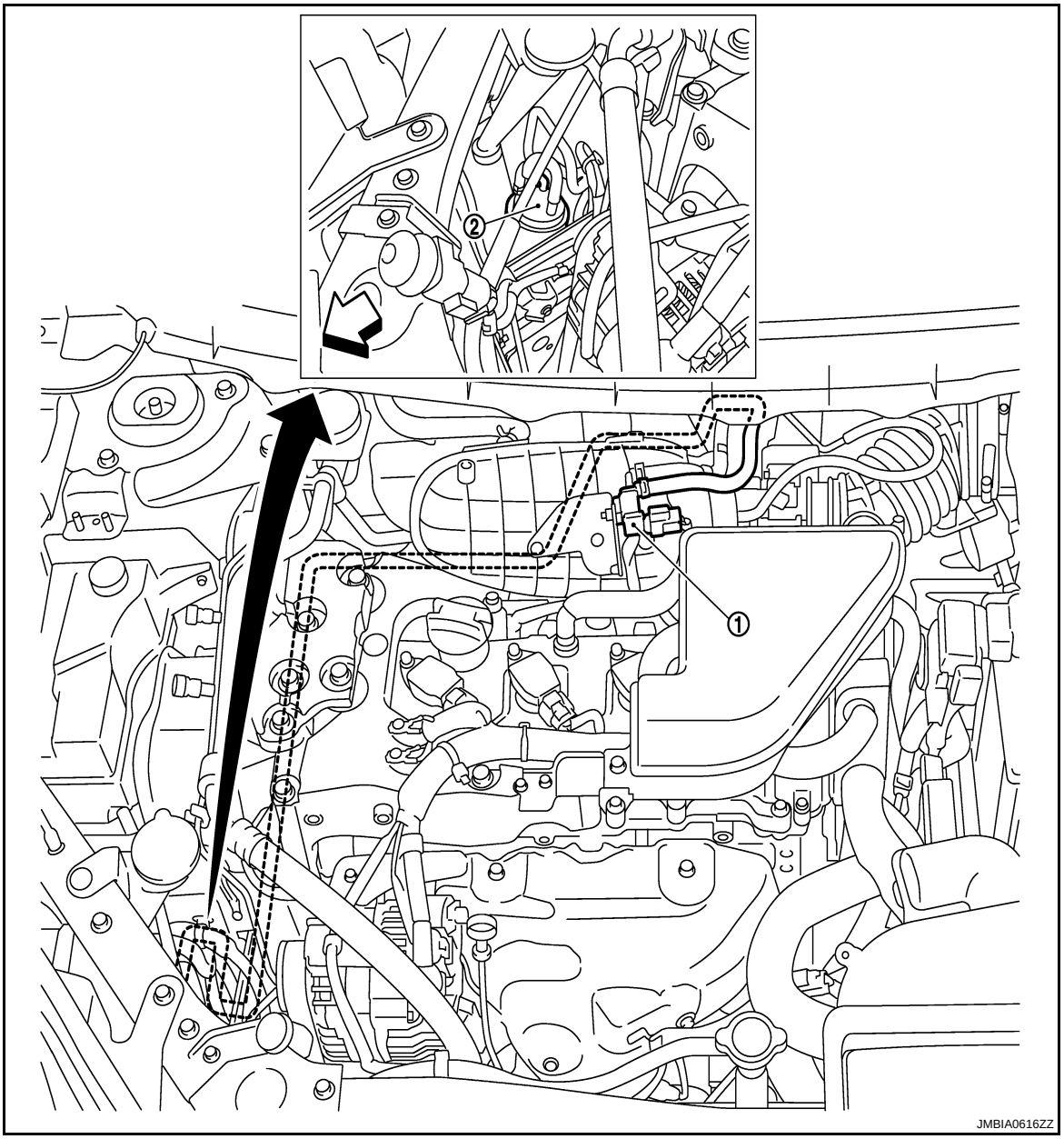
EVAPORATIVE EMISSION SYSTEM

System Diagram

INFOID:0000000001528104



EVAPORATIVE EMISSION LINE DRAWING



1. EVAP canister purge volume control solenoid valve
2. EVAP canister

⇦ : Vehicle front

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

System Description

INFOID:0000000001528105

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*1		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Combination meter*2	Vehicle speed		

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

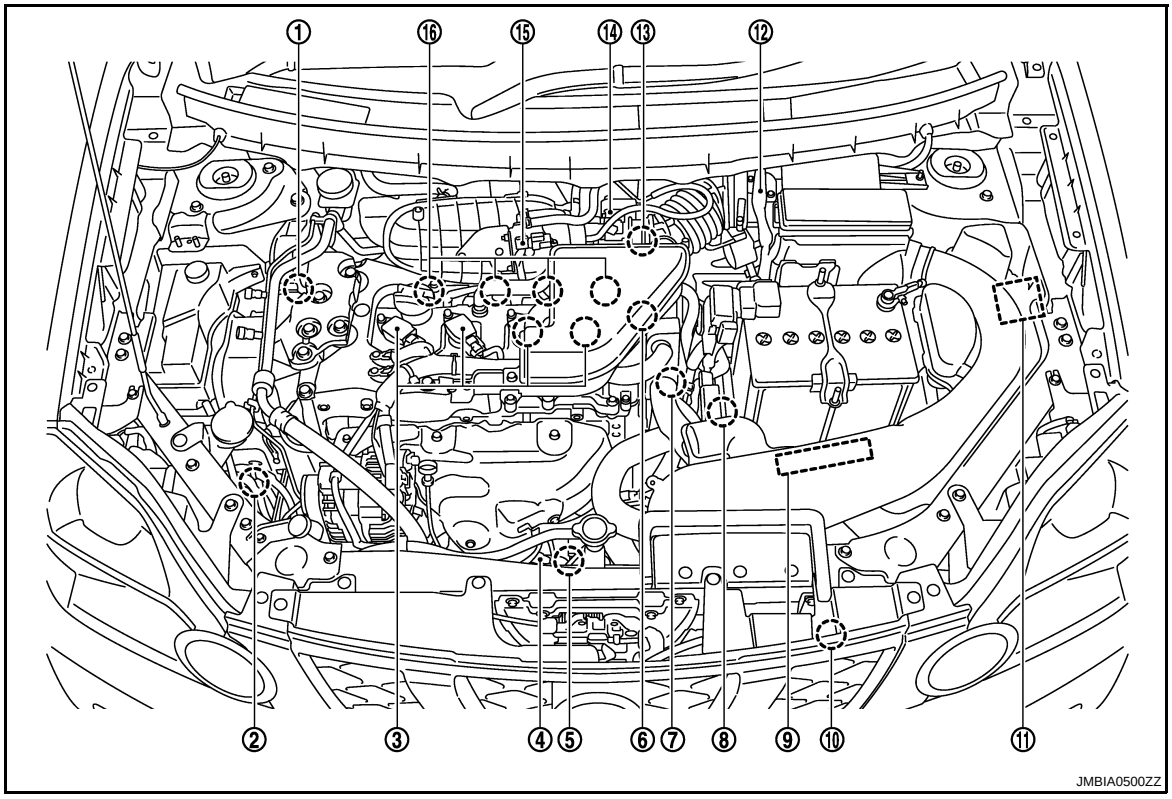
*2: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating.

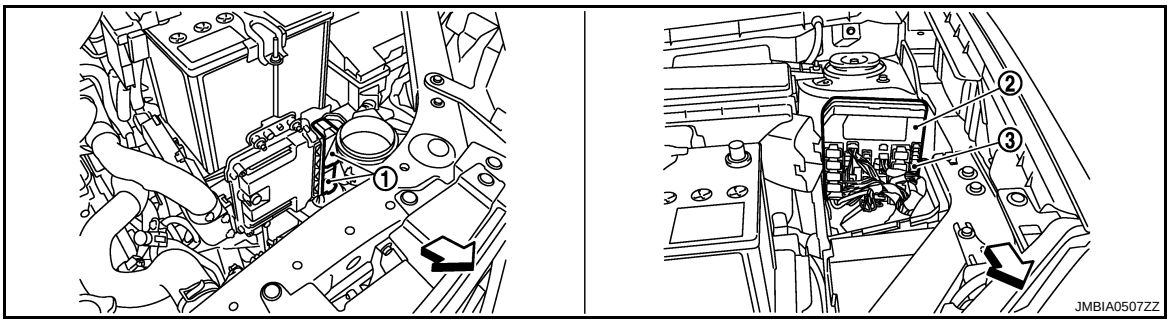
Component Parts Location

INFOID:0000000001528106



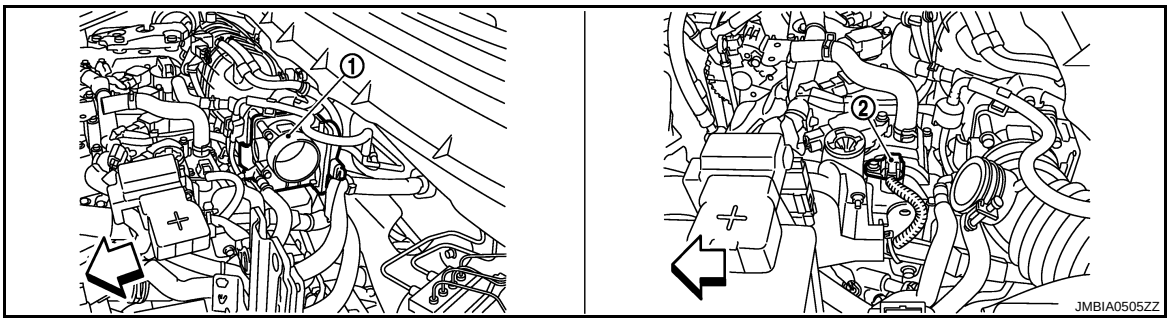
1. Intake valve timing control solenoid valve
2. EVAP canister
3. Ignition coil (with power transistor)
4. Air fuel ratio (A/F) sensor 1
5. Heated oxygen sensor 2
6. Camshaft position sensor (PHASE)

7. Engine coolant temperature sensor
8. Park/neutral position (PNP) switch
9. ECM
10. Refrigerant pressure sensor
11. IPDM E/R
12. Mass air flow sensor (with intake temperature sensor)
13. Crankshaft position sensor (POS)
14. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
15. EVAP canister purge volume control solenoid valve
16. Fuel injector



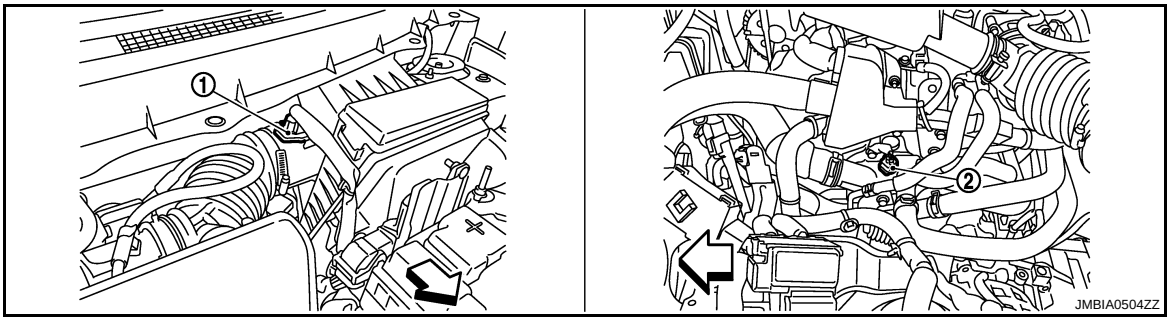
1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

⇦ : Vehicle front



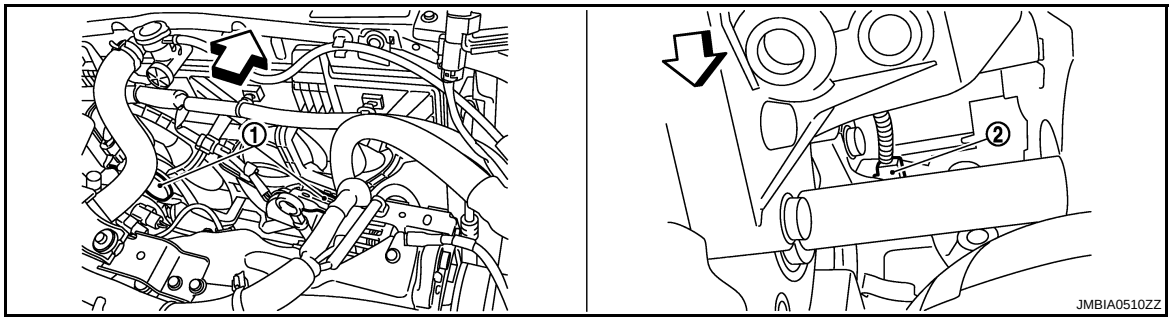
1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Camshaft position sensor (PHASE)

⇦ : Vehicle front



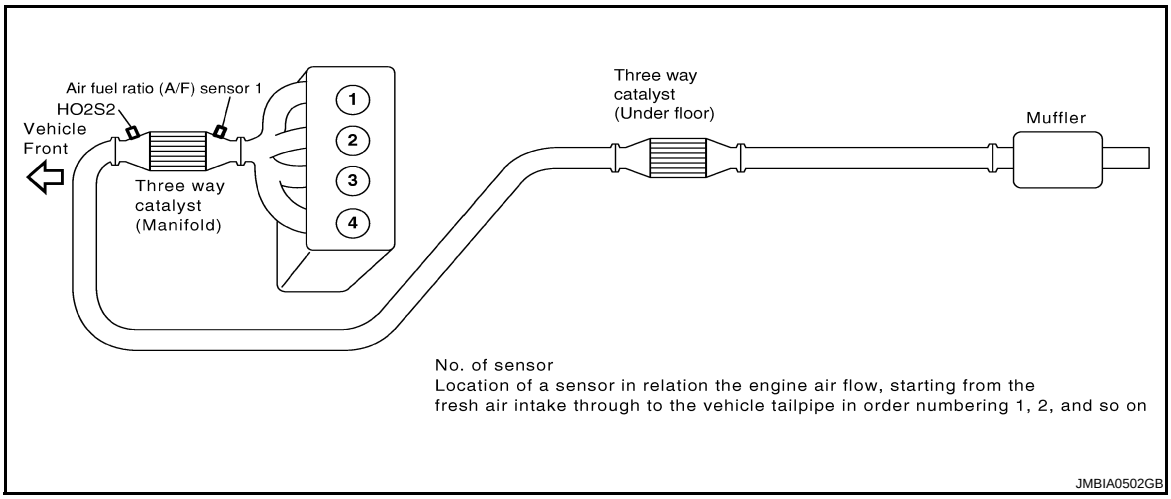
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

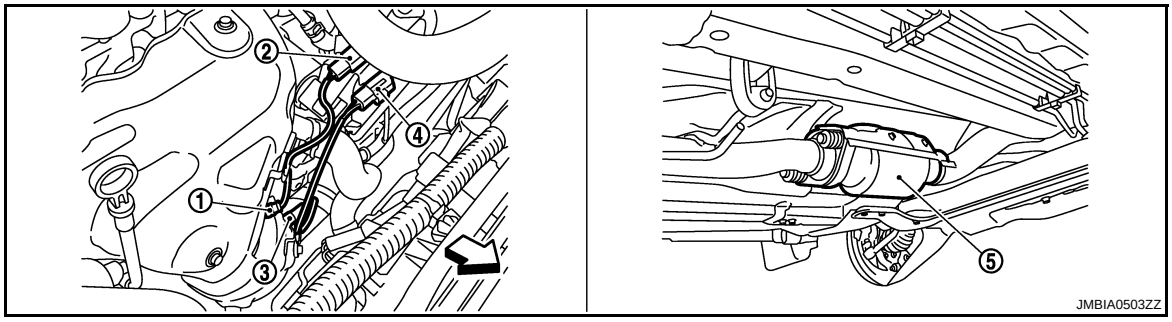
⇦ : Vehicle front



1. Cooling fan motor
2. Crankshaft position sensor (POS)

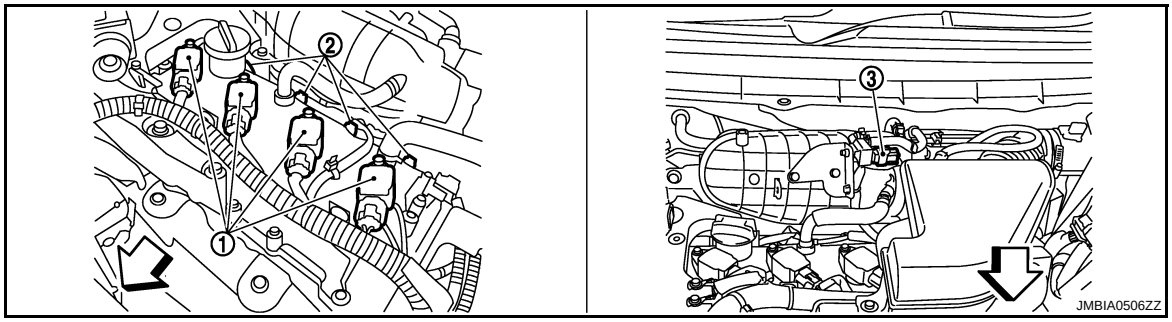
⇦ : Vehicle front





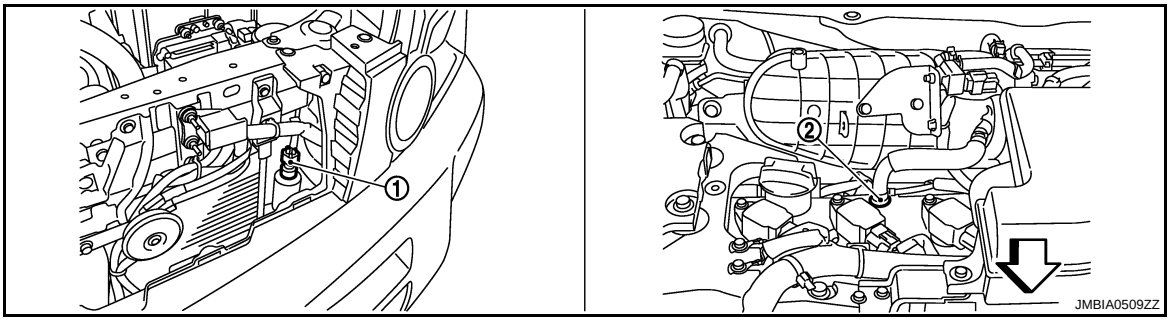
1. Air fuel ratio (A/F) sensor 1
2. Air fuel ratio (A/F) sensor 1 harness connector
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector
5. Three way catalyst (Under floor)

⇦ : Vehicle front



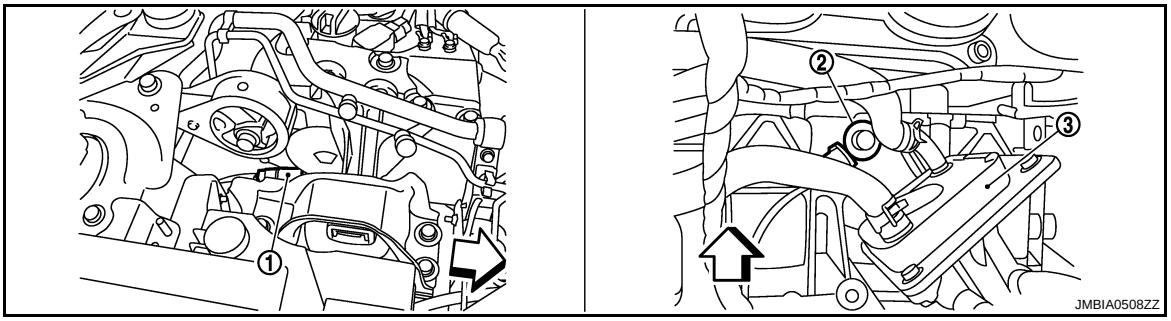
1. Ignition coil (with power transistor) and spark plug
2. Fuel injection
3. EVAP canister purge volume control solenoid valve

⇦ : Vehicle front



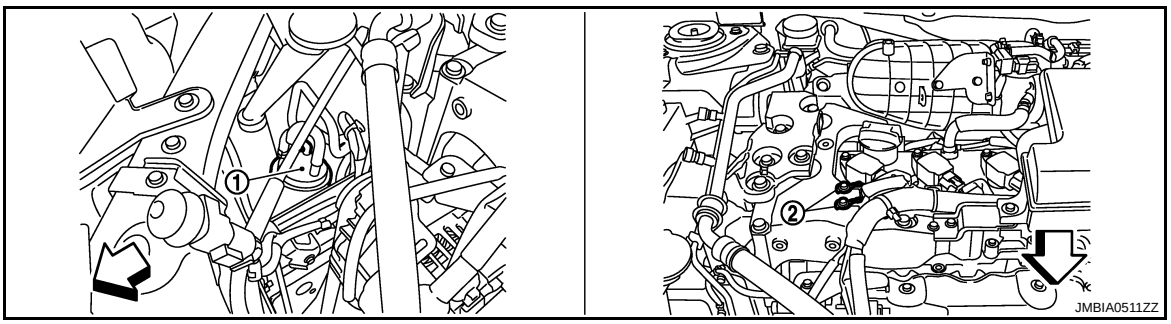
1. Refrigerant pressure sensor
2. PCV valve

⇦ : Vehicle front



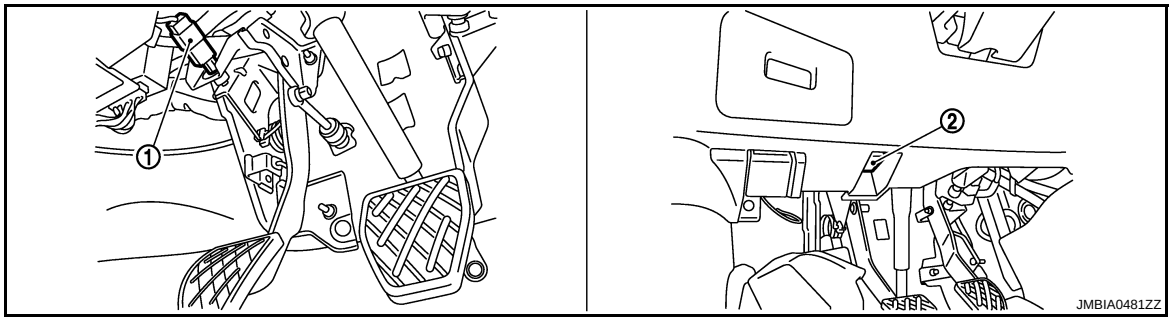
1. Intake valve timing control solenoid valve
2. Knock sensor
3. Engine oil cooler

⇦ : Vehicle front

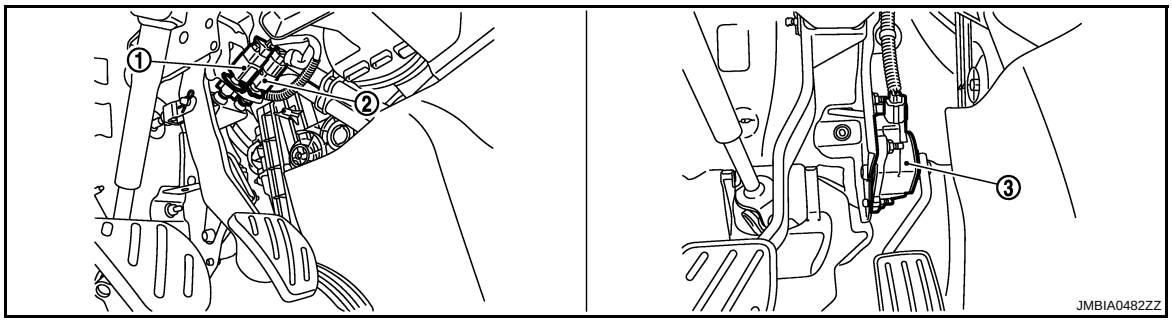


1. EVAP canister
2. Ground

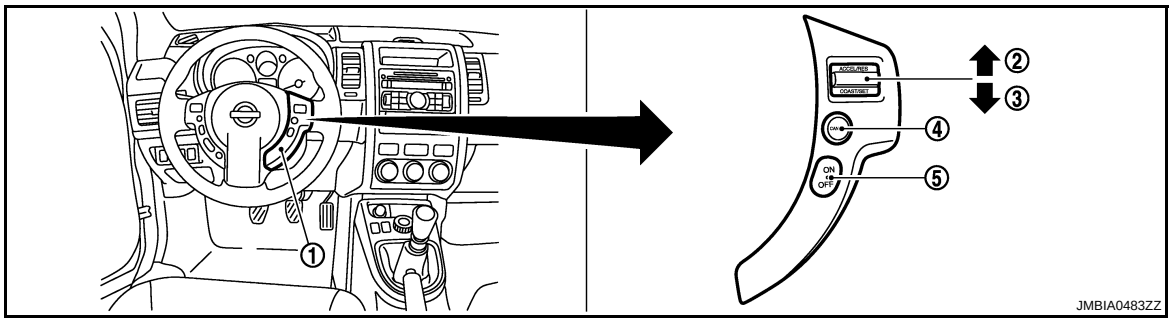
⇦ : Vehicle front



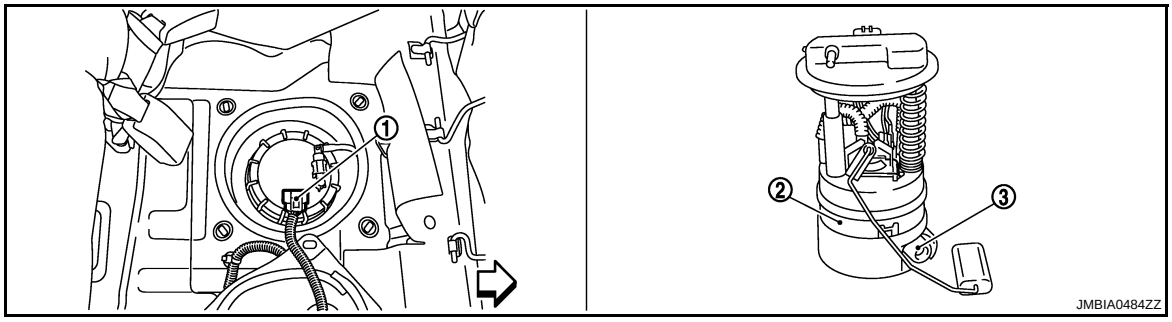
1. ASCD clutch switch
2. Data link connector



1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH



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

⇦ : Vehicle front

Component Description

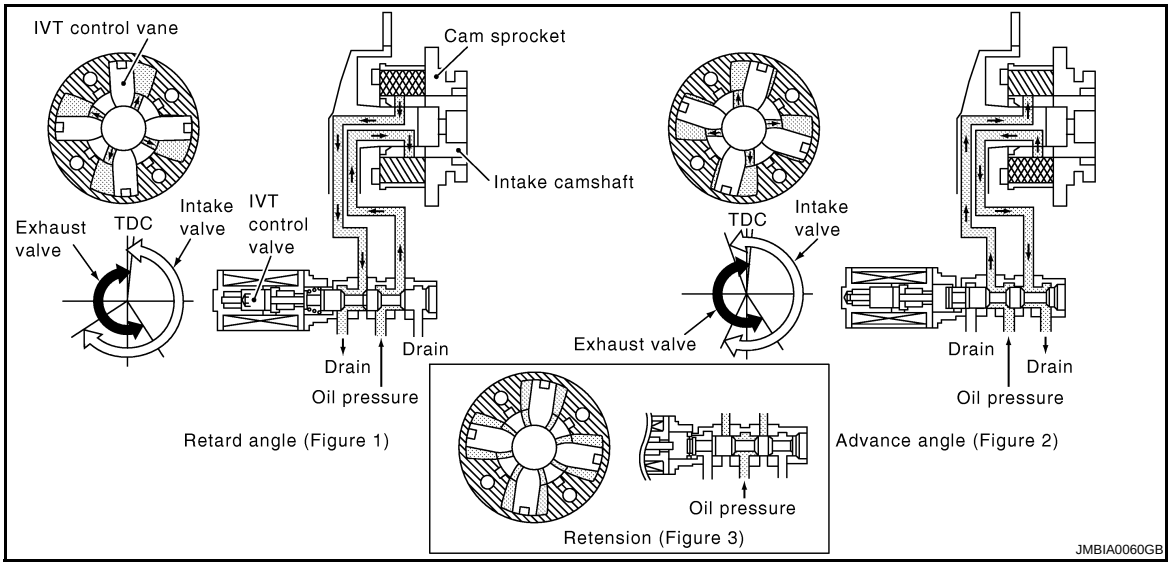
INFOID:0000000001528108

Component	Reference
Accelerator pedal position sensor	ECM-278, "Description"
Camshaft position sensor (PHASE)	ECM-183, "Description"
Crankshaft position sensor (POS)	ECM-179, "Description"
Engine coolant temperature sensor	ECM-122, "Description"
EVAP canister purge volume control solenoid valve	ECM-192, "Description"
Air fuel ratio (A/F) sensor 1	ECM-128, "Description"
Mass air flow sensor	ECM-114, "Description"
Throttle position sensor	ECM-125, "Description"
Vehicle speed sensor	ECM-195, "Description"

INTAKE VALVE TIMING CONTROL

System Diagram

INFOID:0000000001528116



System Description

INFOID:0000000001528117

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 coolant temperature sensor	Engine coolant temperature		

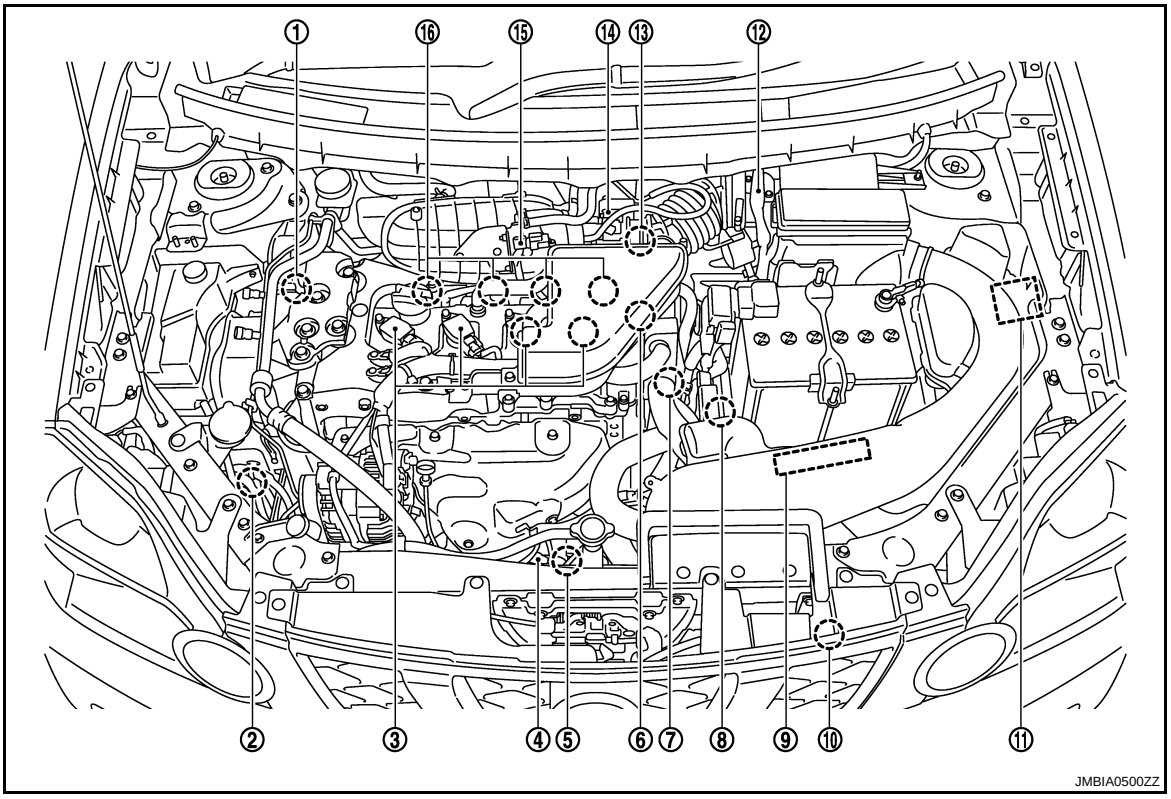
SYSTEM DESCRIPTION

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

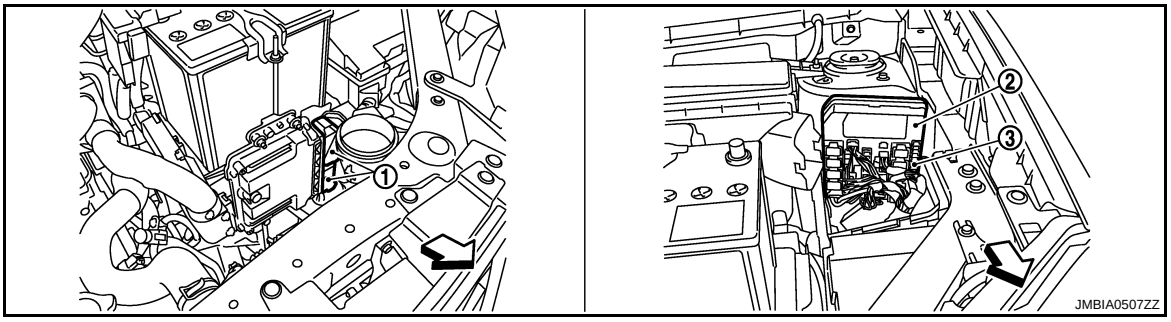
The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing (IVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing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

Component Parts Location

INFOID:0000000001528118

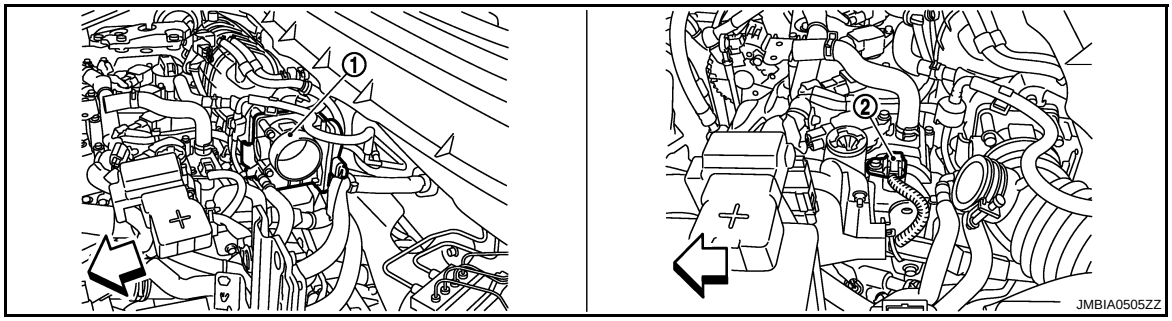


1. Intake valve timing control solenoid valve
2. EVAP canister
3. Ignition coil (with power transistor)
4. Air fuel ratio (A/F) sensor 1
5. Heated oxygen sensor 2
6. Camshaft position sensor (PHASE)
7. Engine coolant temperature sensor
8. Park/neutral position (PNP) switch
9. ECM
10. Refrigerant pressure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



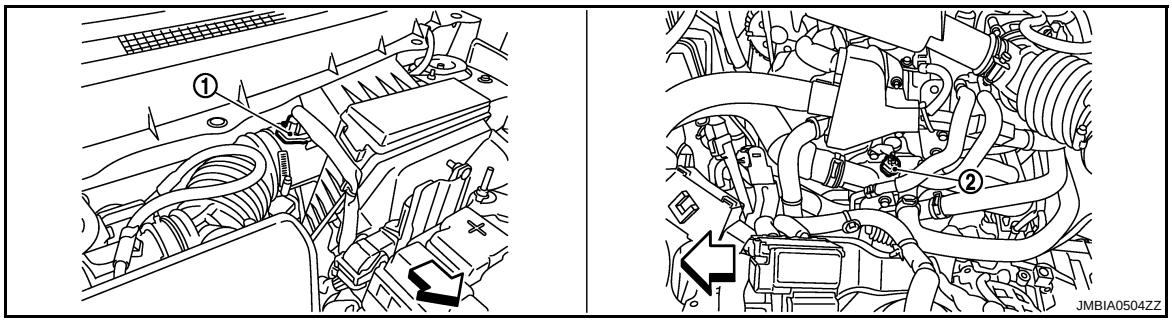
1. ECM
2. IPDM E/R
3. Fuel pump fuse (15A)

⇦ : Vehicle front



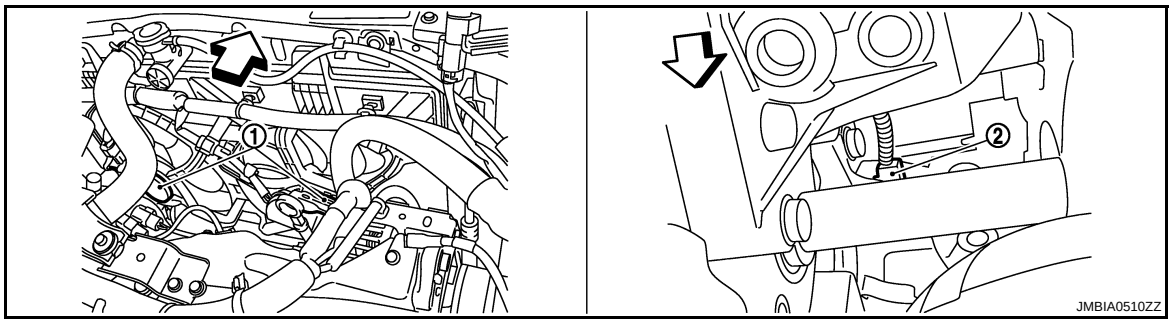
1. Electric throttle control actuator (with built-in position sensor, throttle control motor)
2. Camshaft position sensor (PHASE)

⇦ : Vehicle front



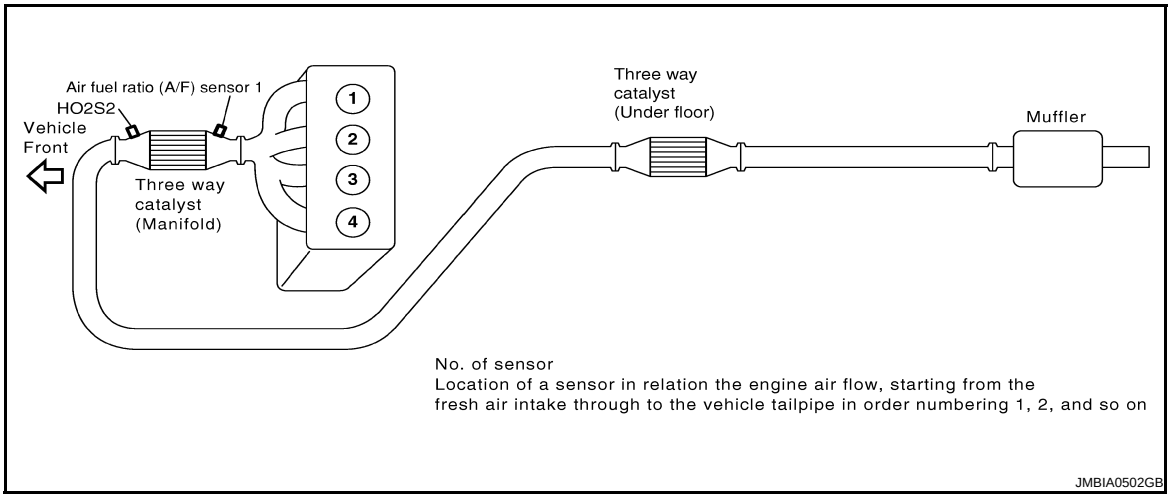
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor

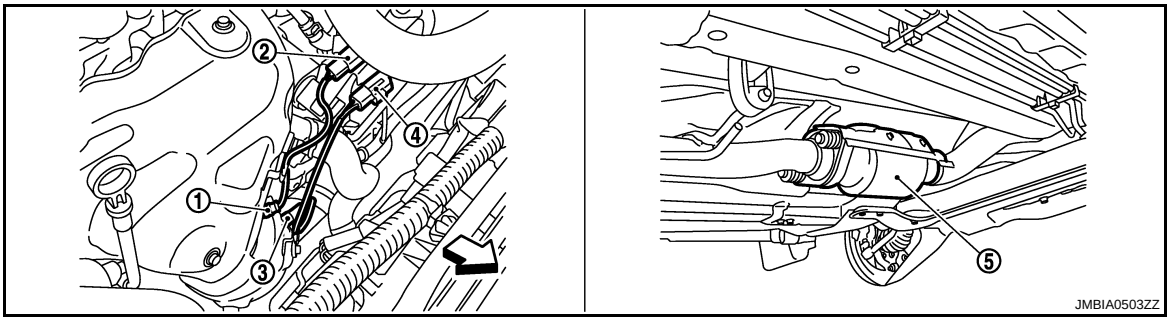
⇦ : Vehicle front



1. Cooling fan motor
2. Crankshaft position sensor (POS)

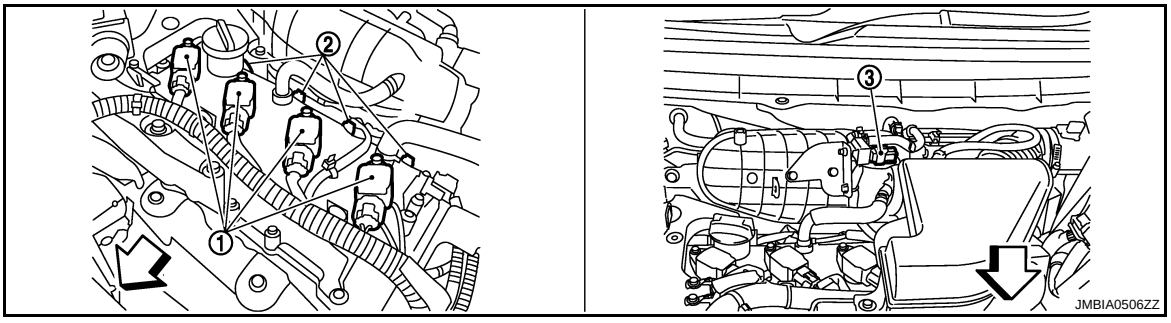
⇦ : Vehicle front





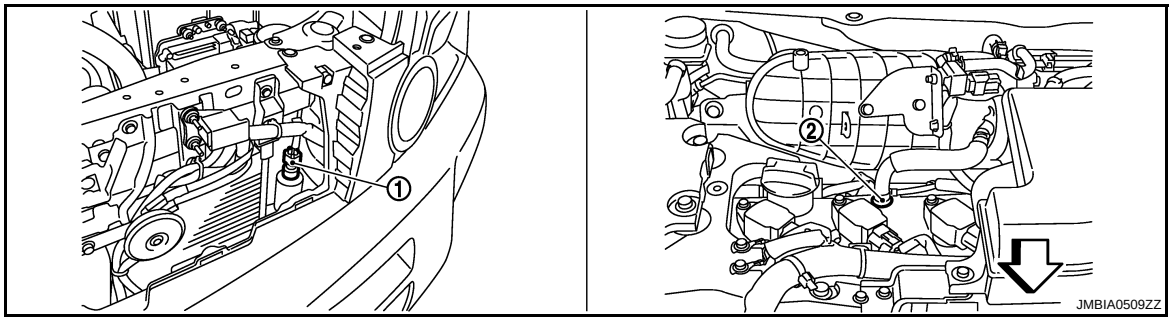
1. Air fuel ratio (A/F) sensor 1
2. Air fuel ratio (A/F) sensor 1 harness connector
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector
5. Three way catalyst (Under floor)

⇦ : Vehicle front



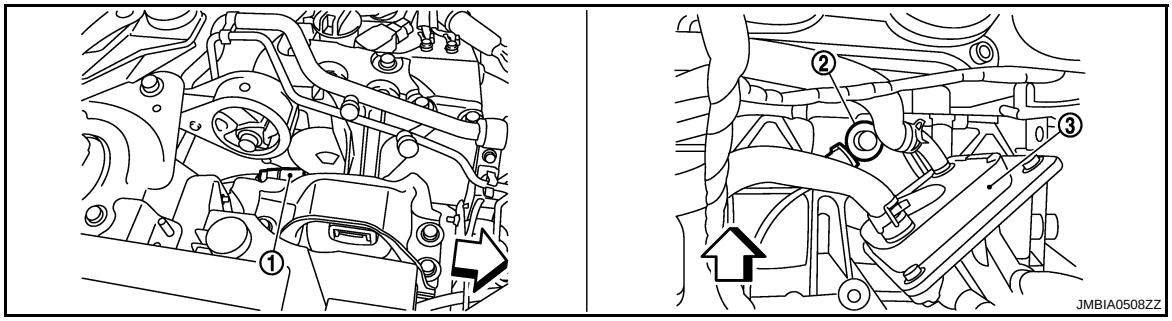
1. Ignition coil (with power transistor) and spark plug
2. Fuel injection
3. EVAP canister purge volume control solenoid valve

⇦ : Vehicle front



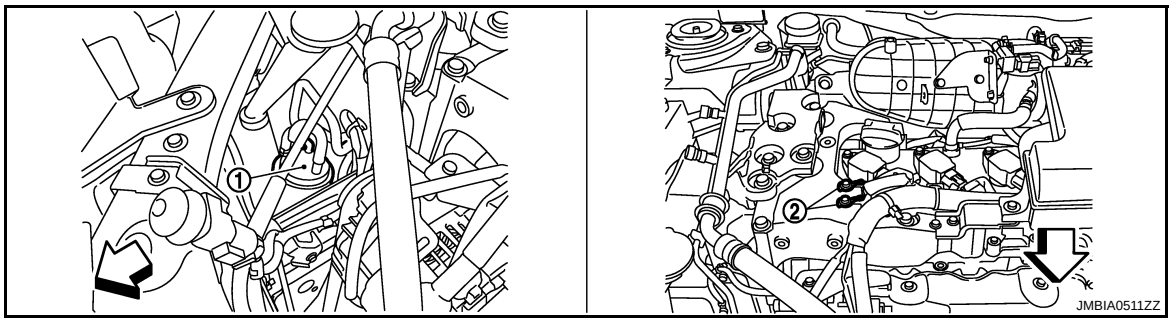
1. Refrigerant pressure sensor 2. PCV valve

⇦ : Vehicle front



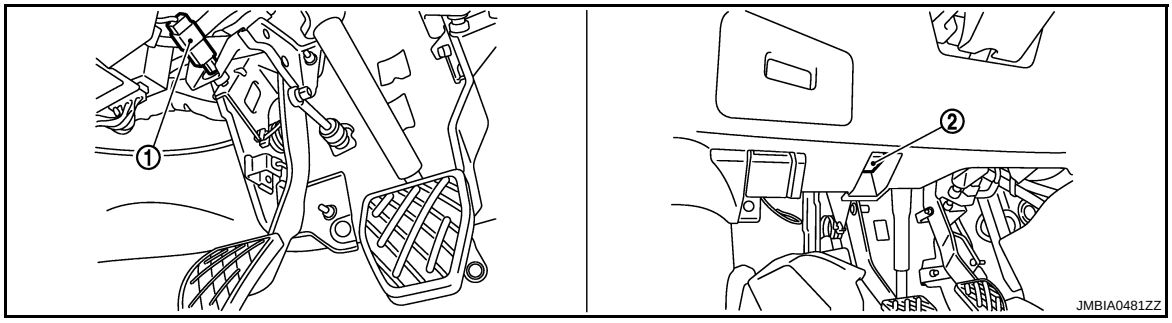
1. Intake valve timing control solenoid valve 2. Knock sensor 3. Engine oil cooler

⇦ : Vehicle front

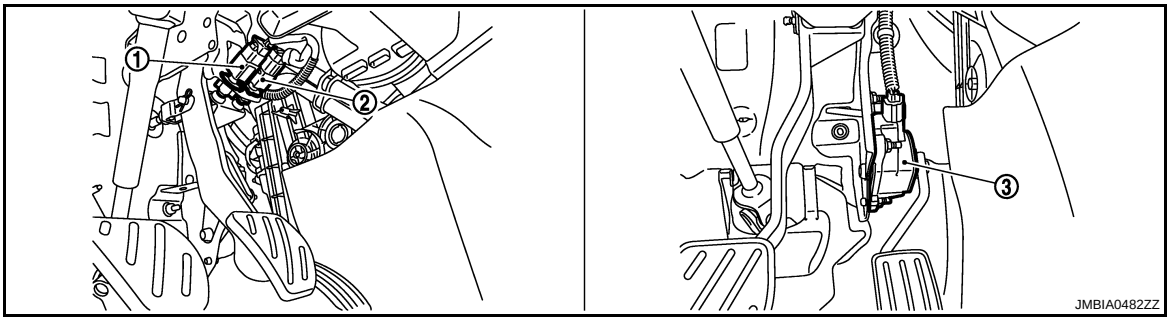


1. EVAP canister 2. Ground

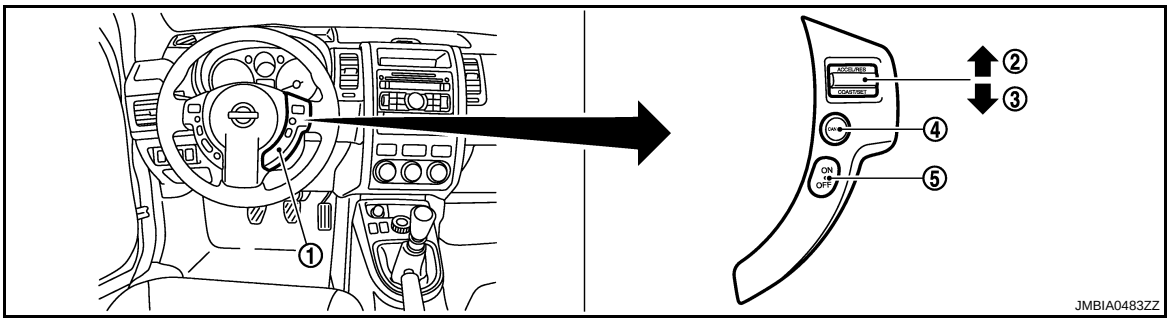
⇦ : Vehicle front



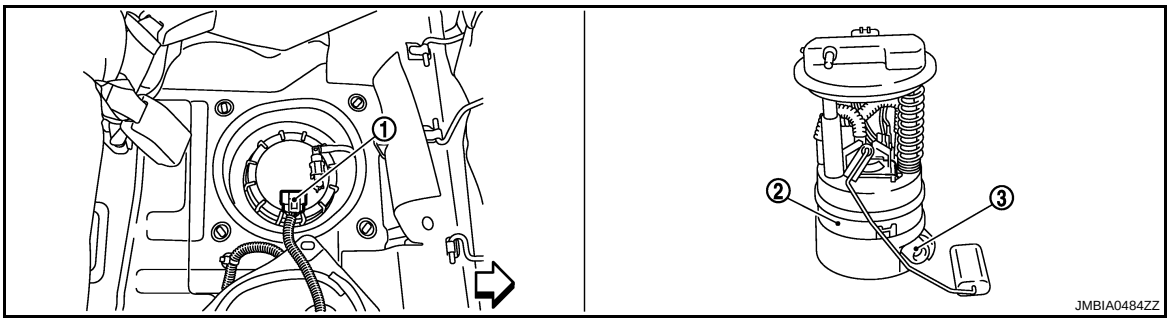
1. ASCD clutch switch 2. Data link connector



1. Stop lamp switch
2. ASCD brake switch
3. Accelerator pedal position sensor



1. ASDC steering switch
2. CANSEL switch
3. RESUME/ACCCELERATE switch
4. SET/COAST switch
5. MAIN SWITCH



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

⇦ : Vehicle front

Component Description

INFOID:0000000001528122

Component	Reference
Camshaft position sensor (PHASE)	ECQ-510, "Description"
Crankshaft position sensor (POS)	ECQ-506, "Description"
Engine coolant temperature sensor	ECQ-475, "Description"
Intake valve timing control solenoid valve	ECQ-422, "System Description"
Vehicle speed sensor	ECQ-517, "Description"

DIAGNOSIS SYSTEM (ECM)

Diagnosis Description

INFOID:0000000001528127

INTRODUCTION

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

Emission-related diagnostic information
Diagnostic Trouble Code (DTC)
Freeze Frame data
1st Trip Diagnostic Trouble Code (1st Trip DTC)
1st Trip Freeze Frame data
Test values and Test limits

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

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data
CONSULT-III	×	×	×	×
ECM	×	×*	—	—

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

The malfunction indicator lamp (MI) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to ECQ-626, "Fail Safe".)

TWO TRIP DETECTION LOGIC

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

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MI lights up. The MI lights up at the same time when the DTC is stored. <2nd trip>

The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MI, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

DTC AND FREEZE FRAME DATA

DTC and 1st Trip DTC

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

If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MI will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MI lights up. In other words, the DTC is stored in the ECM memory and the MI 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 MI during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

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

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 ECQ-359, "Work Flow". Then perform DTC CONFIRMATION PROCEDURE or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

Freeze Frame Data and 1st Trip Freeze Frame Data

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen.
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/MI 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.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”.

How to Read DTC and 1st Trip DTC

With CONSULT-III

CONSULT-III displays the DTC in "SELF-DIAG RESULTS" mode Examples: P0117, P0340, P1217, etc.(CONSULT-III also displays the malfunctioning component or system.)

Without CONSULT-III

The number of blinks of the MI in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0340, 0850, 1148, etc.
These DTCs are controlled by NISSAN.

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

DTC or 1st trip DTC of a malfunction is displayed in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-III. Time data indicates how many times the vehicle was driven after the last detection of a DTC.
If the DTC is being detected currently, the time data will be [0].
If a 1st trip DTC is stored in the ECM, the time data will be [1t].

How to Erase DTC and 1st Trip DTC

With CONSULT-III

The emission related diagnostic information in the ECM can be erased by selecting “All Erase” in the “Description” of “FINAL CHECK” mode with CONSULT-III.

Without CONSULT-III

NOTE:
If the DTC is not for CVT related items (see ECQ-629, "DTC Index"), skip step 2.

1. 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.
2. Perform ECQ-428, "Diagnosis Description". (The DTC in the TCM will be erased.)
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal.

- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- Test values

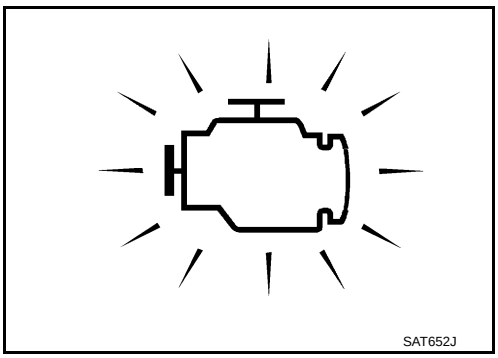
Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

MALFUNCTION INDICATOR LAMP (MI)

Description

The MI is located on the instrument panel.

1. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
   If the MI does not light up, refer to MWI-5, "METER SYSTEM : System Diagram".
2. When the engine is started, the MI should go off.
   If the MI remains on, the on board diagnostic system has detected an engine system malfunction.



On Board Diagnostic System Function

The on board diagnostic system has the following three functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped 	BULB CHECK	This function checks the MI bulb for damage (blown, open circuit, etc.). If the MI does not come on, check MI circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MI will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MI in the 1st trip. • Misfire (Possible three way catalyst damage) • One trip detection diagnoses
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.
	Engine running 	IGNITION TIMING HOLD	Ignition timing will be hold to check ignition timing with a timing light.

Diagnostic Test Mode I — Bulb Check

In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to MWI-5, "METER SYSTEM : System Diagram".

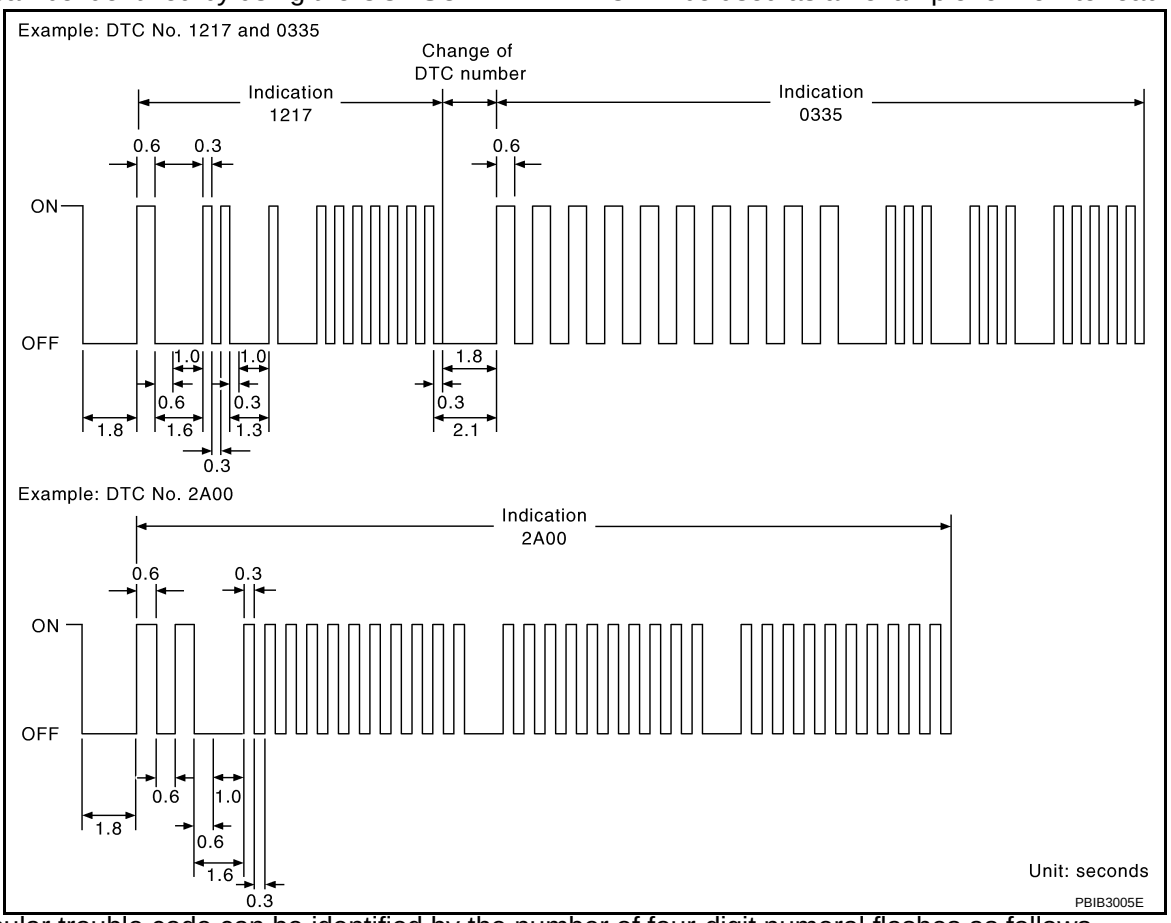
Diagnostic Test Mode I — Malfunction Warning

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

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

Diagnostic Test Mode II — Self-diagnostic Results

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MI as shown below.
The DTC and 1st trip DTC are displayed at the same time. If the MI 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 MI illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT-III . A DTC will be used as an example for how to read a code.



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

Number	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	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-second) - OFF (0.6-second) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-second OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See ECQ-629, "DTC Index")

How to Switch Diagnostic Test Mode

NOTE:

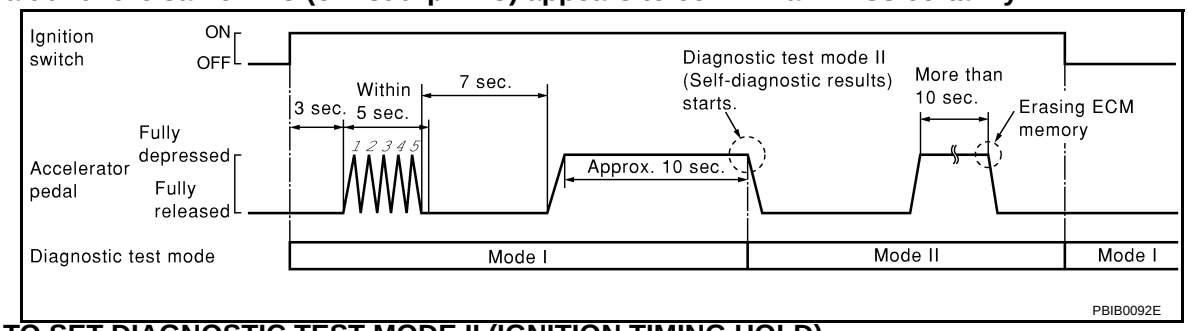
- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.**

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

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.

- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MI starts blinking.
4. Fully release the accelerator pedal.
   ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).
   NOTE:
   Wait until the same DTC (or 1st trip DTC) appears to confirm all DTCs certainly.



HOW TO SET DIAGNOSTIC TEST MODE II (IGNITION TIMING HOLD)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results).
   Refer to “How to Set Diagnostic Test Mode II (Self-diagnostic Results)”.
2. Start Engine.
   ECM has enterd to Diagnostic Test Mode II (Ignition timing hold).

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

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to “How to Set Diagnostic Test Mode II (Self-diagnostic Results)”.
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
   The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

CONSULT-III Function

INFOID:0000000001528128

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-III unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
Active test	Diagnostic Test Mode in which CONSULT-III drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECU part number	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
- Test values

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

Item			DIAGNOSTIC TEST MODE					
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	DATA MONITOR (SPEC)	ACTIVE TEST
				DTC*1	FREEZE FRAME DATA*2			
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		×	×	×	×	
		Camshaft position sensor (PHASE)		×	×	×	×	
		Mass air flow sensor		×		×	×	
		Engine coolant temperature sensor		×	×	×	×	×
		Air fuel ratio (A/F) sensor 1		×		×	×	
		Heated oxygen sensor 2		×		×	×	
		Vehicle speed sensor		×	×	×	×	
		Accelerator pedal position sensor		×		×	×	
		Throttle position sensor		×	×	×	×	
		Intake air temperature sensor		×	×	×	×	
		Knock sensor		×				
		Refrigerant pressure sensor				×	×	
		Closed throttle position switch (accelerator pedal position sensor signal)				×	×	
		Air conditioner switch				×	×	
		Park/neutral position (PNP) switch		×		×	×	
		Stop lamp switch		×		×	×	
		Battery voltage				×	×	
		Load signal				×	×	
		Primary speed sensor		×		×	×	
		Fuel level sensor		×		×	×	
		ASCD steering switch		×		×	×	
		ASCD brake switch		×		×	×	
ENGINE COTNROL COMPONENT PARTS	OUTPUT	Fuel injector				×	×	×
		Power transistor (Ignition timing)				×	×	×
		Throttle control motor relay		×		×	×	
		Throttle control motor		×				
		EVAP canister purge volume control solenoid valve		×		×	×	×
		Air conditioner relay				×	×	
		Fuel pump relay	×			×	×	×
		Cooling fan relay		×		×	×	×
		Air fuel ratio (A/F) sensor 1 heater		×		×	×	
		Heated oxygen sensor 2 heater		×		×	×	
		Intake valve timing control solenoid valve		×		×	×	×
		Alternator				×	×	×
		Calculated load value			×	×	×	

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-III screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to ECQ-428, "Diagnosis Description".

*3: Always “CMPLT” is displayed.

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
SELF-LEARNING CONT	• THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing mixture ratio self-learning value
AP POS LEARN CLR*	—	—
TARGET IGN TIM HLD	Ignition timing will be hold to check ignition timing with timing light.	When checking ignition timing
TARGET IDLE RPM ADJ*	• IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	• IDLE CONDITION	When adjusting target ignition timing

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

SELF-DIAG RESULTS MODE

Self Diagnostic Item
Regarding items of DTC and 1st trip DTC, refer to ECQ-629, "DTC Index".)

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	• The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to ECQ-629, "DTC 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) 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.

Freeze frame data item*	Description
FUEL SYS-B2	• Always a certain value is displayed. • These items are not efficient for L32 models.
L-FUEL TRM-B2 [%]	
S-FUEL TRM-B1 [%]	
INT MANI PRES [kPa]	
FTFMCH1	

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

DATA MONITOR MODE

Monitored Item

×: Applicable

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	• Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	• Accuracy becomes poor if engine speed drops below the idle rpm. • If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1	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	msec	• “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	• When engine is running specification range is indicated in “SPEC”.
A/F ALPHA-B1	%	• 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. • When engine is running specification range is indicated in “SPEC”. • This data also includes the data for the air-fuel ratio learning control.
A/F LEARN-B1	%	• The mean value of the air-fuel ratio feedback learning 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.
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 displayed.	• ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2			

Monitored item	Unit	Description	Remarks
TP SEN 1-B1 TP SEN 2-B1	V	• The throttle position sensor signal voltage is displayed.	• TP SEN 2-B1 signal is converted 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 signal.	
AIR COND SIG	ON/OFF	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW	ON/OFF	• Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
LOAD SIGNAL	ON/OFF	• Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW	ON/OFF	• Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW	ON/OFF	• Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW	ON/OFF	• Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1	msec	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
IGN TIMING	BTDC	• Indicates the ignition timing computed by ECM according to the input signals.	• When the engine is stopped, a certain value is indicated.
CAL/LD VALUE	%	• “Calculated load value” indicates the value of the current air flow divided by peak air flow.	
MASS AIRFLOW	g·m/s	• Indicates the mass air flow computed by ECM 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.	

Monitored item	Unit	Description	Remarks
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.	
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 turbine revolution sensor signal.	
VEHICLE SPEED	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
TRVL AFTER MIL	km or mile	• Distance traveled while MI 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.	
AC PRESS SEN	V	• The signal voltage from the refrigerant pressure sensor is displayed.	
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
Voltage	V	• Voltage, frequency, duty cycle or pulse width measured by the probe.	• Only "#" is displayed if item is unable to be measured. • Figures with "#"s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.
Frequency	msec, Hz or %		
DUTY-HI	—		
DUTY-LOW			
PLS WIDTH-HI			
PLS WIDTH-LOW			

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	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Fuel injector • Air fuel ratio (A/F) sensor 1
IGNITION TIMING	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch OFF • Shift lever: P or N (CVT), Neutral (M/T) • Cut off each fuel injector signal one at a time using CONSULT-III.	Engine runs rough or dies.	• Harness and connectors • Compression • Fuel injector • Power transistor • Spark plug • Ignition coil
COOLING FAN*	• Ignition switch: ON • Turn the cooling fan “LOW”, “HI” and “OFF” CONSULT-III.	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 temperature using CONSULT-III.	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-III and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connectors • Fuel pump relay
PURG VOL CONT/V	• Engine: After warming up, run engine at 1,500 rpm. • Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-III.	Engine speed changes according to the opening percent.	• Harness and connectors • Solenoid valve
FUEL/T TEMP SEN	• Change the fuel tank temperature using CONSULT-III.		
VENT CONTROL/V	• Ignition switch: ON (Engine stopped) • Turn solenoid valve “ON” and “OFF” with the CONSULT-III and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connectors • Solenoid valve
V/T ASSIGN ANGLE	• Engine: Return to the original trouble condition • Change intake valve timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Intake valve timing control solenoid valve
ALTERNATOR DUTY	• Engine: Idle • Change duty ratio using CONSULT-III.	Battery voltage changes.	• Harness and connectors • IPDM E/R • Alternator

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

COMPONENT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000001528130

The specification (SP) value indicates the tolerance of the value that is displayed in “SPEC” of “DATA MONITOR” mode of CONSULT-III during normal operation of the Engine Control System. When the value in “SPEC” of “DATA MONITOR” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “SPEC” of “DATA MONITOR” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MI.
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:0000000001528131

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/cm^2, 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*
- Engine speed: Idle

*: Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

>> GO TO 2.

2. PERFORM “SPEC” OF “DATA MONITOR” MODE

With CONSULT-III
NOTE:
Perform “SPEC” in “DATA MONITOR” mode in maximum scale display.
1. Perform ECQ-20, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Perform ECQ-14, "BASIC INSPECTION : Special Repair Requirement".
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR”
4. Make sure that monitor items are within the SP value.

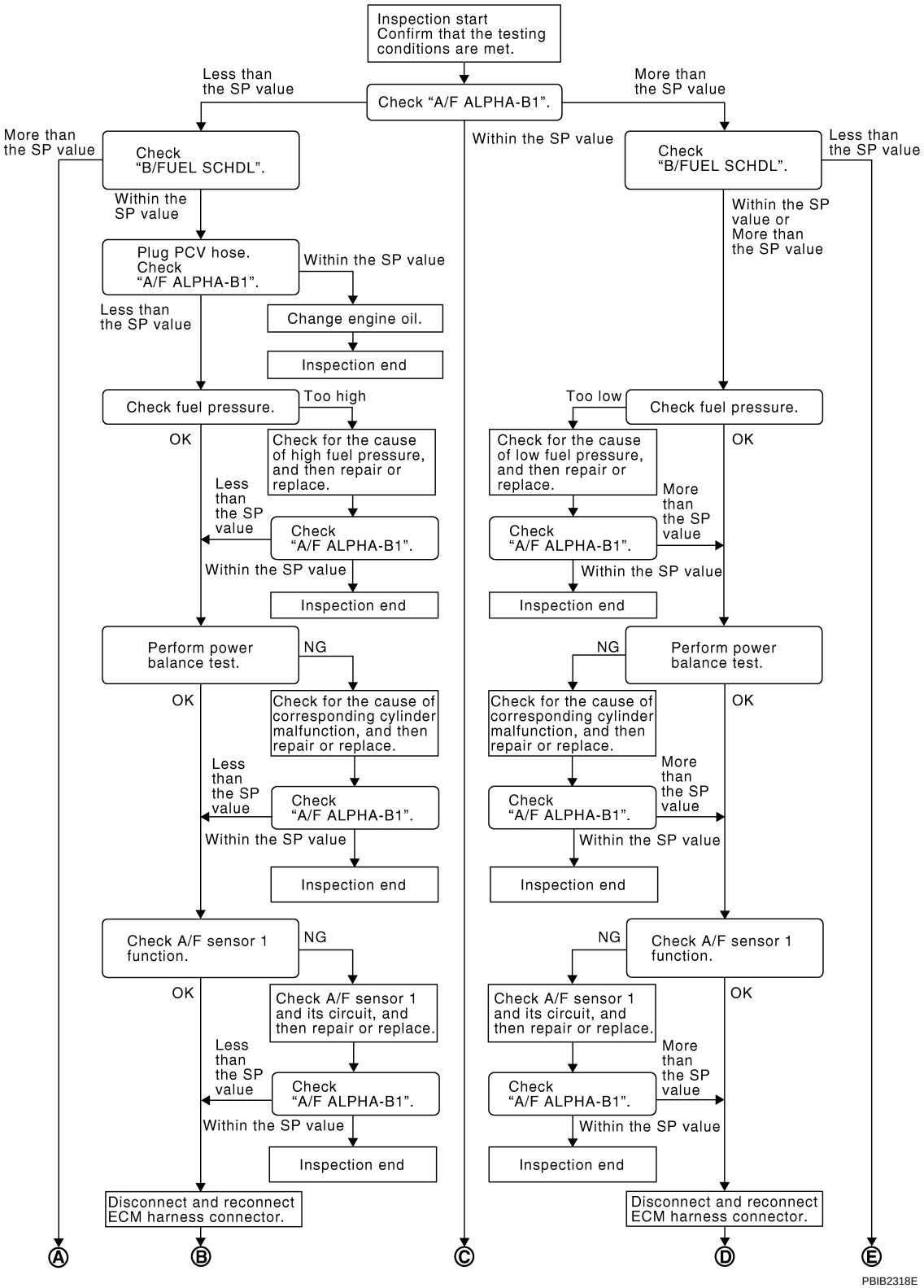
Is the inspection result normal?

YES >> END
NO >> Go to ECQ-440, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001528132

OVERALL SEQUENCE



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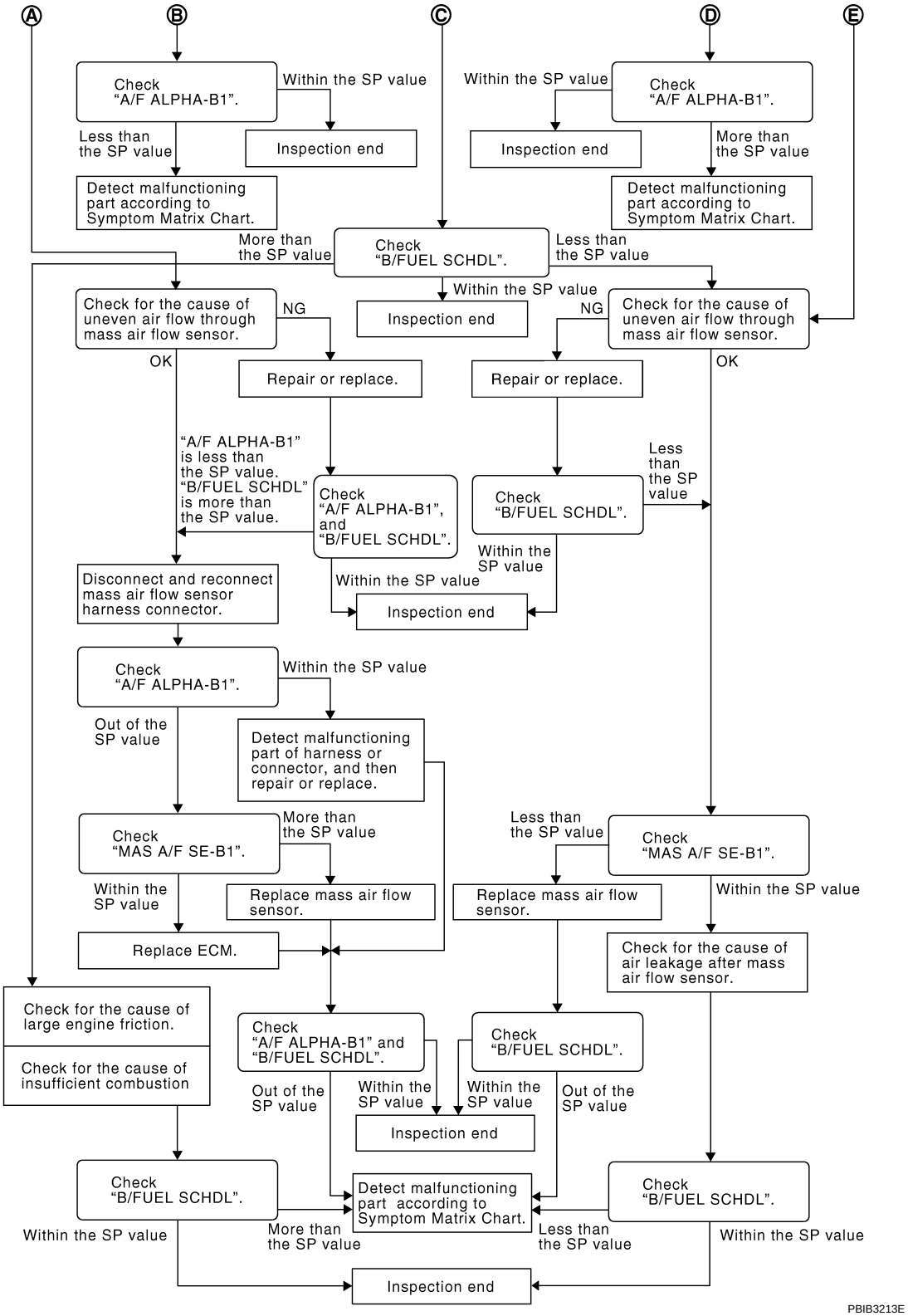


DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1"

With CONSULT-III

1. Start engine.
2. Confirm that the testing conditions are met. Refer to ECQ-439, "Component Function Check".
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the each indication is within the SP value.

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

Is the measurement value within the SP value?

YES >> GO TO 17.
NO-1 >> Less than the SP value: GO TO 2.
NO-2 >> More than the SP value: GO TO 3.

2. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is 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”

1. Stop the engine.
2. Disconnect PCV hose, and then plug it.
3. Start engine.
4. 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.
2. Change engine oil.

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

>> **INSPECTION END**

6. CHECK FUEL PRESSURE

Check fuel pressure. (Refer to ECQ-642, "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”

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 >> GO TO 9.

9. PERFORM POWER BALANCE TEST

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

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.
1. Ignition coil and its circuit (Refer to ECQ-536, "Component Function Check".)
2. Fuel injector and its circuit (Refer to ECQ-498, "Component Inspection".)
3. Intake air leakage
4. Low compression pressure (Refer to EM-146, "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”

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 >> 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 ECQ-484, "DTC Logic".
- For DTC P0131, refer to ECQ-487, "DTC Logic".
- For DTC P0132, refer to ECQ-490, "DTC Logic".

Is any DTC detected?

YES >> GO TO 15.
NO >> GO TO 13.

13. CHECK A/F SENSOR 1 CIRCUIT

Perform DIAGNOSTIC PROCEDURE according to corresponding DTC.

>> GO TO 14.

14. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 15.

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

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

>> GO TO 16.

16. CHECK “A/F ALPHA-B1”

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 ECQ-631, "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 the each indication is within the SP value.

Is the measurement value within the SP value?

YES >> **INSPECTION END**
NO >> “B/FUEL SCHDL” is more, “A/F ALPHA-B1” is less than the SP value: GO TO 21.

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

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

>> GO TO 22.

22. 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 >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to ECQ-462, "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.
2. Go to ECQ-366, "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
- 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 the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to ECQ-631, "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 ECQ-631, "Symptom Table".

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000001528133

1.INSPECTION START

Start engine.

Is engine running?

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

2.CHECK GROUND CONNECTION-I

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace ground connection.

3.CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF and then ON.
2. Check the voltage between ECM connector terminals as follows.

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
E19	89	F43	5	Battery voltage
		E19	118	
			119	
			120	
			121	

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 4.

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

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

ECM		Ground	Continuity
Connector	Terminal		
F43	5	Ground	Existed
E19	118		
	119		
	120		
	121		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 6.

5.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R harness connector E15
- 20A 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.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F121, E7
- Harness for open or short between ECM and ground

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

7. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connectors.
2. Turn ignition switch ON.
3. Check the voltage between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Voltage
Connector	Terminal		
E15	48	Ground	Battery voltage

Is the inspection result normal?

YES >> Go to ECQ-537, "Diagnosis Procedure".
NO >> GO TO 8.

8. CHECK ECM POWER SUPPLY CIRCUIT-III

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

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
E19	115	E19	121	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.

Is the inspection result normal?

YES >> GO TO 14.
NO-1 >> Battery voltage does not exist: GO TO 9.
NO-2 >> Battery voltage exists for more than a few seconds: GO TO 12.

9. CHECK ECM POWER SUPPLY CIRCUIT-IV

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

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F43	20	F19	121	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 12.

10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E15.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E19	115	E15	48	Existed

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

Is the inspection result normal?

YES >> GO TO 17.
NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connectors E7, F121
- Harness for open or short between ECM and IPDM E/R

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

12. CHECK ECM POWER SUPPLY CIRCUIT-VI

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E15.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F43	20	E15	51	Existed

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

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair open circuit or short to ground or short power in harness or connectors.

13. CHECK 20A FUSE

1. Disconnect 20A fuse (No. 62) from IPDM E/R.
2. Check 20A fuse.

Is the inspection result normal?

YES >> GO TO 17.
NO >> Replace 20A fuse.

14. CHECK GROUND CONNECTION-II

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair or replace ground connection.

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

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

ECM		Ground	Continuity
Connector	Terminal		
F43	12	Ground	Existed
E19	118		
	119		
	120		
	121		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 17.
NO >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors F121, E7
- Harness for open or short between ECM and ground

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

17. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair open circuit or short to power in harness or connectors.

U1000, U1001 CAN COMM CIRCUIT

Description

INFOID:0000000001528134

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:0000000001528135

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000	CAN communication line	When ECM is not transmitting or receiving CAN communication signal of OBD (emission related diagnosis) for 2 seconds or more.	• Harness or connectors (CAN communication line is open or shorted)
U1001		When ECM is not transmitting or receiving CAN communication signal other than OBD (emission related diagnosis) for 2 seconds or more.	

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> ECQ-451, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528136

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

U1010 CONTROL UNIT (CAN)

Description

INFOID:0000000001528137

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:0000000001528138

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1010	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 ECQ-452, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528139

1.INSPECTION START

With CONSULT-III

1. Turn ignition switch ON.
2. Select “SELF-DIAG RESULTS” mode with CONSULT-III.
3. Touch “ERASE”.
4. Perform DTC CONFIRMATION PROCEDURE.
   See ECQ-452, "DTC Logic".
5. Check DTC.

Without CONSULT-III

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.
3. Perform DTC CONFIRMATION PROCEDURE.
   See ECQ-452, "DTC Logic".
4. Check DTC.

Is the DTC U1010 displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to ECQ-366, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

P0011 IVT CONTROL

DTC Logic

INFOID:0000000001528140

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	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.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Let it idle for 1 minute.
4. Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	More than 1,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 3.5 msec

5. Repeat the following procedure more than 6 times.
   -Slightly depressed the accelerator pedal for 5 seconds.
   -Fully released the accelerator pedal for 5 seconds.
6. Stop vehicle with engine running and let engine idle for 10 seconds.
7. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-454, "Diagnosis Procedure"
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT-III

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

ENG SPEED	More than 3,600 rpm
COOLAN TEMP/S	More than 70°C (221°F)
Shift lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:
Always drive at a safe speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

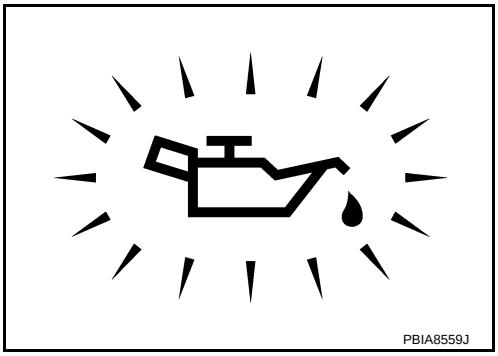
YES >> Go to ECQ-454, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528141

1.CHECK OIL PRESSURE WARNING LAMP

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


PBIA8559J

Is oil pressure warning lamp illuminated?

YES >> Go to LU-16, "Inspection".
NO >> GO TO 2.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to ECQ-455, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace intake valve timing control solenoid valve.

3.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to ECQ-509, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace crankshaft position sensor (POS).

4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to ECQ-513, "Component Inspection".

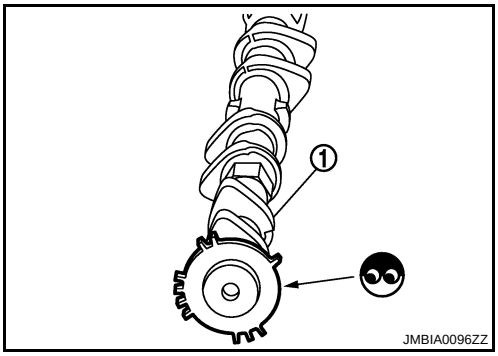
Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace camshaft position sensor (PHASE).

5.CHECK CAMSHAFT (INTAKE)

Check the following.

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



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Is the inspection result normal?

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

6.CHECK TIMING CHAIN INSTALLATION

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

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

YES >> Check timing chain installation. Refer to EM-148, "Removal and Installation".

NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to EM-175, "Inspection".

Is the inspection result normal?

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

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001528142

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

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

Terminals	Resistance
1 and 2	7.0 - 7.5Ω [at 20°C (68°F)]
1 or 2 and ground	∞Ω (Continuity should not exist)

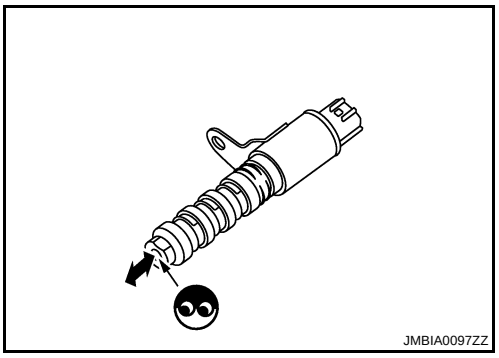
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace intake valve timing control solenoid valve.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

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

CAUTION:
Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.
NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace intake valve timing control solenoid valve.

P0031 A/F SENSOR 1 HEATER

Description

INFOID:0000000001528143

SYSTEM DESCRIPTION

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

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:0000000001528144

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

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 11V 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 ECQ-456, "Diagnosis Procedure".
NG >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528145

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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.
3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F27	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 E6,F123
- IPDM E/R harness connector E14
- 15A fuse (No. 63)
- 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	
F27	3	F43	4	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 A/F SENSOR 1 HEATER

Refer to ECQ-457, "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 air fuel ratio (A/F) sensor 1.

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

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Perform GI-39, "Intermittent Incident".

>> Repair or replace.

Component Inspection

INFOID:000000001528146

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

1. Turn ignition switch OFF.

2. Disconnect A/F sensor 1 harness connector.
3. Check resistance between A/F sensor 1 terminals as follows.

Terminals	Resistance
3 and 4	1.98 - 2.66 Ω [at 25°C (77°F)]
3 and 1, 2	∞Ω (Continuity should not exist)
4 and 1, 2	

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

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

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

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

P0036, P0037, P0038 HO2S2 HEATER

Description

INFOID:0000000001528147

SYSTEM DESCRIPTION

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

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

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
For 2 minutes after starting engine	OFF
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

INFOID:0000000001528148

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0036	Heated oxygen sensor 2 heater control circuit	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An improper 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.) • Heated oxygen sensor 2 heater
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 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 11V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. 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.

Is 1st tip DTC detected?

YES >> Go to ECQ-460, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528149

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK HO2S2 POWER SUPPLY CIRCUIT

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

HO2S2		Ground	Voltage
Connector	Terminal		
F31	2	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R connector E14
- 15A fuse (No. 63)
- Harness for open or short between heated oxygen sensor 2 and fuse

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

4.CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	3	F43	39	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 ECQ-461, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001528150

1. CHECK HEATED OXYGEN SENSOR 2 HEATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Check resistance between HO2S2 terminals as follows.

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

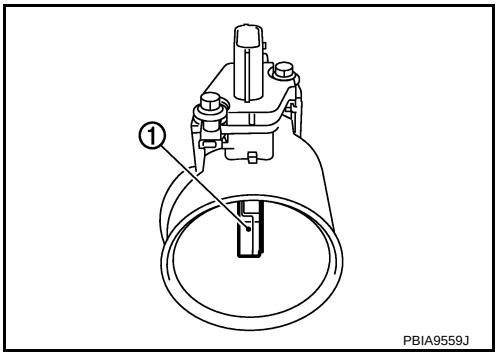
>> INSPECTION END

P0101 MAF SENSOR

Description

INFOID:0000000001528159

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



DTC Logic

INFOID:0000000001528160

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0101	Mass air flow sensor circuit range/performance	The sensor voltage is out of the range calcurated by the ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow 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.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

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

Is DTC detected?

YES >> Go to ECQ-121, "Diagnosis Procedure".
NO >> INSPECTION END.

Diagnosis Procedure

INFOID:0000000001528162

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 E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace ground connection.

3. 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		
E18	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 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.

5. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	4	F43	51	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.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	3	F43	73	Existed

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

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK INTAKE AIR TEMPERATURE SENSOR

Check intake air temperature sensor.
Refer to ECQ-473, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace mass air flow sensor (with intake air temperature sensor).

8.CHECK MASS AIR FLOW SENSOR

Refer to ECQ-464, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace mass air flow sensor.

9.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001528163

1.CHECK MASS AIR FLOW SENSOR-I

With CONSULT-III

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

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.2V
	Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

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

Without CONSULT-III

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

(+)		(–)		Condition	Voltage
Connec-tor	Terminal	Connec-tor	Terminal		
F43	73 (MAF sensor signal)	F43	51	Ignition switch ON (Engine stopped.)	Approx. 0.4V
				Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.2V
				Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*

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

Is the inspection result normal?

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

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

1. Turn ignition switch OFF.
2. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.

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

Is the inspection result normal?

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

3. CHECK MASS AIR FLOW SENSOR-II

With CONSULT-III

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

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.2V
	Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*

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

Without CONSULT-III

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

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	73 (MAF sensor signal)	F43	51	Ignition switch ON (Engine stopped.)	Approx. 0.4V
				Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
				Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

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

Is the inspection result normal?

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

4. CHECK MASS AIR FLOW SENSOR-III

With CONSULT-III

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

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.7V
	Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

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

Without CONSULT-III

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

(+)		(–)		Condition	Voltage
Connec-tor	Terminal	Connec-tor	Terminal		
F43	73 (MAF sensor signal)	F43	51	Ignition switch ON (Engine stopped.)	Approx. 0.4V
				Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.2V
				Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

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

Is the inspection result normal?

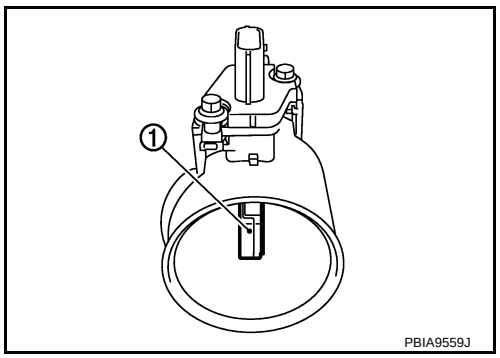
YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor.

P0102, P0103 MAF SENSOR

Description

INFOID:0000000001528164

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



DTC Logic

INFOID:0000000001528165

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

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

Is DTC detected?

YES >> Go to ECQ-467, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528166

1.INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

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

2.CHECK INTAKE SYSTEM

Check the following for connection.
• Air duct

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

Is the inspection result normal?

YES >> GO TO 3.
NO >> Reconnect the parts.

3.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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		
E18	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 for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and IPDM E/R

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

6.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	4	F43	51	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

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	3	F43	73	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 ECQ-469, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace mass air flow sensor.

9.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001528167

1.CHECK MASS AIR FLOW SENSOR-I

With CONSULT-III

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

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.2V
	Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*

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

Without CONSULT-III

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

(+)		(–)		Condition	Voltage
Connec-tor	Terminal	Connec-tor	Terminal		
F43	73 (MAF sensor signal)	F43	51	Ignition switch ON (Engine stopped.)	Approx. 0.4V
				Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.2V
				Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*

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

Is the inspection result normal?

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

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

1. Turn ignition switch OFF.
2. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. CHECK MASS AIR FLOW SENSOR-II

With CONSULT-III

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

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.2V
	Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*

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

Without CONSULT-III

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

(+)		(–)		Condition	Voltage
Connec-tor	Terminal	Connec-tor	Terminal		
F43	73 (MAF sensor signal)	F43	51	Ignition switch ON (Engine stopped.)	Approx. 0.4V
				Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.2V
				Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*

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

Is the inspection result normal?

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

4. CHECK MASS AIR FLOW SENSOR-III

With CONSULT-III

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

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4V
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.2V
	Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*

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

Without CONSULT-III

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

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	73 (MAF sensor signal)	F43	51	Ignition switch ON (Engine stopped.)	Approx. 0.4V
				Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
				Idle to about 4,000 rpm	0.9 - 1.2V to Approx. 2.4V*

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

Is the inspection result normal?

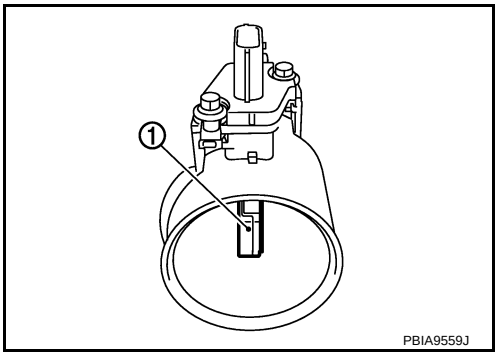
YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor.

P0112, P0113 IAT SENSOR

Description

INFOID:0000000001528168

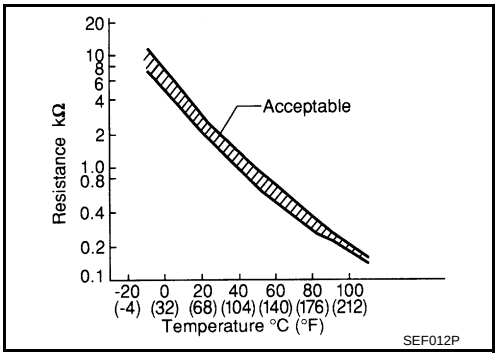
The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

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

*: These data are reference values and are measured between ECM terminals 67 (Intake air temperature sensor) and 48.



DTC Logic

INFOID:0000000001528169

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.) • Intake air temperature sensor
P0113	Intake air 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

1. Start engine and run it for 5 minutes at idle speed.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-473, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528170

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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

MAF sensor		Ground	Voltage
Connector	Terminal		
E18	2	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

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

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E18	1	F43	48	Existed

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to ECQ-473, "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-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001528171

1.CHECK INTAKE AIR TEMPERATURE SENSOR

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

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

Is the inspection result normal?

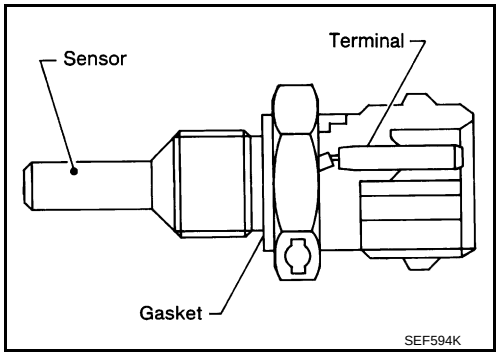
YES >> INSPECTION END
NO >> Replace mass air flow sensor (with intake air temperature sensor).

P0117, P0118 ECT SENSOR

Description

INFOID:0000000001528172

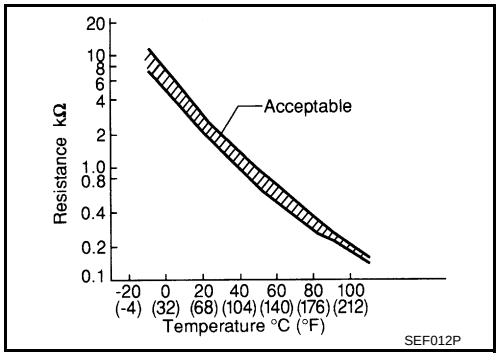
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

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

*: These data are reference values and are measured between ECM terminals 75 (Engine coolant temperature sensor) and 56.



DTC Logic

INFOID:0000000001528173

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.) • Engine coolant temperature sensor
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

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Turn ignition switch ON and wait at least 5 seconds.
4. Check DTC.

Is DTC detected?

YES >> Go to ECQ-476, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528174

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT

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

ECT sensor		Ground	Voltage
Connector	Terminal		
F80	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

ECT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F80	2	F43	56	Existed

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to ECQ-476, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace engine coolant temperature sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

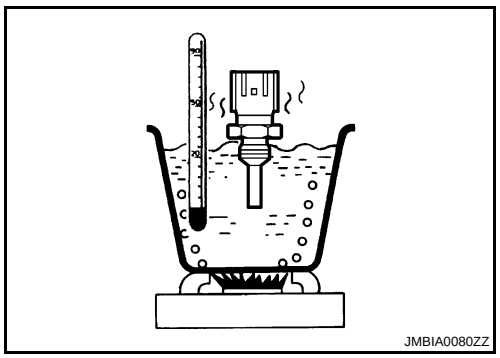
Component Inspection

INFOID:0000000001528175

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Remove engine coolant temperature sensor.

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



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

Is the inspection result normal?

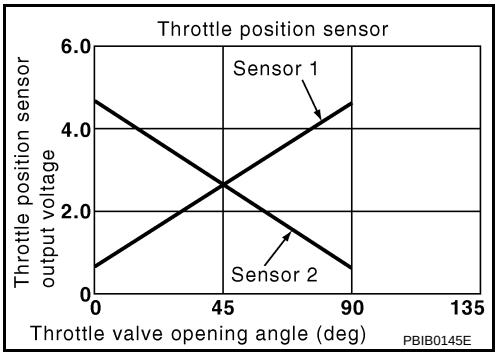
YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor.

P0122, P0123 TP SENSOR

Description

INFOID:0000000001528176

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001528177

DTC DETECTION 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.) (APP sensor 1 circuit is open or shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) • Electric throttle control actuator (TP sensor 2) • Accelerator pedal position sensor (APP sensor 1) • Camshaft position sensor (PHASE) • Refrigerant pressure sensor
P0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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 8V 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 ECQ-478, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528178

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-I

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

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-II

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F43	15	Refrigerant pressure sensor	E49	3
	33	CMP sensor (PHASE)	F26	1
	34	TP sensor	F29	1
E19	113	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.
- Refrigerant pressure sensor (Refer to ECQ-603, "Diagnosis Procedure".)
- Camshaft position sensor (PHASE) (Refer to ECQ-513, "Component Inspection".)
- Accelerator pedal position sensor(APP sensor) (Refer to ECQ-572, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning component.

5.CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F43	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 THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	3	F43	72	Existed

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

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK THROTTLE POSITION SENSOR

Refer to ECQ-480, "Component Inspection".

Is the inspection result normal?

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

8.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to ECQ-481, "Special Repair Requirement".

>> INSPECTION END

9.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001528179

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform ECQ-368, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift 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				
F29	71 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	72 (TP sensor 2 signal)			Fully released	Less than 4.75V
				Fully depressed	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. Go to ECQ-481, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001528180

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-368, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

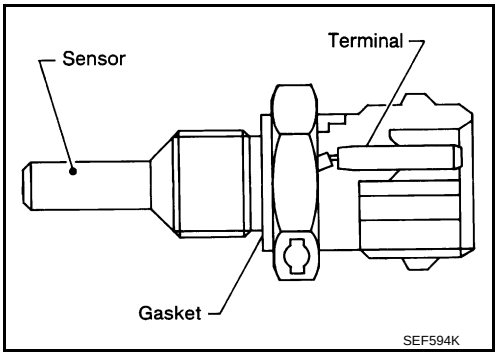
>> END

P0125 ECT SENSOR

Description

INFOID:0000000001528181

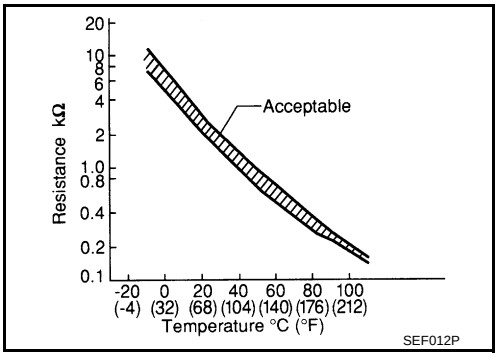
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

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

*: These data are reference values and are measured between ECM terminals 75 (Engine coolant temperature sensor) and 56.



DTC Logic

INFOID:0000000001528182

DTC DETECTION LOGIC

NOTE:
If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to ECQ-475, "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.	• 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.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st tip DTC.

Is 1st trip DTC detected?

YES >> ECQ-483, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528183

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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 ECQ-483, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace engine coolant temperature sensor.

3.CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace thermostat. Refer to CO-58, "Removal and Installation".

4.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

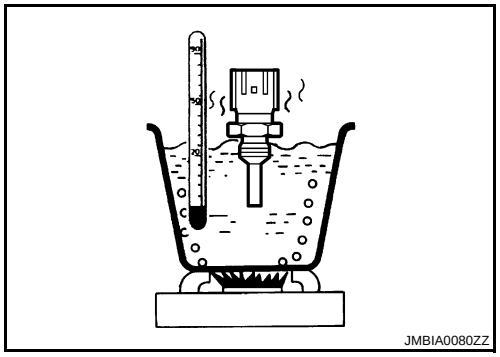
>> INSPECTION END

Component Inspection

INFOID:0000000001528184

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

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



Terminals	Condition		Resistance
1 and 2	Temperature °C (°F)	20 (68)	2.37 - 2.63 kΩ
		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.

P0130 A/F SENSOR 1

Description

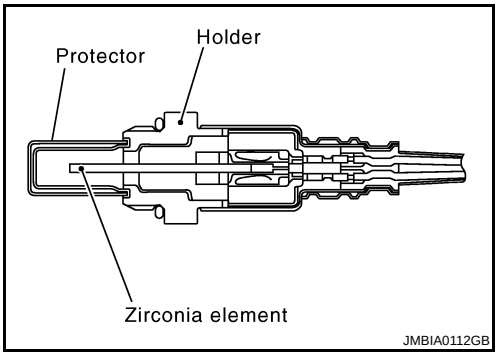
INFOID:0000000001528192

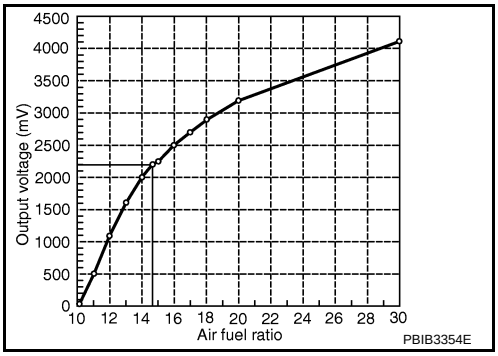
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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:0000000001528193

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 circuit	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2V.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • A/F sensor 1

DTC CONFIRMATION PROCEDURE

1. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer toECQ-484, "Component Function Check" ,

NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to ECQ-485, "Diagnosis Procedure"

Component Function Check

INFOID:0000000001528194

1. PERFORM COMPONENT FUNCTION CHECK

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-III.
3. Check “A/F SEN1 (B1)” indication.

If the indication is constantly approx. 2.2V and does not fluctuates, go to ECQ-485, "Diagnosis Procedure".
If the indication fluctuates around 2.2V, go to next step.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and warm it up to normal operating temperature.
6. Select “DATA MONITOR” mode with CONSULT-III.
7. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
8. Set 5th position, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).
NOTE:
Never apply brake during releasing the accelerator pedal.
9. Repeat steps 7 to 8 for five times.
10. Stop the vehicle and turn ignition switch OFF.
11. Wait at least 10 seconds and restart engine.
12. Repeat steps 7 to 8 for five times.
13. Check 1st trip DTC.

With out CONSULT-III
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.
3. Set D (CVT) or 1st (M/T) position, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).
CAUTION:
Always drive vehicle at a safe speed.
NOTE:
Never apply brake 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. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-485, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528195

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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 sensor 1		Ground	Voltage
Connector	Terminal		
F27	4	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R harness connector E14

- 15A 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

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	
F27	1	F43	54	Existed
	2		53	

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

A/F sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F27	1	F43	54	Ground	Not existed
	2		53		

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-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

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

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

CAUTION:

- **Discard any 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 tool and approved anti-seize lubricant.**

>> INSPECTION END

P0131 A/F SENSOR 1

Description

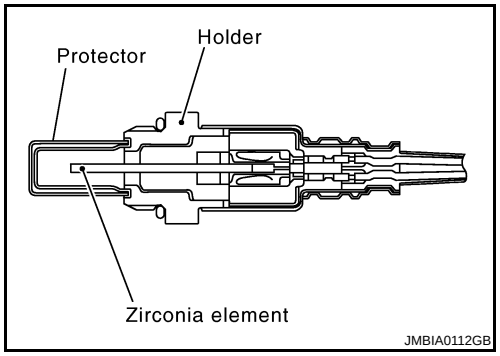
INFOID:0000000001528196

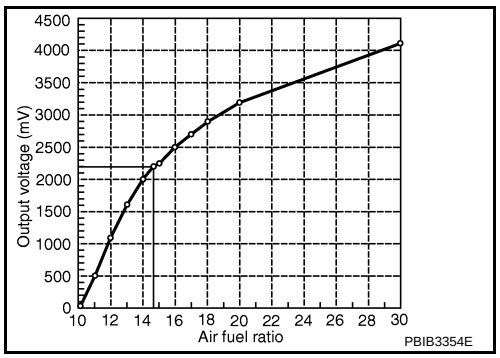
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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:0000000001528197

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. 0V.	• 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 10.5V at idle.

>> GO TO 2.

2.CHECK A/F SENSOR FUNCTION

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-III.
3. Check “A/F SEN1 (B1)” indication.

Is the indication constantly approx. 0V?

YES >> Go to ECQ-488, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
   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
Shift 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.

Is 1st trip DTC detected?

YES >> Go to ECQ-488, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528198

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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 sensor 1		Ground	Voltage
Connector	Terminal		
F27	4	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

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

>> Repair or replace harness or connectors.

4.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F27	1	F43	54	Existed
	2		53	

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

A/F sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F27	1	F43	54	Ground	Not existed
	2		53		

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-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

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

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

CAUTION:

- **Discard any 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 tool and approved anti-seize lubricant.**

>> INSPECTION END

P0132 A/F SENSOR 1

Description

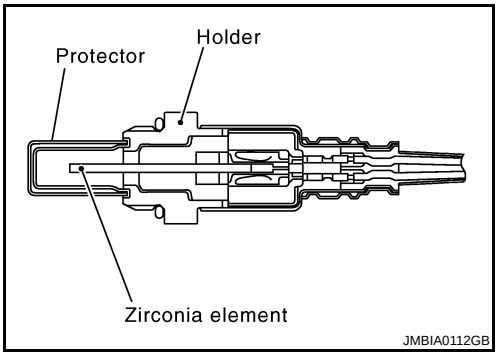
INFOID:0000000001528199

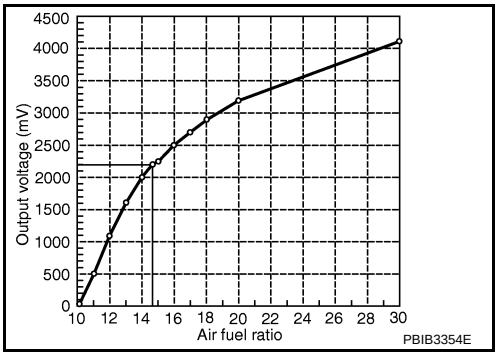
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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:0000000001528200

DTC DETECTION LOGIC

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	Air fuel ratio (A/F) sensor 1 circuit high voltage	• The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5V.	• 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 10.5V at idle.

>> GO TO 2.

2.CHECK A/F SENSOR FUNCTION

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-III.
3. Check “A/F SEN1 (B1)” indication.

Is the indication constantly approx. 5V?

YES >> Go to ECQ-491, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
   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
Shift 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.

Is 1st trip DTC is detected?

YES >> Go to ECQ-491, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528201

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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 sensor 1		Ground	Voltage
Connector	Terminal		
F27	4	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R harness connector E14
- 15A fuse (No. 63)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F27	1	F43	54	Existed
	2		53	

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

A/F sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F27	1	F43	54	Ground	Not existed
	2		53		

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-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

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

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

CAUTION:

- **Discard any 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 tool and approved anti-seize lubricant.**

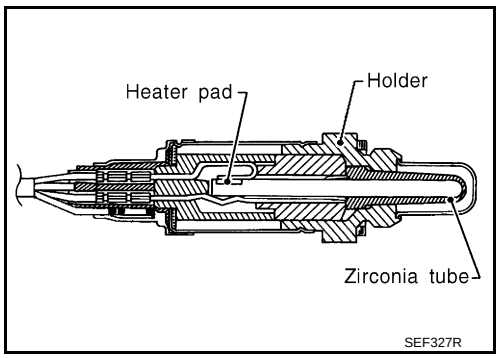
>> INSPECTION END

P0136 HO2S2

Description

INFOID:0000000001528205

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 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



DTC Logic

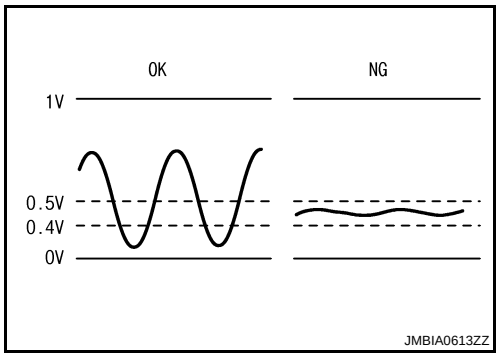
INFOID:0000000001528206

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

Under the condition in which the heated oxygen sensor 2 signal is not input, the ECM circuits will read a continuous approximately 0.4 - 0.5V. Therefore, for this diagnosis, the time that output voltage is within 400 - 500 mV range is monitored, and the diagnosis checks that this time is not inordinately long.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0136	Heated oxygen sensor 2 circuit	The voltage from the sensor is constantly approx.0.4 - 0.5V.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen 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.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 12 minute under no load.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-494, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528208

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	1	F43	46	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.

3.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	4	F43	65	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F31	4	F43	65	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 2

Refer to ECQ-495, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001528209

1. INSPECTION START

Do you have CONSULT-III?

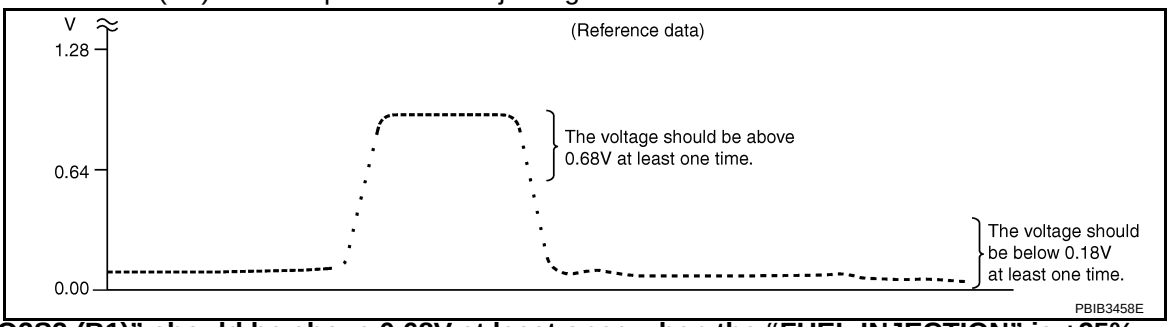
Do you have CONSULT-III?

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

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.18V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F43	65 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.18V 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			
F43	65 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.18V 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			
F43	65 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.18V 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.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

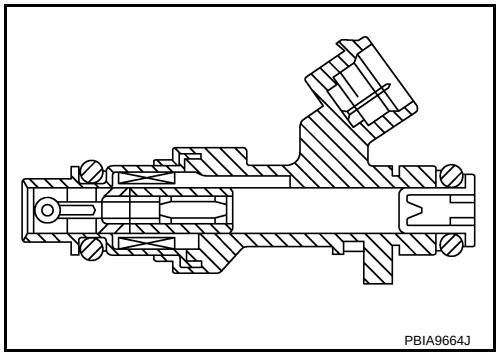
>> INSPECTION END

P0201, P0202, P0203, P0204 FUEL INJECTOR

Description

INFOID:0000000001528253

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.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DTC Logic

INFOID:0000000001528254

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0201	No. 1 cylinder fuel injector circuit	An excessively low or high voltage signal is sent to ECM through the No. 1 fuel injector	• Harness or connectors (No. 1 fuel injector circuit is open or shorted.) • No. 1 fuel injector
P0202	No. 2 cylinder fuel injector circuit	An excessively low or high voltage signal is sent to ECM through the No. 2 fuel injector	• Harness or connectors (No. 2 fuel injector circuit is open or shorted.) • No. 2 fuel injector
P0203	No. 3 cylinder fuel injector circuit	An excessively low or high voltage signal is sent to ECM through the No. 3 fuel injector	• Harness or connectors (No. 3 fuel injector circuit is open or shorted.) • No. 3 fuel injector
P0204	No. 4 cylinder fuel injector circuit	An excessively low or high voltage signal is sent to ECM through the No. 4 fuel injector	• Harness or connectors (No. 4 fuel injector circuit is open or shorted.) • No. 4 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

1. Start engine and wait at least 1 second.
2. 1st trip Check DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-497, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528255

1.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel injector harness connector and ground.

DTC	Fuel injector			Ground	Voltage
	Cylinder	Connector	Terminal		
P0201	1	F37	1	Ground	Battery voltage
P0202	2	F38	1		
P0203	3	F39	1		
P0204	4	F40	1		

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
- 15A fuse (No. 64)
- 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

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

DTC	Fuel injector			ECM		Continuity
	Cylinder	Connector	Terminal	Connector	Terminal	
P0201	1	F37	2	F14	59	Existed
P0202	2	F38	2		23	
P0203	3	F39	2		60	
P0204	4	F40	2		21	

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 ECQ-498, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning fuel injector.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

Component Inspection

INFOID:0000000001528256

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as follows.

Terminals	Resistance
1 and 2	11.1 - 14.3Ω [at 10 -60°C (50 - 140°F)]

Is the inspection result normal?

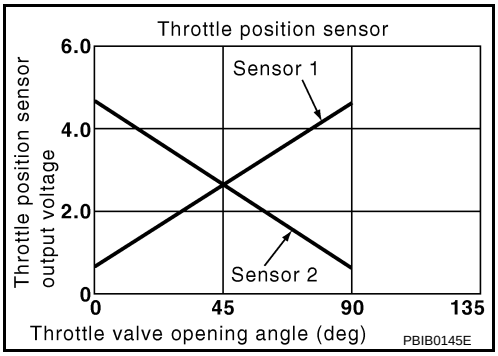
YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector.

P0222, P0223 TP SENSOR

Description

INFOID:0000000001528257

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001528258

DTC DETECTION 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.) (APP sensor 1 circuit is open or shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) • Electric throttle control actuator (TP sensor 1) • Accelerator pedal position sensor (APP sensor 1) • Camshaft position sensor (PHASE) • Refrigerant pressure sensor
P0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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 8V 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 ECQ-500, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528259

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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-II

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

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-II

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F43	15	Refrigerant pressure sensor	E49	3
	33	CMP sensor (PHASE)	F26	1
	34	TP sensor	F29	1
E19	113	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.
- Refrigerant pressure sensor (Refer to ECQ-603, "Diagnosis Procedure".)
- Camshaft position sensor (PHASE) (Refer to ECQ-513, "Component Inspection".)
- Accelerator pedal position sensor(APP sensor) (Refer to ECQ-572, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning component.

5. CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F43	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 THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	2	F43	71	Existed

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

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK THROTTLE POSITION SENSOR

Refer to ECQ-502, "Component Inspection".

Is the inspection result normal?

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

8.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to ECQ-503, "Special Repair Requirement".

>> INSPECTION END

9.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001528260

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform ECQ-368, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector terminals as follows.

(–)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
F43	71 (TP sensor 1 signal)	F43	52	Accelerator pedal	Fully released	More than 0.36V
					Fully depressed	Less than 4.75V
	72 (TP sensor 2 signal)				Fully released	Less than 4.75V
					Fully depressed	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. Go to ECQ-503, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001528261

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-368, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> END

P0327 KS

Description

INFOID:0000000001528264

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

DTC Logic

INFOID:0000000001528265

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.) • 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 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Maintain the following conditions for 1 consecutive minute.

Engine speed	More than 1,240 rpm (CVT) More than 2,500 rpm (M/T)
Vehicle speed	More than 70 km/h (43 MPH) (CVT) More than 100 km/h (62 MPH) (M/T)
Shift lever	Suitable position

Is 1st trip DTC detected?

YES >> Go to ECQ-504, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528266

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

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

2.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	
F16	1	F43	63	Existed
	2		44	

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

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK KNOCK SENSOR

Refer to ECQ-505, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace knock sensor.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001528267

1.CHECK KNOCK SENSOR

1. Turn ignition switch OFF.
2. Disconnect knock sensor harness connector.
3. Check resistance between knock sensor terminals as follows.

NOTE:
It is necessary to use an ohmmeter which can measure more than 10 MΩ.

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?

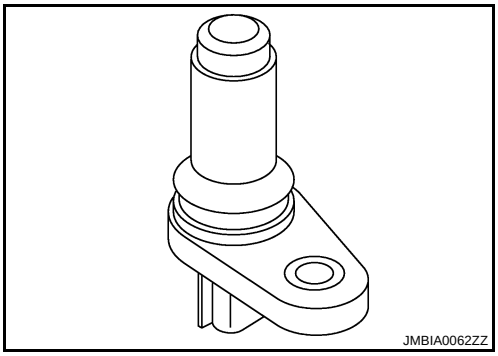
YES >> INSPECTION END
NO >> Replace knock sensor.

P0335 CKP SENSOR (POS)

Description

INFOID:0000000001528268

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.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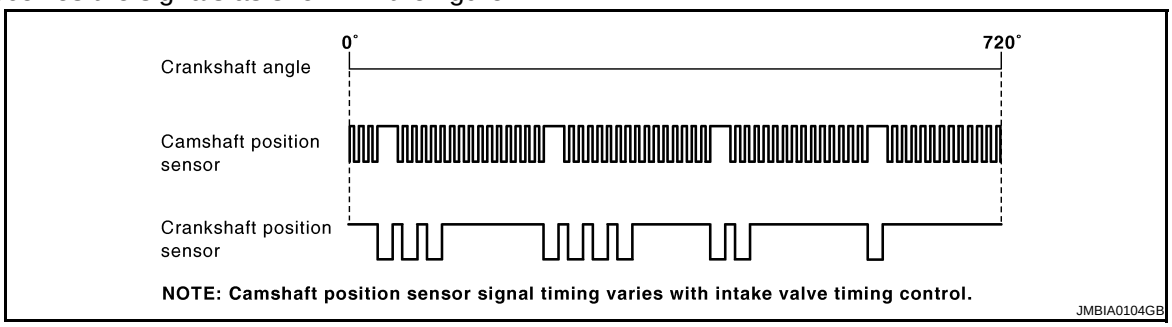

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DTC Logic

INFOID:0000000001528269

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.] (Accelerator pedal position sensor 2 circuit is shorted.) • Crankshaft position sensor (POS) • Accelerator pedal position sensor 2 • Signal plate

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 10.5V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-507, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528270

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

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

2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-I

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CKP sensor (POS) harness connector and ground.

CKP sensor (POS)		Ground	Voltage
Connector	Terminal		
F20	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-II

1. Turn ignition switch ON.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	1	F43	12	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit.

4. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F43	12	CKP sensor (POS)	F20	1
E19	105	APP sensor	E40	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.
- Accelerator pedal position sensor(APP sensor) (Refer to ECQ-572, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace malfunctioning components.

6.CHECK APP SENSOR

Refer to ECQ-576, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to ECQ-577, "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 sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	2	F43	11	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.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F20	3	F43	6	Existed

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 CRANKSHAFT POSITION SENSOR (POS)

Refer to ECQ-509, "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.
NO >> Replace the signal plate.

12.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

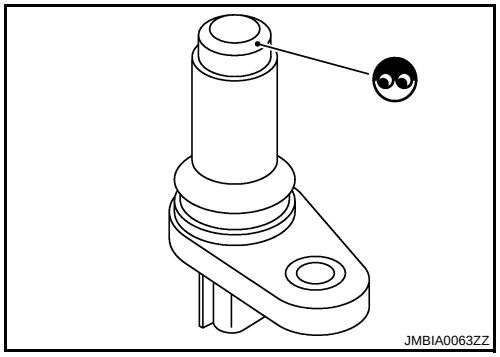
>> INSPECTION END

Component Inspection

INFOID:0000000001528271

1. CHECK CRANKSHAFT POSITION SENSOR (POS)-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect crankshaft position sensor (POS) harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.



Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace crankshaft position sensor (POS).

2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as follows.

Terminals (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

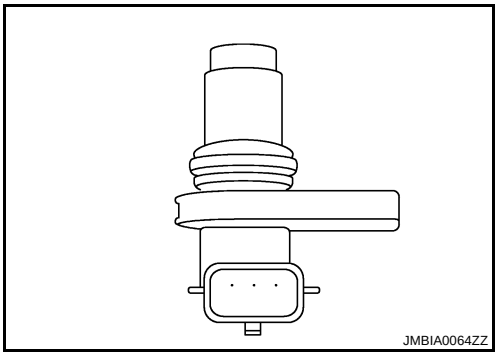
YES >> INSPECTION END
NO >> Replace crankshaft position sensor (POS).

P0340 CMP SENSOR (PHASE)

Description

INFOID:0000000001528272

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.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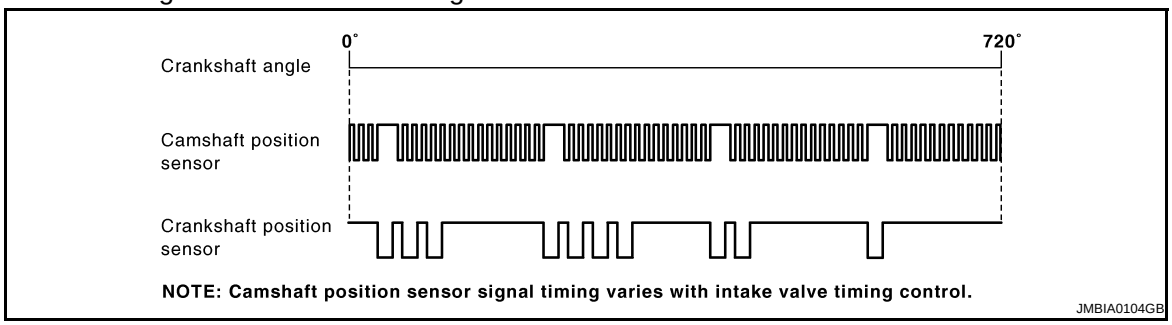


DTC Logic

INFOID:0000000001528273

DTC DETECTION 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 (TP sensor circuit is open or shorted.) (APP sensor 1 circuit is open or shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) • Camshaft position sensor (PHASE) • Electric throttle control actuator (TP sensor) • Accelerator pedal position sensor (APP sensor 1) • Refrigerant pressure sensor • Camshaft (INT) • Starter motor (Refer to STR-5, "System Diagram".) • Starting system circuit (Refer to STR-5, "System Diagram".) • 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 10.5V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-511, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528274

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.

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace ground connection.

3.CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT-I

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CMP sensor (PHASE) harness connector and ground.

CMP sensor (PHASE)		Ground	Voltage
Connector	Terminal		
F26	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT-II

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F43	15	Refrigerant pressure sensor	E49	3
	33	CMP sensor (PHASE)	F26	1
	34	TP sensor	F29	1
E19	113	APP sensor	E110	4

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.
- Refrigerant pressure sensor (Refer to ECQ-603, "Diagnosis Procedure".)
- Electric throttle control actuator(TP sensor) (Refer to ECQ-502, "Component Inspection".)
- Accelerator pedal position sensor(APP sensor) (Refer to ECQ-572, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace malfunctioning component.

6. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F26	2	F43	30	Existed

3. Also check harness for 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 CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F26	3	F43	25	Existed

3. 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 CAMSHAFT POSITION SENSOR (PHASE)

Refer to ECQ-513, "Component Inspection".

Is the inspection result normal?

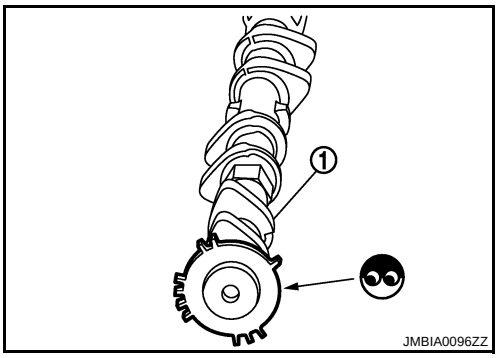
YES >> GO TO 9.
NO >> Replace camshaft position sensor (PHASE).

9. 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 10.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



10. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

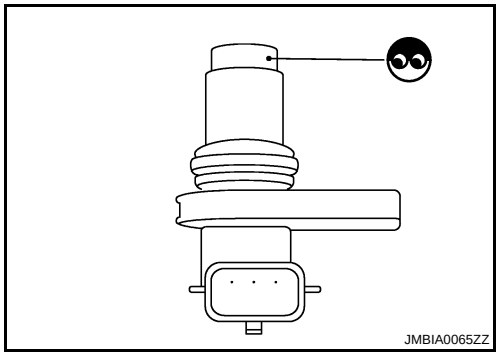
>> INSPECTION END

Component Inspection

INFOID:0000000001528275

1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect camshaft position sensor (PHASE) harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.



Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace camshaft position sensor (PHASE).

2. CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check resistance camshaft position sensor (PHASE) terminals as follows.

Terminals (Polarity)	Resistance
1 (+) - 2 (-)	Except 0 or ∞Ω [at 25°C (77°F)]
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

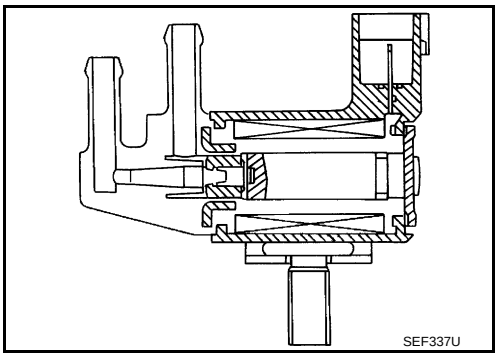
YES >> INSPECTION END
NO >> Replace camshaft position sensor (PHASE).

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:0000000001528289

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



DTC Logic

INFOID:0000000001528290

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 9V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 13 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-514, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528291

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

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.
- Harness connectors E7, F121
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F32	2	F43	42	Existed

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

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 4.
YES-2 >> Without CONSULT-III: GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to ECQ-516, "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-39, "Intermittent Incident".

>> INSPECTION END

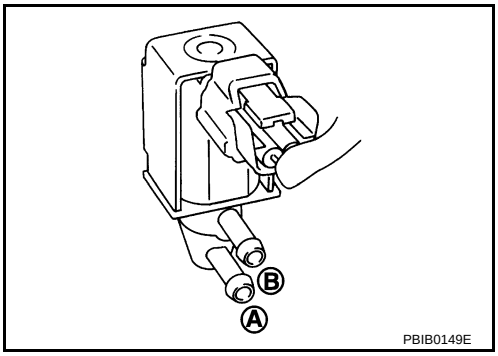
Component Inspection

INFOID:0000000001528292

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Turn ignition switch ON.
5. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III.
6. Touch “Qd” and “Qu” on CONSULT-III screen to adjust “PURG VOL CONT/V” opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition (PURG VOL CONT/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed

Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP canister purge volume control solenoid valve

P0500 VSS

Description

INFOID:0000000001528330

The vehicle speed signal is sent to the combination meter from the “ABS actuator and electric unit (control unit)” by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

DTC Logic

INFOID:0000000001528331

DTC DETECTION LOGIC

NOTE:

- **If DTC P0500 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001.Refer to** ECQ-451, "DTC Logic".
- **If DTC P0500 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to ECQ-452, "DTC Logic"**.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500	Vehicle speed sensor	The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM 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) • Vehicle speed sensor • Combination meter • ABS actuator and electric unit (control unit)

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-III

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Maintain the following conditions for at least 5 consecutive seconds.

CAUTION:

Always drive vehicle at a safe speed.

ENG SPEED	CVT: 2,200 - 6,000 rpm M/T: 2,200 - 6,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	CVT: 5.5 - 31.8 msec M/T: 4.8 - 31.8 msec
Shift lever	Except P or N position (CVT) Except Neutral position (M/T)
Steering wheel	Not being tuned

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-518, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528333

1. CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-11, "Component Description".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace.

2. CHECK COMBINATION METER

Refer to MWI-24, "CONSULT-III Function (METER/M&A)".

>> INSPECTION END

P0562 BATTERY VOLTAGE

DTC Logic

INFOID:0000000001528348

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0562	System voltage low	An excessively low voltage from the battery is sent to ECM.	• Dead (Weak) battery • Battery dead (Under charge) • Charging system • Alternator

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 let it idle for 3 minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-519, "Diagnosis Procedure"
NO >> INSPECTION END.

Diagnosis Procedure

INFOID:0000000001528350

1.CHECK BATTERY

Refer to PG-136, "Battery".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace battery.

2.CHECK CHARGING SYSTEM

Refer to CHG-3, "Work Flow".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

P0563 BATTERY VOLTAGE

DTC Logic

INFOID:0000000001528351

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0563	System voltage high	An excessively high voltage from the battery is sent to ECM.	• Incorrect battery • Chargeing system • Alternator

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 let it idle for 3 minutes.
2. Drive the vehicle at a speed of 25 km/h (15.5 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 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-520, "Diagnosis Procedure"
NO >> INSPECTION END.

Diagnosis Procedure

INFOID:0000000001528352

1.CHECK BATTERY

Check that the proper type of battery is installed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace with the proper one.

2.CHECK CHARGING SYSTEM

Refer to CHG-3, "Work Flow".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

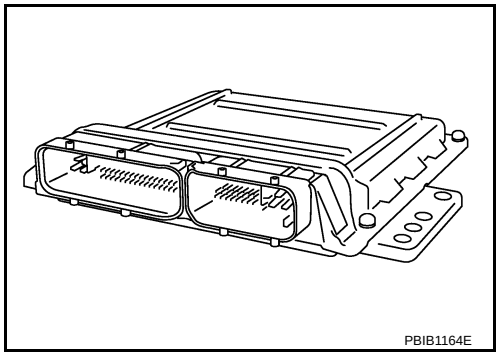
>> INSPECTION END

P0605 ECM

Description

INFOID:0000000001528353

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.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DTC Logic

INFOID:0000000001528354

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605	Engine control module	A)	ECM calculation function is malfunctioning.	• ECM
		B)	ECM EEP-ROM system is malfunctioning.	
		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 ECQ-522, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Wait at least 10 second.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-522, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Wait at least 1 second.
2. Turn ignition switch OFF, wait at least 30 seconds, and then turn ON.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-522, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528355

1.INSPECTION START

With CONSULT-III

1. Turn ignition switch ON.
2. Select “SELF-DIAG RESULTS” mode with CONSULT-III.
3. Touch “ERASE”.
4. **Perform DTC CONFIRMATION PROCEDURE.**
   See ECQ-521, "DTC Logic".

Without CONSULT-III

1. Turn ignition switch ON.
2. Erase the diagnostic Test Mode II (Self-diagnostic results) memory.
3. **Perform DTC CONFIRMATION PROCEDURE.**
   See ECQ-521, "DTC Logic".

Is the 1st trip DTC P0605 displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to ECQ-366, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

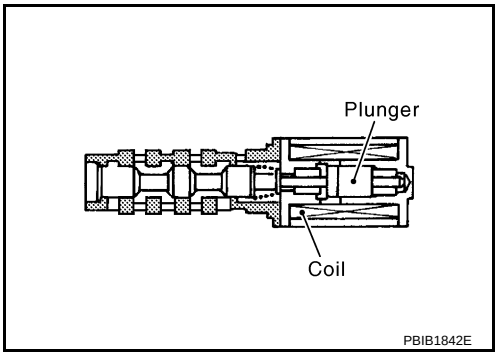
>> INSPECTION END

P1111 IVT CONTROL SOLENOID VALVE

Description

INFOID:0000000001528363

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:0000000001528364

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1111	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 ECQ-523, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528365

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

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

IVT control solenoid valve		Ground	Voltage
Connector	Terminal		
F45	2	Ground	Battery voltage

Is the inspection result normal?

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

2.DETECT MALFUNCTION PART

Check the following.
- Harness connectors E7, F121
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R

>> Repair or replace harness or connectors.

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

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

IVT control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F45	1	F43	62	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 ECQ-524, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace intake valve timing control solenoid valve.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001528366

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

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

Terminals	Resistance [at 20°C (68°F)]
1 and 2	6.7 - 7.7 Ω
1 or 2 and ground	∞ Ω (Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace intake valve timing control solenoid valve.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.

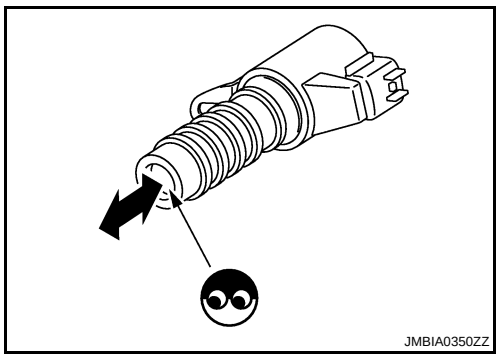
2. Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:

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

NOTE:

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



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve.

P1212 TCS COMMUNICATION LINE

Description

INFOID:0000000001528367

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

INFOID:0000000001528368

DTC DETECTION LOGIC

NOTE:
- **If DTC P1212 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to ECM-108, "DTC Logic".**
- **If DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to ECM-109, "DTC Logic".**

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 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-526, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528369

Go to ECQ-359, "Work Flow".

P1217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000001528370

DTC DETECTION LOGIC

NOTE:

- **If DTC P1217 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to ECQ-451, "DTC Logic".**
- **If DTC P1217 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to ECQ-452, "DTC Logic".**

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217	Engine over 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 relays-1, -2, -3) • Cooling fan relays-4 and -5 • Cooling fan motors-1, -2 • 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-41, "Draining". Also, replace the engine oil. Refer to LU-17, "Draining".

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-23, "SAE Viscosity Number".**
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 ECQ-527, "Component Function Check".

NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-528, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001528371

1.PERFORM COMPONENT FUNCTION CHECK-I

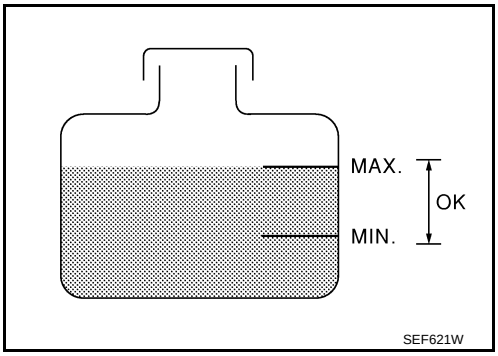
WARNING:

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.

Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.

Is the coolant level in the reservoir tank and/or radiator below the proper range?

YES >> Go to ECQ-528, "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 ECQ-528, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that cooling fan motors-1 and -2 operate at each speed (LOW/MID/HI).

Without CONSULT-III
Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PCS-8, "Diagnosis Description".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-528, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001528372

1.CHECK COOLING FAN OPERATION

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that cooling fan motors-1 and -2 operate at each speed (LOW/MID/HI).

Without CONSULT-III
1. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PCS-8, "Diagnosis Description".
2. Make sure that cooling fan motors-1 and -2 operate at each speed (Low/Middle/High).

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to ECQ-591, "Diagnosis Procedure".

2.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-41, "Inspection".

Is leakage detected?

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

3.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak. Refer to CO-41, "Inspection".
- Hose
- Radiator
- Water pump

>> Repair or replace malfunctioning part.

4. CHECK RADIATOR CAP

Check radiator cap. Refer to CO-48, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace radiator cap.

5. CHECK THERMOSTAT

Check thermostat. Refer to CO-58, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace thermostat.

6. CHECK WATER CONTROL VALVE

Check water control valve. Refer to CO-58, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace water control valve

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to ECQ-476, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace engine coolant temperature sensor.

8. CHECK MAIN 13 CAUSES

If the cause cannot be isolated, check the following.

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	MA-23, "SAE Viscosity Number"
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-41, "Draining"
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 bar, 0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	CO-48, "Removal and Installation"
ON*2	5	• Coolant leaks	• Visual	No leaks	CO-41, "Inspection"
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	CO-58, "Removal and Installation"
ON*1	7	• Cooling fan motor	• CONSULT-III	Operating	ECQ-591, "Component Function Check"
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	CO-41, "Inspection"
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	CO-41, "Inspection"

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	11	• Water control valve	• Remove and inspect the valve	Within the specified value	CO-58, "Removal and Installation"
OFF	12	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-202, "Removal and Installation"
	13	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	EM-203, "Disassembly and Assembly"

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to CO-37, "Troubleshooting Chart".

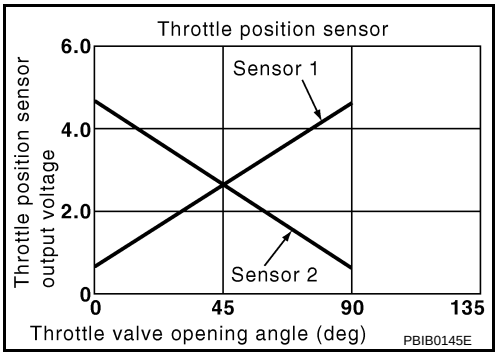
>> INSPECTION END

P1225 TP SENSOR

Description

INFOID:0000000001528402

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001528403

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 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-531, "Diagnosis Procedure".
NO >> INSPECTION END

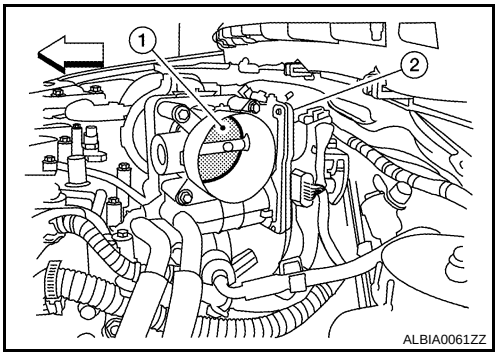
Diagnosis Procedure

INFOID:0000000001528404

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

3. Check if foreign matter is caught between the throttle valve (1) and the housing.



2. Electric throttle control actuator

⇦ : Vehicle front

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to ECQ-532, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001528405

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-368, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

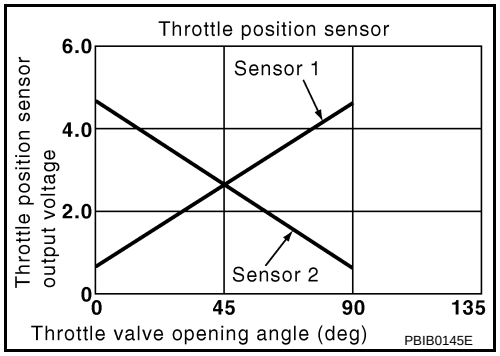
>> END

P1299 TP SENSOR

Description

INFOID:0000000001528406

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001528407

DTC DETECTION LOGIC

NOTE:
If DTC P1299 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1299	Throttle valve closed position learning performance	Closed throttle position learning is not performed successfully.	• Battery • Engine coolant temperature sensor • Intake air temperature sensor • Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Electric throttle control actuator (TP sensor 1 and 2) • Accelerator pedal position sensor (APP sensor 1 and 2) • Vehicle speed 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 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-533, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528408

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-368, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.ERASE DTC

With CONSULT-III
1. Turn ignition switch ON.

2. Select “SELF-DIAG RESULTS“ mode with CONSULT-III.
3. Touch “ERASE“.

Without CONSULT-III

1. Turn ignition switch ON.
2. Erase the diagnostic Test Mode II (Self-diagnostic results) memory.

Is DTC erased?

YES >> INSPECTION END
NO >> GO TO 3.

3.CHECK BATTERY

Refer to PG-3, "How to Handle Battery".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace battery.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to ECQ-476, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace engine coolant temperature sensor.

5.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to ECQ-473, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace mass air flow sensor (with intake air temperature sensor).

6.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to ECQ-509, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace crankshaft position sensor (POS).

7.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to ECQ-513, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace malfunctioning camshaft position sensor (PHASE).

8.CHECK THROTTLE POSITION SENSOR

Refer to ECQ-580, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunctioning electric throttle control actuator.
2. Go to ECQ-581, "Special Repair Requirement".

>> INSPECTION END.

10.CHECK APP SENSOR

Refer to ECQ-572, "Component Inspection".

Is the inspection result normal?

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

11. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to ECQ-572, "Special Repair Requirement".

>> INSPECTION END.

12. CHECK VEHICLE SPEED SENSOR

Refer to ECQ-517, "Description".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Go to ECQ-518, "Diagnosis Procedure".

13. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END.

P1320 IGNITION COIL

Description

INFOID:0000000001528410

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.

DTC Logic

INFOID:0000000001528411

DTC DETECTION LOGIC

NOTE:

- **If DTC P1320 is displayed with DTC P0335, P0340 first perform the trouble diagnosis for DTC P0335, P0340. Refer to ECQ-451, "DTC Logic", ECQ-451, "DTC Logic".**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1320	Ignition coil primary circuit	The ignition signal in the primary circuit is not sent to ECM during engine cranking or running.	• Harness or connectors (The ignition primary circuit is open or shorted.) • Power transistor unit built into ignition coil • Condenser

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 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine. (If engine does not run, turn ignition switch to START for at least 5 seconds.)
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-456, "Diagnosis Procedure".
NG >> INSPECTION END

Component Function Check

INFOID:0000000001528412

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT-III: GO TO 2.
YES-2 >> Without CONSULT-III: GO TO 3.
NO >> Go to ECQ-537, "Diagnosis Procedure".

2.IGNITION SIGNAL FUNCTION

With CONSULT-III

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
2. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

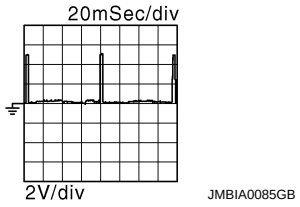
YES >> INSPECTION END
NO >> Go to ECQ-537, "Diagnosis Procedure".

3.IGNITION SIGNAL FUNCTION

Without CONSULT-III

1. Let engine idle.

2. Read the voltage signal between ECM harness connector terminals as follows.

(+)		(–)		Voltage signal
Connector	Terminal	Connector	Terminal	
F43	9	E19	121	
	10			
	28			
	29			

NOTE:
The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-537, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001528413

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 terminals as follows.

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
E19	115	E19	121	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to ECQ-447, "Diagnosis Procedure".

2. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Turn ignition switch ON.
4. Check the voltage between condenser harness connector and ground.

Condenser		Ground	Voltage
Connector	Terminal		
F13	1	Ground	Battery voltage

Is the inspection result normal?

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

3. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E15.
3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

IPDM E/R		Condenser		Continuity
Connector	Terminal	Connector	Terminal	
E15	47	F13	1	Existed

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

Is the inspection result normal?

YES >> Go to ECQ-447, "Diagnosis Procedure".
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. 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		
F13	2	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CONDENSER

Refer to ECQ-540, "Component Inspection (Condenser)"

Is the inspection result normal?

YES >> GO TO 6.
NG >> Replace condenser.

6. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Reconnect all harness connectors disconnected.
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ignition coil harness connector and ground.

Ignition coil			Ground	Voltage
Cylinder	Connector	Terminal		
1	F33	3	Ground	Battery voltage
2	F34	3		
3	F35	3		
4	F36	3		

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity
Cylinder	Connector	Terminal		
1	F33	2	Ground	Existed
2	F34	2		
3	F35	2		
4	F36	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F33	1	F43	10	Existed
2	F34	1		28	
3	F35	1		9	
4	F36	1		29	

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to ECQ-539, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace malfunctioning ignition coil with power transistor.

10. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000001528414

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-I

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

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?

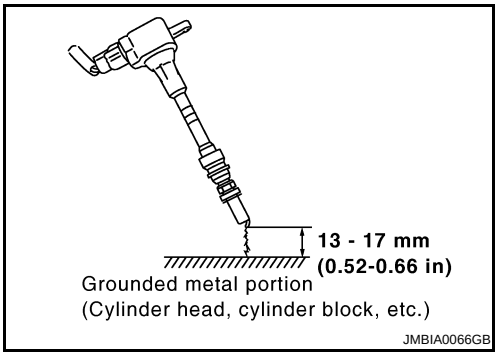
YES >> GO TO 2.
NO >> Replace malfunctioning ignition coil with power transistor.

2. CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
4. Start engine.
5. After engine stalls, crank it two or three times to release all fuel pressure.
6. Turn ignition switch OFF.

7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
8. Remove ignition coil and spark plug of the cylinder to be checked.
9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
10. Connect spark plug and harness connector to ignition coil.
11. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm 0.66 in) is taken.**

NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning ignition coil with power transistor.

Component Inspection (Condenser)

INFOID:0000000001528415

1. CHECK CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check resistance between condenser terminals as follows.

Terminals	Resistance
1 and 2	Above 1 MΩ [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace condenser.

P1564 ASCD STEERING SWITCH

Description

INFOID:0000000001528416

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 ECQ-399, "System Description" for the ASCD function.

DTC Logic

INFOID:0000000001528417

DTC DETECTION LOGIC

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to ECQ-521, "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

1. Turn ignition switch ON.
2. Wait at least 10 seconds.
3. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Check DTC.

Is DTC detected?

YES >> Go to ECQ-541, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528418

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YS >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ASCD STEERING SWITCH CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
E19	108 (ASCD steering switch signal)	E19	100	MAIN switch: Pressed	Approx. 0V
				CANSEL switch: Pressed	Approx. 1V
				SET/COAST switch: Pressed	Approx. 2V
				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.

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 M33.
4. Check the continuity between combination switch and ECM harness connector.

Combination switch	ECM		Continuity
Terminal	Connector	Terminal	
33	E19	100	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 M33, E352
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

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

5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and combination switch.

Combination switch	ECM		Continuity
Terminal	Connector	Terminal	
34	E19	108	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 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.

7. CHECK ASCD STEERING SWITCH

Refer to ECQ-543, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001528419

1. CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector M33.
2. Check the continuity between combination switch harness connector terminals under following conditions.

Combination meter		Condition	Resistance
Connector	Terminals		
M352	33 and 34	MAIN switch: Pressed	Approx. 0 Ω
		CANCEL switch: Pressed	Approx. 250 Ω
		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
NO >> Replace ASCD steering switch

P1572 ASCD BRAKE SWITCH

Description

INFOID:0000000001528420

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 ECQ-399, "System Description" for the ASCD function.

DTC Logic

INFOID:0000000001528421

DTC DETECTION LOGIC

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to ECQ-521, "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
P1572	ASCD brake switch	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.) • Harness or connectors (The ASCD clutch switch circuit is shorted.) (M/T) • Stop lamp switch • ASCD brake switch • ASCD clutch switch (M/T) • Incorrect stop lamp switch installation • Incorrect ASCD brake switch installation • Incorrect ASCD clutch switch installation (M/T) • ECM
		B)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	

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 - I

With CONSULT-III

1. Turn ignition switch ON wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-545, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A - II

With CONSULT-III

1. Drive the vehicle for at least 10 consecutive seconds under the following conditions.
   CAUTION:
   Always drive vehicle at a safe speed.

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

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-545, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528422

1. CHECK OVERALL FUNCTION-I

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E19	94 (ASCD brake switch signal)	E19	121	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	Approx. 0V
					Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO-1 >> CVT models: GO TO 3.
NO-1 >> M/T models: GO TO 7.

2. CHECK OVERALL FUNCTION-II

Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E19	84 (Stop lamp switch signal)	E19	121	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	Approx. 0V
					Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 19.
NO >> GO TO 14.

3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

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

4. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector M77, E105
- 10A fuse (No.1)
- Harness for open or short between ASCD brake switch and fuse

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

5. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

ASCD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E112	2	E19	94	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ASCD BRAKE SWITCH

Refer to ECQ-548, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 19.
NO >> Replace ASCD brake switch.

7. CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD clutch switch harness connector and ground.

ASCD clutch switch		Ground	Condition		Voltage (V)
Connector	Terminal				
E111	1	Ground	Brake pedal	Slightly depressed	Approx. 0
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 8.

8. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector M77, E105
- 10A fuse (No.3)
- Harness for open or short between ASCD brake switch and fuse

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

10. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ASCD brake switch harness connector and ASCD clutch switch harness connector.

ASCD brake switch		ASCD clutch switch		Continuity
Connector	Terminal	Connector	Terminal	
E112	2	E111	1	Existed

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

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ASCD BRAKE SWITCH

Refer to ECQ-548, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 19.
NO >> Replace ASCD brake switch.

12. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

ECM		ASCD clutch switch		Continuity
Connector	Terminal	Connector	Terminal	
E19	94	E111	2	Existed

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

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK ASCD CLUTCH SWITCH

Refer to ECQ-549, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 19.
NO >> Replace ASCD clutch switch.

14. 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		
E115	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 16.
NO >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector M77, E105
- 10A fuse (No.11)
- 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.

16. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

ECM		ASCD clutch switch		Continuity
Connector	Terminal	Connector	Terminal	
E19	94	E111	2	Existed

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

Is the inspection result normal?

YES >> GO TO 18.
NG >> GO TO 17.

17. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector M77, E105
- 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.

18. CHECK STOP LAMP SWITCH

Refer to ECQ-549, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 19.
NO >> Replace stop lamp switch.

19. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000001528423

1. CHECK ASCD BRAKE SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-8, "Inspection and Adjustment".
2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD brake switch.

Component Inspection (ASCD Clutch Switch)

INFOID:0000000001528424

1.CHECK ASCD CLUTCH SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ASCD CLUTCH SWITCH-II

1. Adjust ASCD clutch switch installation. Refer to CL-5, "Inspection and Adjustment".
2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD clutch switch.

Component Inspection (Stop Lamp Switch)

INFOID:0000000001528425

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-8, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

P1574 ASCD VEHICLE SPEED SENSOR

Description

INFOID:0000000001528426

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 ECQ-399, "System Description" for ASCD functions.

DTC Logic

INFOID:0000000001528427

DTC DETECTION LOGIC

NOTE:

- **If DTC P1574 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to ECQ-451, "DTC Logic".**
- **If DTC P1574 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to ECQ-452, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to ECQ-517, "DTC Logic"**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to ECQ-521, "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.) (Combination meter circuit is open or shorted.) • Combination meter • ABS actuator and electric unit (control unit) • Wheel sensor • TCM (CVT models) • 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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. 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 ECQ-551, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528428

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-217, "Diagnosis Description".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-17, "CONSULT-III Function (ABS)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK COMBINATION METER

Check combination meter function.
Refer to MWI-24, "CONSULT-III Function (METER/M&A)".

>> INSPECTION END

P1706 PNP SWITCH

Description

INFOID:0000000001528429

When the shift lever position is P or N (CVT), Neutral position (M/T), park/neutral position (PNP) switch is ON. ECM detects the position because the continuity of the line (the ON signal) exists.

DTC Logic

INFOID:0000000001528430

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	• Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] • Park/neutral position (PNP) switch

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 5.

2.PRECONDITIONING

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

>> GO TO 3.

3.CHECK PNP SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-III. Then check the “P/N POSI SW” signal under the following conditions.

Position (Shift lever)	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 ECQ-554, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Maintain the following conditions for at least 50 consecutive seconds.

CAUTION:
Always drive vehicle at a safe speed.

ENG SPEED	CVT: 2,000 - 6,375 rpm M/T: 2,000 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)

B/FUEL SCHDL	CVT: 2.4 - 31.8 msec M/T: 3.5 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 mph)
Shift lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-554, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to ECQ-554, "Component Function Check".

NOTE:
Use component function check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-554, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001528431

1.PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
F43	27 (PNP switch signal)	F43	121	Shift lever	P or N (CVT) Neutral (M/T)	Approx. 0V
					Except above	BATTERY VOLTAGE

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-554, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001528432

1.CHECK PNP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect Park/neutral position (PNP) switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between PNP switch harness connector and ground.

PNP switch		Ground	Voltage
Connector	Terminal		
F21 (CVT)	1	Ground	Battery voltage
F48 (M/T)	2		

Is the inspection result normal?

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

2.DTECTED MALFUNCTIONING PART

Check the following.
- Harness connectors E6, F123
- Harness for open or short between PNP switch and IPDM E/R

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

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

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

PNP switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F21 (CVT)	2	F43	27	Existed
F48 (M/T)	1			

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

Is the inspection result normal?

YES >> GO TO 5.
NO-1 >> Repair open circuit or short to ground or short to power in harness or connectors. (M/T)
NO-2 >> GO TO 4. (CVT)

4. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Check the continuity between PNP switch harness connector and ECM harness connector.

PNP switch		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F21 (CVT)	1	E15	58	Existed

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

ECM		IPDM		Continuity
Connector	Terminal	Connector	Terminal	
F43	27	E15	58	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 PNP SWITCH

Refer to TM-404, "Component Inspection" (CVT) or TM-66, "Component Inspection" (M/T).

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace PNP switch.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

P1715 INPUT SPEED SENSOR (PRIMARY SPEED SENSOR)

Description

INFOID:0000000001528433

ECM receives primary speed sensor signal from TCM through CAN communication line. ECM uses this signal for engine control.

DTC Logic

INFOID:0000000001528434

DTC DETECTION LOGIC

NOTE:

- **If DTC P1715 is displayed with DTC U1000, U1001 first perform the trouble diagnosis for DTC U1000, U1001. Refer to ECQ-451, "DTC Logic".**
- **If DTC P1715 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to ECQ-452, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to ECQ-506, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to ECQ-510, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to ECQ-521, "DTC Logic".**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715	Input speed sensor (Primary speed sensor) (TCM output)	Primary speed sensor signal is different from the theoretical value calculated by ECM from secondary speed sensor 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

1. 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 ECQ-556, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528435

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-392, "Diagnosis Description".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM.

>> INSPECTION END

P1805 BRAKE SWITCH

Description

INFOID:0000000001528436

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

DTC Logic

INFOID:0000000001528437

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	• Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-III.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to ECQ-558, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528438

1.CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is 1st trip DTC detected?

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

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		
E115(CVT)	1	Ground	Battery voltage
E114(M/T)	1	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector M77,E105
- 10A fuse (No. 11)
- Harness for open or short between stop lamp switch and battery

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

4.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

ECM		Stop lamp switch		Continuity
Connector	Terminal	Connector	Terminal	
E19	84	E115(CVT)	2	Existed
		E114(M/T)	2	

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

Is the inspection result normal?

YES >> GO TO 6.
NG >> GO TO 5.

5.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.

6.CHECK STOP LAMP SWITCH

Refer to ECQ-559, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace stop lamp switch.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Stop Lamp Switch)

INFOID:0000000001528439

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-8, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

Description

INFOID:0000000001528447

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

DTC Logic

INFOID:0000000001528448

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 8V.

Witch DTC is detected?

P2100 >> GO TO 2.
P2103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to ECQ-561, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to ECQ-561, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528449

1.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 E15.
4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F43	22	E13	32	Existed

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

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

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F43	2	E15	52	Existed

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

Is the inspection result normal?

YES >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUSE

1. Disconnect 15A fuse (No. 61) from IPDM E/R.
2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace 15A fuse.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:0000000001528450

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:0000000001528451

DTC DETECTION LOGIC

NOTE:
If DTC P2101 is displayed with DTC P2100 or P2119, first perform the trouble diagnosis for DTC P2100 or P2119. Refer to ECQ-561, "DTC Logic" or ECQ-568, "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 8V 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.
3. Check DTC.

Is DTC detected?

YES >> Go to ECQ-563, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528452

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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

1. Check the voltage between ECM harness connector terminals as follows.

ECM		ECM		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F43	2	E19	121	Ignition switch OFF	Approx. 0V
				Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 3.

3.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector F10.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E13	32	F43	22	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 CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

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

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E15	52	F43	2	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 FUSE

1. Disconnect 15A fuse (No. 61) from IPDM E/R.
2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace 15A fuse.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

7.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	5	F43	1	Not existed
			3	Existed
	6		1	Existed
			3	Not existed

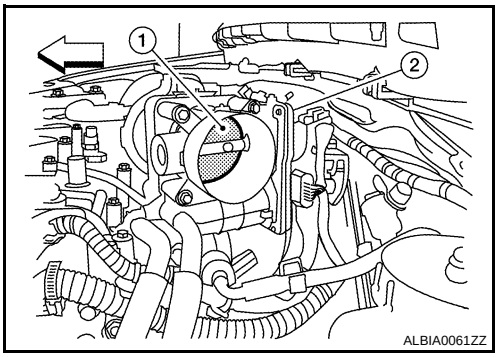
5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve (1) and the housing.



2. Electric throttle control actuator
⇦ : Vehicle front

Is the inspection result normal?

YES >> GO TO 9.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

9.CHECK THROTTLE CONTROL MOTOR

Refer to ECQ-565, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 11.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace harness or connectors.

11.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunction electric throttle control actuator.
2. Go to ECQ-566, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000001528453

1.CHECK THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between electric throttle control actuator terminals as follows.

Terminals	Resistance
1 and 3	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. Go to ECQ-566, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001528454

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-368, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

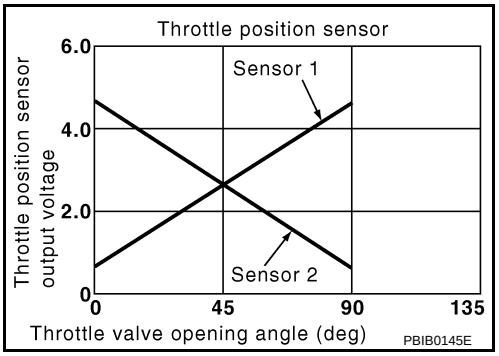
>> END

P2109 TP SENSOR

Description

INFOID:0000000001528463

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001528464

DTC DETECTION LOGIC

NOTE:
If DTC P2109 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2109	Throttle valve closed position learning performance	Throttle valve closed position is not memorized in the ECM.	• Throttle valve closed position learning has not been performed.

Diagnosis Procedure

INFOID:0000000001528465

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-368, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.ERASE DTC

With CONSULT-III
1. Turn ignition switch ON.
2. Select “SELF-DIAG RESULTS“ mode with CONSULT-III.
3. Touch “ERASE“.

Without CONSULT-III
1. Turn ignition switch ON.
2. Erase the diagnostic Test Mode II (Self-diagnostic results) memory..

Is DTC erased?

YES >> INSPECTION END.
NO >> GO TO 3.

3.CHECK INTERMITTENT INCIDENT

Refer toGI-39, "Intermittent Incident".

>> INSPECTION END.

Special Repair Requirement

INFOID:0000000001528466

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-368, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> END

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

INFOID:0000000001528467

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:0000000001528468

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P2119	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	• Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM 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.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 second.
3. Turn ignition switch ON and wait at least 1 second.
4. Set shift lever to D (CVT) or 1st (M/T) position and wait at least 5 seconds.
5. Set shift lever to N, P (CVT) or Neutral (M/T) position.
6. Start engine and let it idle for 3 seconds.
7. Check DTC.

Is DTC detected?

YES >> Go to ECQ-568, "Diagnosis Procedure".
NO >> INSPECTION END

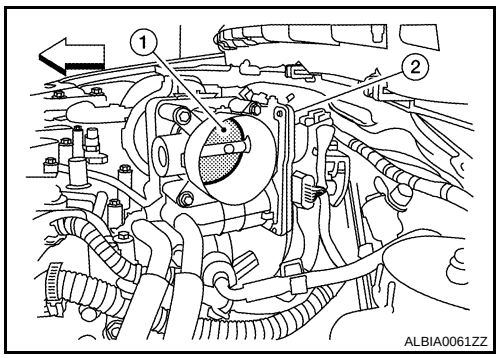
Diagnosis Procedure

INFOID:0000000001528469

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

3. Check if foreign matter is caught between the throttle valve (1) and the housing.



2. Electric throttle control actuator

⇦ : Vehicle front

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to ECQ-569, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001528470

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-368, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

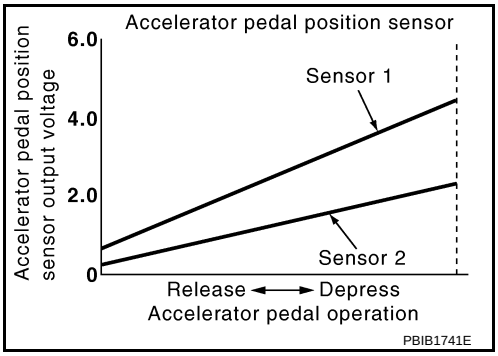
>> END

P2122, P2123 APP SENSOR

Description

INFOID:0000000001528471

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

DTC Logic

INFOID:0000000001528472

DTC DETECTION 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.) (TP sensor circuit is open or shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1) • Electric throttle control actuator (TP sensor) • Camshaft position sensor (PHASE) • Refrigerant pressure sensor
P2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 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.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to ECQ-570, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528473

1.CHECK GROUND CONNECTION

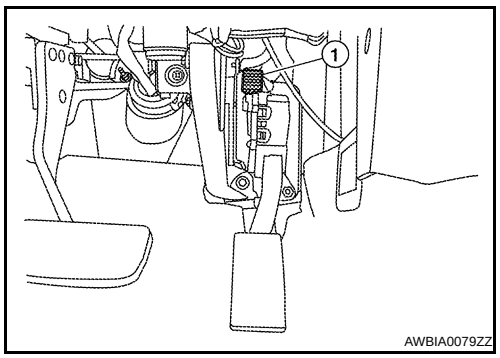
1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

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

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT-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		
E110	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT-II

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F43	15	Refrigerant pressure sensor	E49	3
	33	CMP sensor (PHASE)	F26	1
	34	TP sensor	F29	1
E19	113	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.
- Refrigerant pressure sensor (Refer to ECQ-603, "Diagnosis Procedure".)
- Camshaft position sensor (PHASE) (Refer to ECQ-513, "Component Inspection".)
- Electric throttle control actuator (TP sensor) (Refer to ECQ-502, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning component.

5. 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	
E110	2	E19	99	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 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	
E110	3	E19	107	Existed

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

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK APP SENSOR

Refer to ECQ-572, "Component Inspection".

Is the inspection result normal?

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

8.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to ECQ-572, "Special Repair Requirement".

>> INSPECTION END

9.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001528474

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 terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E110	107 (APP sensor 1 signal)	E19	98	Accelerator pedal	Fully released	0.5 - 1.0V
					Fully depressed	4.2 - 4.8V
	106 (APP sensor 2 signal)		100		Fully released	0.25 - 0.5V
					Fully depressed	2.0 - 2.5V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to ECQ-572, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001528475

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to ECQ-368, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-368, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

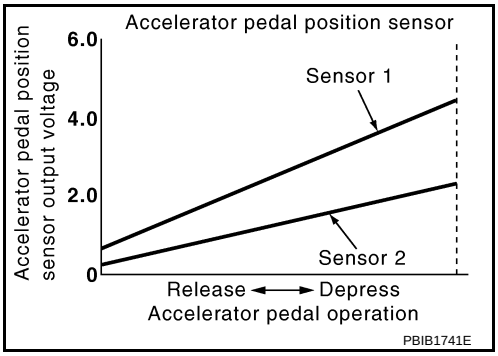
>> END

P2127, P2128 APP SENSOR

Description

INFOID:0000000001528476

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



DTC Logic

INFOID:0000000001528477

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.) [Crankshaft position sensor (POS) circuit is shorted.] • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS)
P2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 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.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to ECQ-574, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528478

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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		
E110	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	5	E19	105	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 APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E43	12	CKP sensor (POS)	F20	1
E19	105	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 ECQ-509, "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

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	
E110	1	E19	98	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 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	
E110	6	E19	106	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 ECQ-576, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to ECQ-577, "Special Repair Requirement".

>> INSPECTION END

10.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001528479

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 terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E110	107 (APP sensor 1 signal)	E19	98	Accelerator pedal	Fully released	0.5 - 1.0V
					Fully depressed	4.2 - 4.8V
	106 (APP sensor 2 signal)		100		Fully released	0.25 - 0.5V
					Fully depressed	2.0 - 2.5V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to ECQ-577, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001528480

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to ECQ-368, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-368, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

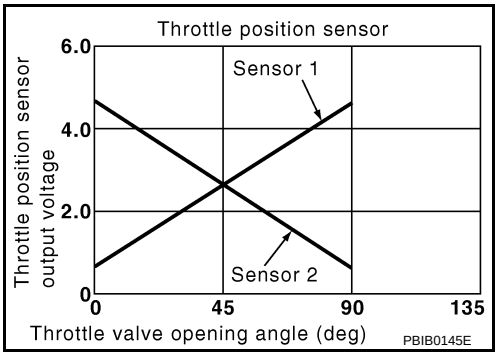
>> END

P2135 TP SENSOR

Description

INFOID:0000000001528481

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:0000000001528482

DTC DETECTION 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 and 2 circuit is open or shorted.) (APP sensor 1 circuit is open or shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) • Electric throttle control actuator (TP sensor 1 and 2) • Accelerator pedal position sensor (APP sensor 1) • Camshaft position sensor (PHASE) • Refrigerant pressure 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 8V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and keep the engine speed 2,000 rpm for at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Go to ECQ-578, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528483

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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-I

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

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F29	1	Ground	Approx. 5V

Is the inspection result normal?

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

3. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-II

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	1	F43	34	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit.

4. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F43	15	Refrigerant pressure sensor	E49	3
	33	CMP sensor (PHASE)	F26	1
	34	TP sensor	F29	1
E19	113	APP sensor	E110	4

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.
- Refrigerant pressure sensor (Refer to ECQ-603, "Diagnosis Procedure".)
- Camshaft position sensor (PHASE) (Refer to ECQ-513, "Component Inspection".)
- Accelerator pedal position sensor(APP sensor) (Refer to ECQ-572, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace malfunctioning component.

6. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	4	F43	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 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	
F29	2	F43	71	Existed
	3		72	

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 THROTTLE POSITION SENSOR

Refer to ECQ-580, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. ECQ-581, "Special Repair Requirement"

>> INSPECTION END

10.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001528484

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform ECQ-581, "Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
F43	71 (TP sensor 1 signal)	F43	52	Accelerator pedal	Fully released	More than 0.36V
					Fully depressed	Less than 4.75V
	72 (TP sensor 2 signal)				Fully released	Less than 4.75V
					Fully depressed	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. Go to ECQ-581, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001528485

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-368, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

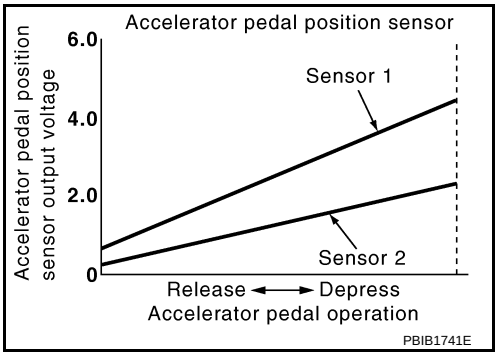
>> END

P2138 APP SENSOR

Description

INFOID:0000000001528486

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

DTC Logic

INFOID:0000000001528487

DTC DETECTION 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 and 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) (TP sensor circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2) • Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Refrigerant pressure sensor • Electric throttle control actuator (TP 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 8V 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 ECQ-583, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001528488

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "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 sensor		Ground	Voltage
Connector	Terminal		
E110	4	Ground	Approx. 5V

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. Turn ignition switch ON.
2. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E110	5	Ground	Approx. 5V

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	
E110	5	E19	105	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.

5. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F43	12	CKP sensor (POS)	F20	1
	15	Refrigerant pressure sensor	E49	3
	33	CMP sensor (PHASE)	E219	3
	34	TP sensor	F30	1
E19	105	APP sensor	E110	5
	113	APP sensor	E110	4

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 ECQ-509, "Component Inspection".)
- Refrigerant pressure sensor (Refer to ECQ-603, "Diagnosis Procedure".)
- Camshaft position sensor (PHASE) (Refer to ECQ-513, "Component Inspection".)
- Electric throttle control actuator(TP sensor) (Refer to ECQ-502, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace malfunctioning component.

7.CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	1	F19	98	Existed
	2		99	

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

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

8.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E110	3	F19	107	Existed
	6		106	

2. 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 ECQ-585, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 10.

10. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to ECQ-585, "Special Repair Requirement".

>> INSPECTION END

11. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001528489

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 terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E110	107 (APP sensor 1 signal)	E19	98	Accelerator pedal	Fully released	0.5 - 1.0V
					Fully depressed	4.2 - 4.8V
	106 (APP sensor 2 signal)		99		Fully released	0.25 - 0.5V
					Fully depressed	2.0 - 2.5V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to ECQ-585, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001528490

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to ECQ-368, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to ECQ-368, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> END

ASCD BRAKE SWITCH

Description

INFOID:0000000001528496

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 ECQ-399, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000001528497

1.CHECK FOR ASCD BRAKE SWITCH FUNCTION

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as follows.

ECM		ECM		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E19	94 (ASCD brake switch signal)	E19	121	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	Approx. 0V
					Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to ECQ-586, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001528498

1.CHECK OVERALL FUNCTION-I

Check which type of transmission the vehicle is equipped with.

Is the inspection result normal?

CVT >> GO TO 2.
M/T >> GO TO 6.

2.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector M77, E105
- 10A fuse (No. 1)
- Harness for open or short between ASCD brake switch and fuse

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

4.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

ASCD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E112	2	E19	94	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 ASCD BRAKE SWITCH

Refer to ECQ-588, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD brake switch.

6. CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.
4. Check the continuity between ASCD clutch switch harness connector and ground.

ASCD clutch switch		Ground	Condition		Voltage (V)
Connector	Terminal				
E111	1	Ground	Brake pedal	Slightly depressed	Approx. 0
				Fully released	Battery voltage

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

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 7.

7. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

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

8. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector M77, E105
- 10A fuse (No. 1)
- 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.

9. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Check the continuity between ASCD brake switch harness connector and ASCD clutch switch harness connector.

ASCD brake switch		ASCD clutch switch		Continuity
Connector	Terminal	Connector	Terminal	
E112	2	E111	1	Existed

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 ASCD BRAKE SWITCH

Refer to ECQ-588, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD brake switch.

11. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

ASCD clutch switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E111	2	E19	94	Existed

4. 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 ASCD CLUTCH SWITCH

Refer to ECQ-589, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD clutch switch.

13. CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000001528499

1. CHECK ASCD BRAKE SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-8, "Inspection and Adjustment".
2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD brake switch.

Component Inspection (ASCD Clutch Switch)

INFOID:0000000001528500

1.CHECK ASCD CLUTCH SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ASCD CLUTCH SWITCH-II

1. Adjust ASCD clutch switch installation. Refer to CL-5, "Inspection and Adjustment".
2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD clutch switch.

ASCD INDICATOR

Description

INFOID:0000000001528501

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 ECQ-399, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000001528502

1.ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	• Ignition switch: ON	• MAIN switch: Pressed at the 1st time →at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed: Between 40 km/h (25 MPH) and M/T models:171 km/h (106 MPH),CVT models:166 km/h (103 MPH).	• ASCD: Operating	ON
		• ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-590, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001528503

1.CHECK DTC

Check that DTC U1000 or U1001 is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for DTC U1000, U1001. Refer to ECQ-451, "DTC Logic".

2.CHECK COMBINATION METER OPERATION

Refer to WCS-9, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check combination meter circuit. Refer to WCS-4, "WARNING CHIME SYSTEM : System Diagram".

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

COOLING FAN

Description

INFOID:0000000001528504

Cooling fan operates at each speed when the current flows in the cooling fan motor as follows.
Refer to ECQ-407, "System Diagram" for cooling fan operation.

Component Function Check

INFOID:0000000001528505

1. CHECK COOLING FAN LOW SPEED FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III and touch “LOW” on the CONSULT-III screen.
3. Make sure that cooling fans operates at low speed.

Without CONSULT-III

1. Start engine and let it idle.
2. Turn air conditioner switch and blower fan switch ON.
3. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Check cooling fan low speed control circuit.

2. CHECK COOLING FAN HIGH SPEED FUNCTION

With CONSULT-III

1. Touch “HI” on the CONSULT-III screen.
2. Make sure that cooling fans operates at higher speed than low speed.

Without CONSULT-III

1. Turn ignition switch OFF.
2. Turn air conditioner switch and blower fan switch OFF.
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5. Restart engine and make sure that cooling fan operates at higher speed than low speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Check cooling fan high speed control circuit.

Diagnosis Procedure

INFOID:0000000001528506

1. CHECK IPDM E/R POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E10.
3. Check the voltage between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Voltage
Connector	Terminal		
E10	6	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short ground or short to power in harness or connectors.

2. CHECK COOLING FAN MOTORS POWER SUPPLY CIRCUIT-I

1. Disconnect cooling fan relay-4 and -5.
2. Check the voltage between cooling fan relays terminals and ground.

Cooling fan relay			Ground	Voltage
Relay	Connector	Terminal		
4	E57	2	Ground	Battery voltage
5	E59	2		

3. Also check harness for short to ground or short to power.

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R connector E14
- 15A fuse (No. 63)
- Harness for open or short between IPDM E/R and cooling fan relay-4 and -5.

>> Repair or replace malfunctioning part.

4. CHECK COOLING FAN MOTORS POWER SUPPLY CIRCUIT-II

1. Disconnect cooling fan motor-2 harness connector.
2. Check the voltage between cooling fan motor-2 harness connector and ground.

Cooling fan motor-2		Ground	Voltage
Connector	Terminal		
E54	1	Ground	Battery voltage
	2		

3. Also check harness for short to ground or short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- 40A fusible link (letter M)
- Harness for open or short between cooling fan motor-2 and battery

>> Repair or replace malfunctioning part.

6. CHECK COOLING FAN MOTORS CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-1, 2 harness connector.
3. Check the continuity between cooling fan motor-1, 2 harness connectors and IPDM E/R harness connector.

Cooling fan motor			IPDM E/R		Continuity
Motor	Connector	Terminal	Connector	Terminal	
1	E53	1	E10	4	Existed
1	E53	2	E10	8	
2	E54	3	E10	7	

4. 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 for open or short between cooling fan motor-1, -2 and IPDM E/R
- Harness for open or short between cooling fan motor-1 and ground
- Harness for open or short between IPDM E/R and ground

>> Repair or replace malfunctioning part.

8. CHECK COOLING FAN MOTORS CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor--1, -2harness connector.
3. Check the continuity between cooling fan relay-4, -5 terminals and cooling fan motor-1, -2 harness connector.

Cooling fan relay			Cooling fan motor			Continuity
Relay	Connector	Terminal	motor	Connector	Terminal	
4	E57	5	1	E53	2	Existed
4	E57	3	2	E54	3	
5	E59	3	2	E54	4	

4. Check the continuity between cooling fan relay-4, -5 terminals and IPDM E/R harness connector.

Cooling fan relay			IPDM E/R		Continuity
Relay	Connector	Terminal	Connector	Terminal	
4	E57	1	E13	31	Existed
		2	E14	40	
		3	E10	7	
		5	E10	8	
5	E59	1	E15	50	
		2		40	

5. Check the continuity between cooling fan relay-4, 5 or IPDM E/R harness connector or cooling fan motor-1, -2 harness connector ground.

Cooing fan relay			IPDM E/R		Cooling fan motor-1		Ground	Continuity
Relay	Connector	Terminal	Connector	Terminal	Connector	Terminal		
5	E59	5	E11	11	E53	3	Ground	Existed
			E13	25		4		

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

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan relay-4, -5 and IPDM E/R
- Harness for open or short between cooling fan relay-4 and cooling fan motor-1,-2
- Harness for open or short between cooling fan relay-5 and cooling fan motor-1
- Harness for open or short between cooling fan relay-5 and ground
- Harness for open or short between cooling fan motor-1 and ground
- Harness for open or short between IPDM E/R and ground

>> Repair or replace malfunctioning part.

10.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace ground connection.

11.CHECK COOLING FAN RELAYS

Refer to ECQ-594, "Component Inspection (Cooling Fan Relay)".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace malfunctioning cooling fan relay.

12.CHECK COOLING FAN MOTORS

Refer to ECQ-594, "Component Inspection (Cooling Fan Motor)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace malfunctioning cooling fan motor.

13.CHECK INTERMITTENT INCIDENT

Perform GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connector.

Component Inspection (Cooling Fan Motor)

INFOID:0000000001528507

1.CHECK COOLING FAN MOTORS

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-1 and -2 harness connectors E53, E54.
3. Supply cooling fan motor terminals with battery voltage and check operation.

Speed	Terminals		Operation
	(+)	(–)	
Low	1	4	Cooling fans operates at low speed.
	2	3	
High	1 and 2	3 and 4	Cooling fans operates at high speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan motor.

Component Inspection (Cooling Fan Relay)

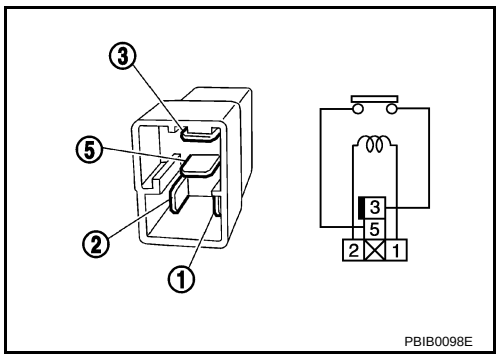
INFOID:0000000001528508

1.CHECK COOLING FAN RELAYS

1. Turn ignition switch OFF.
2. Remove cooling fan relay.

3. Check the continuity between cooling fan relay terminals under the following conditions.

Terminals	Conditions	Continuity
3 and 5	12V direct current supply between terminals 1 and 2	Existed
	No current supply	Not existed



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Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace cooling fan relay.

ELECTRICAL LOAD SIGNAL

Description

INFOID:0000000001528509

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred through the CAN communication line from BCM to ECM via IPDM E/R.

Component Function Check

INFOID:0000000001528510

1.CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

1. Turn ignition switch ON.
2. Connect CONSULT-III and select “DATA MONITOR” mode.
3. Select “LOAD SIGNAL” and check indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Rear window defogger switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to ECQ-596, "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 ECQ-596, "Diagnosis Procedure".

3.CHECK HEATER FAN CONTROL SWITCH FUNCTION

Select “HEATER FAN SW” and check indication under the following conditions.

Monitor item	Condition		Indication
HEATER FAN SW	Heater fan control switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-596, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001528511

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to ECQ-596, "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-4, "System Diagram".

>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Refer to EXL-13, "System Diagram" (XENON TYPE) or EXL-237, "System Diagram" (HALOGEN TYPE).

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Refer to GI-39, "Intermittent Incident".

>> INSPECTION END

FUEL PUMP

Description

INFOID:0000000001528516

Sensor	Input signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓ Fuel pump
Battery	Battery voltage*		

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

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine startability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops.
Except as shown above	Stops.

Component Function Check

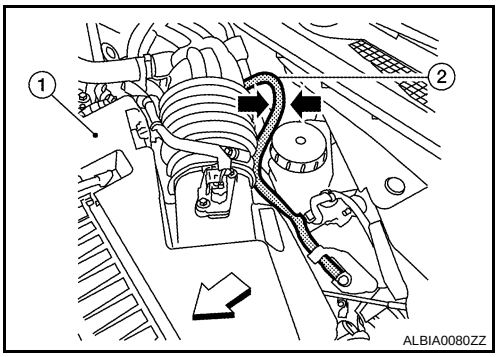
INFOID:0000000001528517

1.CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose (2) with two fingers.

1 : Air cleaner assembly

⇦ : Vehicle front



Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

YES >> INSPECTION END

NO >> ECQ-598, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001528518

1.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector and ground.

(+)		(–)		Ground	Voltage
Connector	Terminal	Connector	Terminal		
F43	78	E19	121	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect IDPDM E/R harness connector F10.
3. Check the continuity between IPDM E/R harness connector and ECM harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F43	78	E13	33	Existed

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E6, B123
- IPDM E/R connector F10
- Harness for open or short between “fuel level sensor unit and fuel pump” and IPDM E/R

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

4.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Disconnect “fuel level sensor unit and fuel pump” harness connector.
2. Check the continuity between IPDM E/R harness connector and “fuel level sensor unit and fuel pump” and ground.

IPDM E/R		Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E14	46	B40	5	Existed

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connector (B66, B67),(M11, B1),(E105, M77)
- 15A fuse (NO.57)
- Harness for open or short between “fuel level sensor unit and fuel pump” and IPDM E/R
- Harness for open or short between “fuel level sensor unit and fuel pump” and ground

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

6.CHECK FUEL PUMP GROUND CIRCUIT

1. Check the continuity between “fuel level sensor unit and fuel pump” and ground.

Fuel level sensor unit and fuel pump		Ground	Continuity
Connector	Terminal		
B40	3	Ground	Existed

2. Also heck harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to power in harness or connectors.

7.CHECK FUEL PUMP

Refer to ECQ-600, "Component Inspection (Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace fuel pump.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

Component Inspection (Fuel Pump)

INFOID:0000000001528519

1.CHECK FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Check resistance between “fuel level sensor unit and fuel pump” terminals as follows.

Terminals	Resistance
1 and 3	0.2 - 5.0Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace “fuel level sensor unit and fuel pump”.

Component Inspection (Condenser-1)

INFOID:0000000001528520

1.CHECK CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser-1 harness connector.
3. Check resistance between condenser-1 terminals as follows.

Terminal	Resistance
1 and 2	Above 1MΩ [at 25°C (77°F)]

Is the inspection result normal?

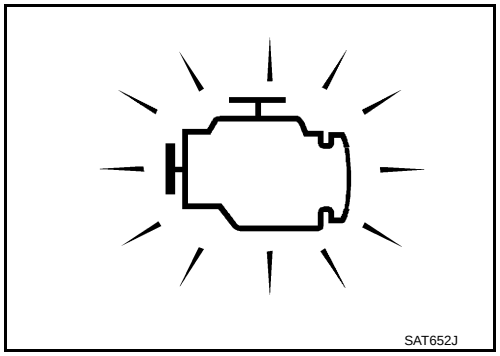
YES >> INSPECTION END
NO >> Replace condenser-1.

MALFUNCTION INDICATOR LAMP

Description

INFOID:0000000001528526

The Malfunction Indicator Lamp (MI) is located on the combination meter.
The MI 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 MI should go off. If the MI remains on, the on board diagnostic system has detected an engine system malfunction.
For details, refer to ECQ-601, "Diagnosis Procedure".



Component Function Check

INFOID:0000000001528527

1.CHECK MI FUNCTION

1. Turn ignition switch ON.
2. Make sure that MI lights up.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-601, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001528528

1.CHECK DTC

Check that DTC U1000 or U1001 is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for DTC U1000, U1001. Refer to ECQ-451, "Diagnosis Procedure".

2.CHECK DTC WITH METER

Refer to MWI-24, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-39, "Intermittent Incident".

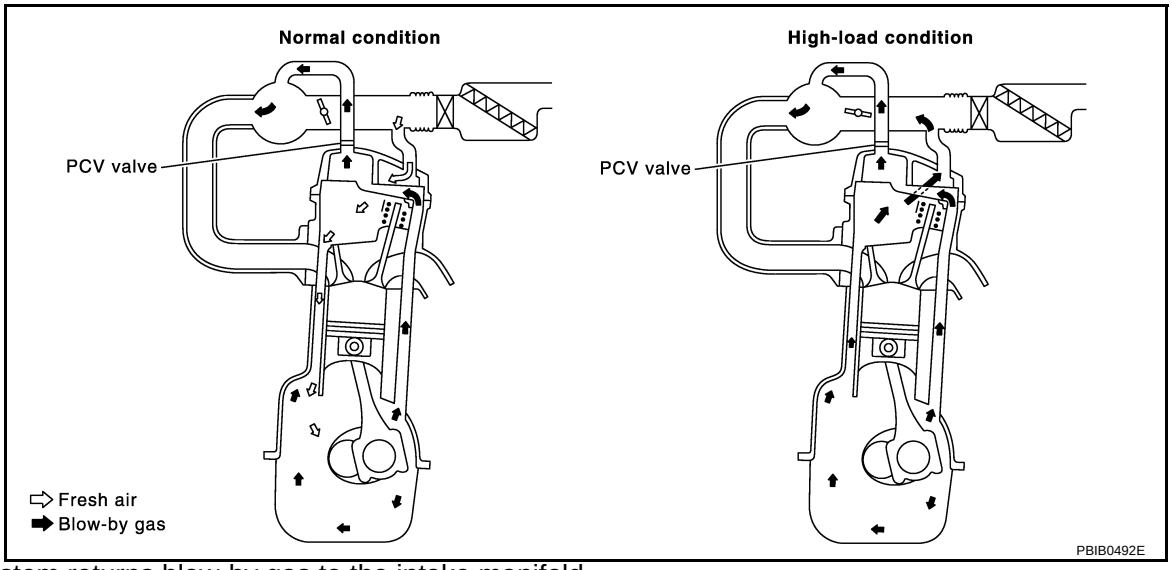
Is the inspection result normal?

YES >> Replace combination meter.
NO >> Repair or replace.

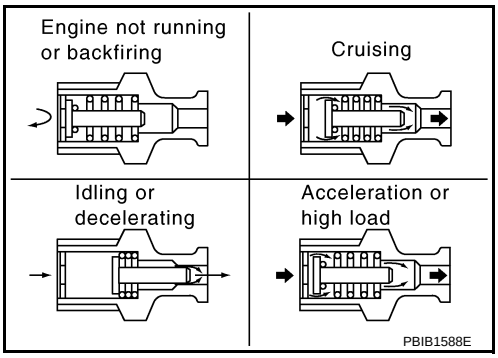
POSITIVE CRANKCASE VENTILATION

Description

INFOID:0000000001528533



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 then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



Component Inspection

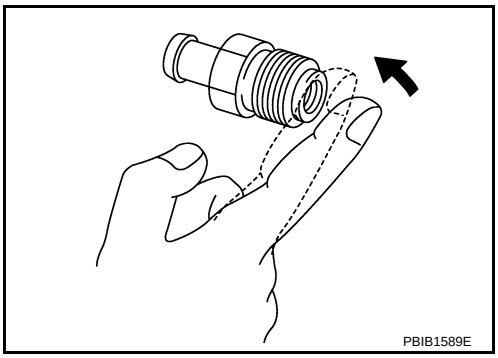
INFOID:0000000001528534

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.

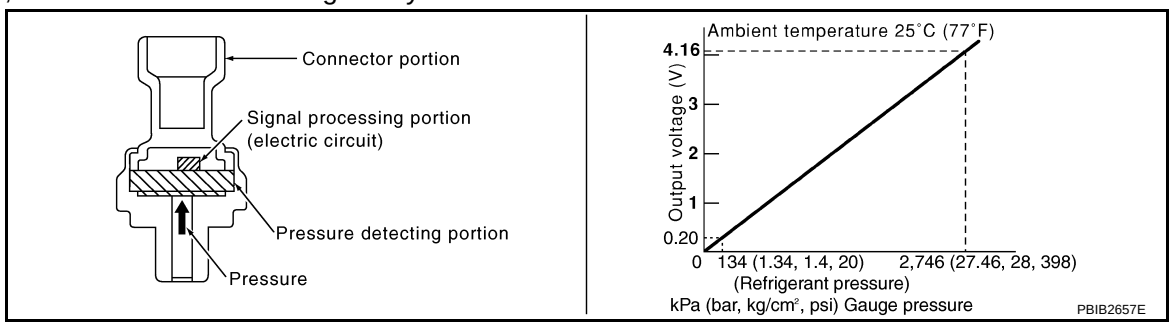


REFRIGERANT PRESSURE SENSOR

Description

INFOID:0000000001528535

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



Component Function Check

INFOID:0000000001528536

1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower fan switch ON.
3. Check the voltage between ECM harness connector terminals as follows.

ECM		ECM		Voltage
Connector	Terminal	Connector	Terminal	
F43	37 (Refrigerant pressure sensor signal)	F43	18	1.0 - 4.0V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to ECQ-603, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001528537

1. CHECK GROUND CONNECTION

1. Turn A/C switch and blower fan switch OFF.
2. Stop engine.
3. Turn ignition switch OFF.
4. Check ground connection E21. Refer to Ground Inspection in GI-41, "Circuit Inspection".

Is the inspection result normal?

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

2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pressure sensor		Ground	Voltage
Connector	Terminal		
E49	3	Ground	Approx. 5V

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- Harness for open or short between ECM and refrigerant pressure sensor

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

4.CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E49	1	F43	18	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 F1, E3
- Harness for open or short between ECM and refrigerant pressure sensor

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

6.CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and refrigerant pressure sensor harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E49	2	F43	37	Existed

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

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- 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-39, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.
NO >> Repair or replace.

ECU DIAGNOSIS

ECM

Reference Value

INFOID:0000000001528538

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.

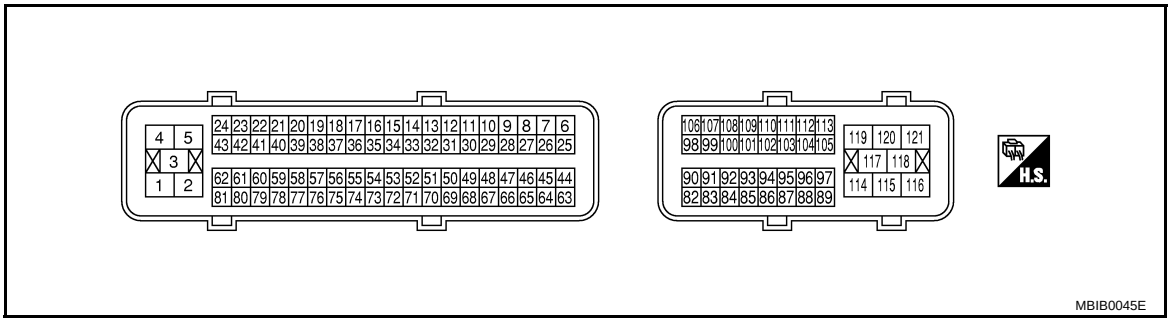
Monitor Item	Condition		Values/Status
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See ECQ-440, "Diagnosis Procedure".		
B/FUEL SCHDL	See ECQ-440, "Diagnosis Procedure".		
A/F ALPHA-B1	See ECQ-440, "Diagnosis Procedure".		
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
HO2S2 (B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		0 - 0.3V ←→ Approx. 0.6 - 1.0V
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2*1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
THRL SEN 1-B1	• Ignition switch: ON (Engine stopped) • Shift lever: D (CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
THRL SEN 2-B1*1	• Ignition switch: ON (Engine stopped) • Shift lever: D (CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
INT/A TEMP SE	• Ignition switch: ON		Indicates intake air temperature
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	• Ignition switch: ON	Shift lever: P or N (CVT), Neutral (M/T)	ON
		Selector lever: Except above	OFF
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON
		Rear window defogger switch and lighting switch: OFF	OFF

Monitor Item	Condition		Values/Status
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
CAL/LD VALUE	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	4.0 - 10.0 g·m/s
PURG VOL C/V	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%
		2,000 rpm	20% - 90%
INT/V TIM (B1)	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	–5° - 5°CA
		2,000 rpm	Approx. 0° - 20°CA
INT/V SOL (B1)	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0%
		2,000 rpm	Approx. 0% - 60%
AIR COND RLY	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	• For 1 seconds after turning ignition switch: ON • Engine running or cranking		ON
	• Except above		OFF
THRTL RELAY	• Ignition switch: ON		ON
COOLING FAN	• Engine: After warming up • Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F)or less.	OFF
		Engine coolant temperature is between94°C (203°F) and 99°C (210°F)	LOW
		Engine coolant temperature is between94°C (203°F) and 99°C (210°F)	MID
		Engine coolant temperature is 100°C (212°F) or more	HIGH
HO2S2 HTR (B1)	• 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
	• For 2 minutes after starting engine		OFF
I/P PULLY SPD	• Vehicle speed: More than 20 km/h (12 MPH)		Almost the same speed as the tachometer indication

Monitor Item	Condition		Values/Status
A/F LEARN-B1	• Engine: After warming up, idle the engine		–16.500 - 10.359%
VEHICLE SPEED	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
TRVL AFTER MIL	• Ignition switch: ON	Vehicle has traveled after MI has turned ON.	0 - 65,535 km (0 - 40,723 miles)
A/F S1 HTR (B1)	• Engine: After warming up, idle the engine (More than 140 seconds after starting engine.)		4 - 100%
AC PRESS SEN	• Engine: Idle • Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0V
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
SET VHCL SPD	• Engine: Running	ASCD: Operating	The preset vehicle speed is displayed

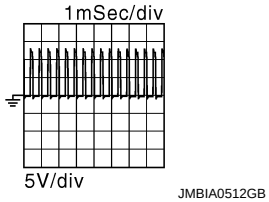
*1: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

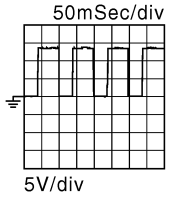
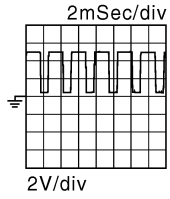
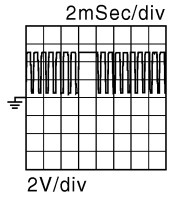
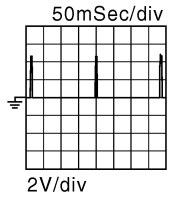
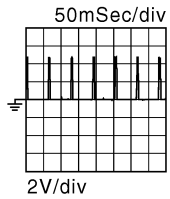
TERMINAL LAYOUT

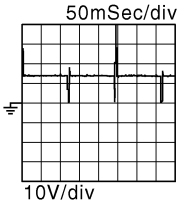
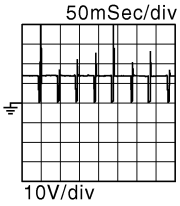
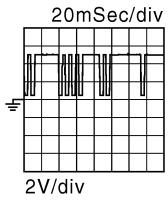
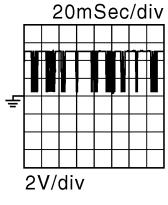


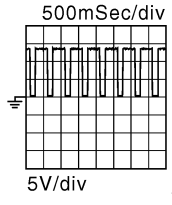
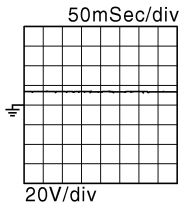
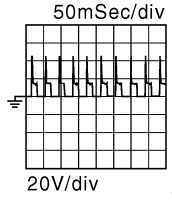
PHYSICAL VALUES

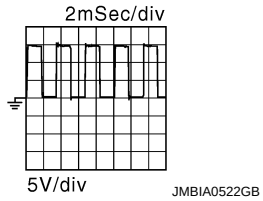
NOTE:
- ECM is located behind the passenger side instrument lower panel. For this inspection, remove passenger side instrument lower panel.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
1 (L/Y)	121 (B)	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14V★  JMBIA0512GB
2 (R)	121 (B)	Throttle control motor relay power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
3 (P)	121 (B)	Throttle control motor (Close)	Output	[Ignition switch: ON] • For 10 second after turning ignition switch ON • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	0 - 14V★

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
4 (R)	121 (B)	A/F sensor 1 heater	Output	[Engine is running] • Warm-up condition • Idle speed	0 - 14V★  JMBIA0513GB
5 (B)	—	ECM ground	—	—	—
6 (W)	121 (B)	Crankshaft position sensor (POS)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  JMBIA0514GB
				[Engine is running] • Engine speed: 2,000 rpm	1.0 - 4.0V★  JMBIA0515GB
9 (R) 10 (SB) 28 (W) 29 (G)	121 (B)	Ignition signal No. 3 Ignition signal No. 2 Ignition signal No. 1 Ignition signal No. 4	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 4.0V★  JMBIA0516GB
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 - 4.0V★  JMBIA0517GB
11 (B)	—	Sensor ground [Crankshaft position sensor (POS)]	—	—	—
12 (P)	121 (B)	Sensor power supply [Crankshaft position sensor (POS)]	—	[Ignition switch: ON]	5V
15 (L)	121 (B)	Sensor power supply (Refrigerant pressure sensor)	—	[Ignition switch: ON]	5V
18 (V)	—	Sensor ground (Refrigerant pressure sensor)	—	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
20 (G)	121 (B)	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] • A few seconds after turning ignition switch OFF	0 - 1.5V
				[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
21 (P)	121 (B)	Fuel injector No. 4	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  JMBIA0089GB
23 (BR)		Fuel injector No. 3			
59 (GR)		Fuel injector No. 2		[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  JMBIA0090GB
60 (LG)		Fuel injector No. 1			
22 (LG)	121 (B)	Throttle control motor relay	Output	[Ignition switch: ON → OFF]	0 - 1.5V ↓ BATTERY VOLTAGE (11 - 14V)
				[Ignition switch: ON]	0 - 1.0V
25 (G)	121 (B)	Camshaft position sensor (PHASE)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 4.0★  JMBIA0518GB
				[Engine is running] • Engine speed is 2,000 rpm	1.0 - 4.0★  JMBIA0519GB
27 (LG)	121 (B)	PNP switch	Input	[Ignition switch: ON] • Shift lever: P or N (CVT), Neutral (M/T)	BATTERY VOLTAGE (11 - 14V)
				[Ignition switch: ON] • Shift lever: Except above	0V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
30 (Y)	—	Sensor ground [Camshaft position sensor (PHASE)]	—	—	—
33 (P)	121 (B)	Sensor power supply [Camshaft position sensor (PHASE)]	—	[Ignition switch: ON]	5V
34 (W)	121 (B)	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5V
37 (LG)	18 (V)	Refrigerant pressure sensor	Input	[Engine is running] • Warm-up condition • Both A/C switch and blower fan motor switch: ON (Compressor operates)	1.0 - 4.0V
39 (Y)	121 (B)	Heated oxygen sensor 2 heater	Output	[Engine is running] • 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 - 14V★  JMBIA0520GB
				[Ignition switch: ON] • Engine stopped [Engine is running] • For 2 minutes after starting engine • Idle speed	BATTERY VOLTAGE (11 - 14V)
42 (Y)	121 (B)	EVAP canister purge volume control solenoid valve	Output	[Engine is running] • Idle speed	BATTERY VOLTAGE (11 - 14V)★  JMBIA0087GB
				[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)	BATTERY VOLTAGE (11 - 14V)★  JMBIA0521GB
44 (O)	121 (B)	Knock sensor 2	—	[Engine is running] • Warm-up condition • Idle speed	2.4V
46 (L)	—	Sensor ground (Heated oxygen sensor 2)	—	—	—
48 (Y)	—	Sensor ground (Intake air temperature sensor)	—	—	—
51 (L)	—	Sensor ground (Mass air flow sensor)	—	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
52 (R)	—	Sensor ground (Throttle position sensor)	—	—	—
53 (LG)	121 (B)	A/F sensor 1	Input	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.
54 (Y)	121 (B)	A/F sensor 1 (bank 1)	Input	[Ignition switch: ON]	2.2V
56 (O)	—	Sensor ground (Engine coolant temperature sensor)	—	—	—
62 (O)	121 (B)	Intake valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14V)
				[Engine is running] • Warm-up condition • Engine speed: 2,000rpm	0 - 14V★  JMBIA0522GB
63 (W)	121 (B)	Knock sensor 1	Input	[Engine is running] • Idle speed	2.4V
65 (P)	46 (L)	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 - 1.0V
67 (W)	48 (Y)	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with intake air temperature.
71 (G)	52 (R)	Throttleposition sensor 1	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
				[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
72 (B)	52 (R)	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
				[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
73 (P)	51 (L)	Mass air flow sensor	Input	[Engine is running] • Warm-up condition • Idle speed	0.9 - 1.1V
				[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	1.4 - 1.7V
75 (P)	56 (O)	Engine coolant temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with engine coolant temperature.
78 (L)	121 (B)	Fuel pump relay	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.5V
				[Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)
82 (L)	121 (B)	CAN communication line	Input/ Output	—	—
84 (R)	121 (B)	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0V
				[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
87 (Y)	121 (B)	Data link connector	Input/ Output	[Ignition switch: ON] • CONSULT-III : Disconnected	BATTERY VOLTAGE (11 - 14V)
89 (O)	121 (B)	Power supply for ECM (Back-up)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
90 (P)	121 (B)	CAN communication line	Input/ Output	—	—
93 (O)	121 (B)	Ignition switch	Input	[Ignition switch: OFF]	0V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
94 (GR)	121 (B)	ASCD brake switch	Input	[Ignition switch: ON] • Brake pedal: Slightly depressed (CVT) • Brake pedal or clutch pedal: Slightly depressed (M/T)	0V
				[Ignition switch: ON] • Brake pedal: Fully released (CVT) • Brake pedal and clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)
98 (B)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
99 (W)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—
100 (B)	—	Sensor ground (ASCD steering switch)	—	—	—
105 (V)	121 (B)	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
106 (G)	99 (W)	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4V
107 (R)	98 (B)	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7V
108 (V)	100 (B)	ASCD steering switch	Input	[Ignition switch: ON] • ASCD steering switch: OFF	4V
				[Ignition switch: ON] • MAIN switch: Pressed	0V
				[Ignition switch: ON] • CANCEL switch: Pressed	1V
				[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3V
				[Ignition switch: ON] • SET/COAST switch: Pressed	2V
113 (LG)	121 (B)	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5V
115 (R)	121 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
118 (B) 119 (B) 120 (B) 121 (B)	—	ECM ground	—	—	—

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Wiring Diagram — ENGINE CONTROL SYSTEM —

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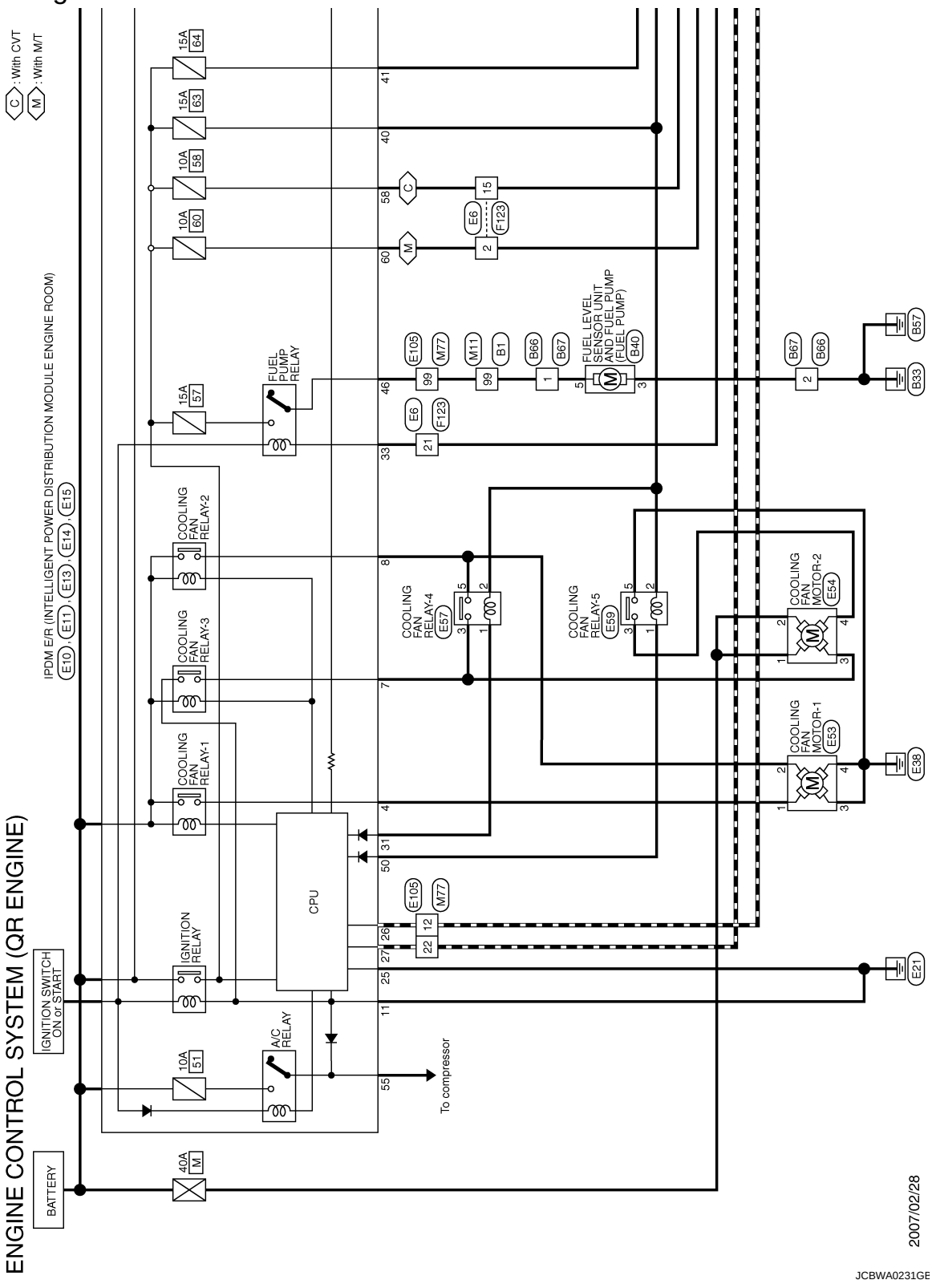
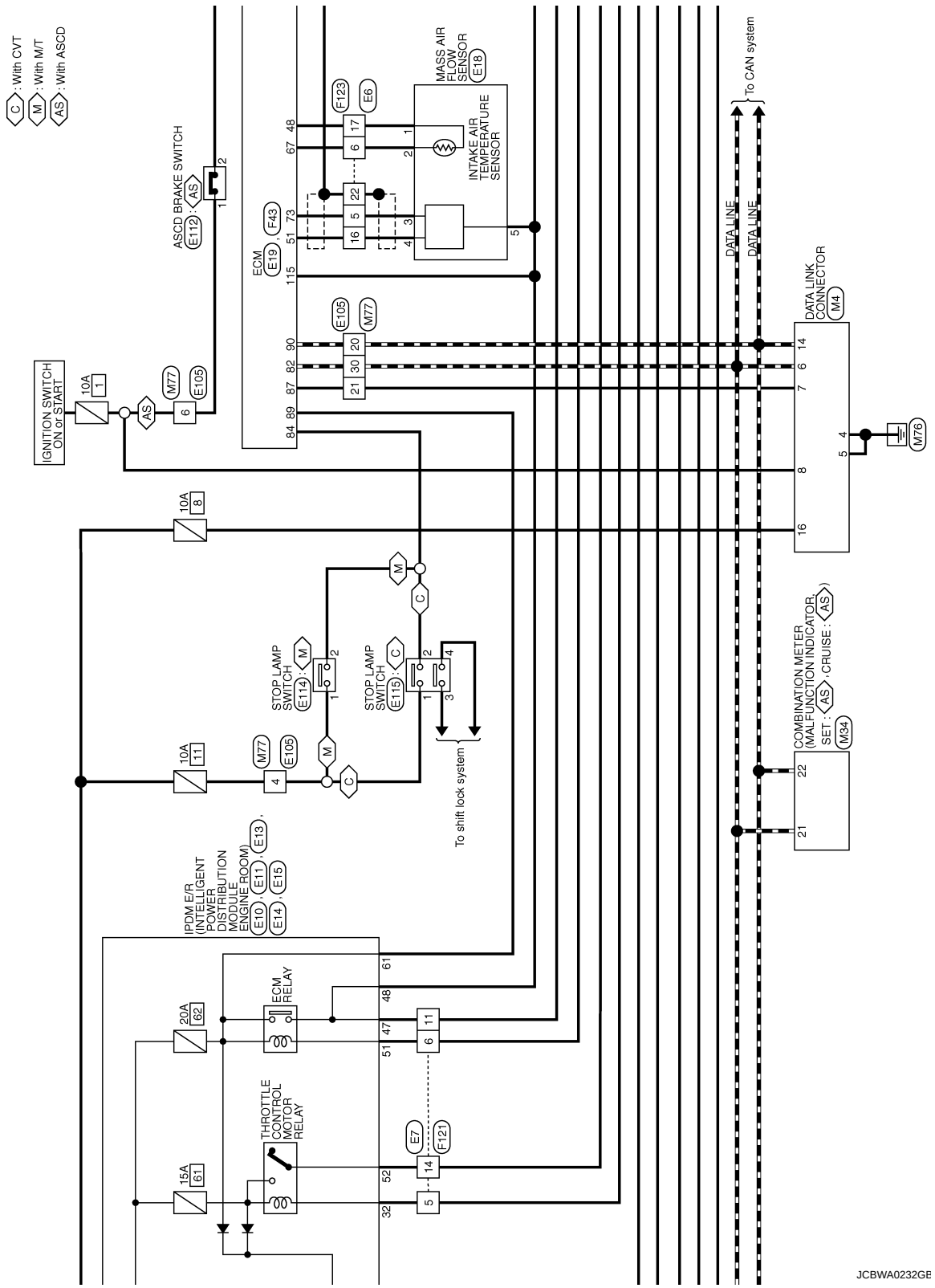
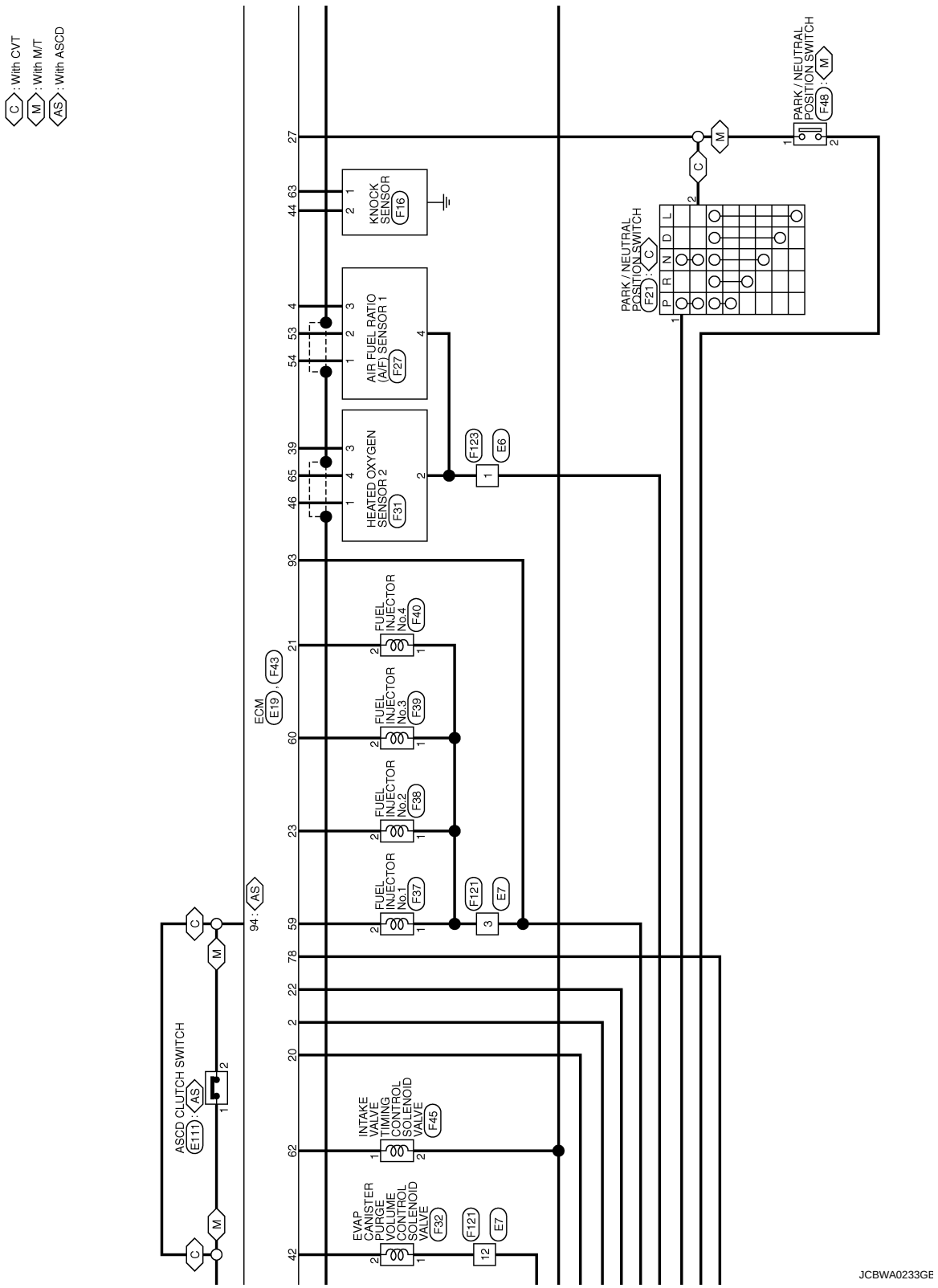
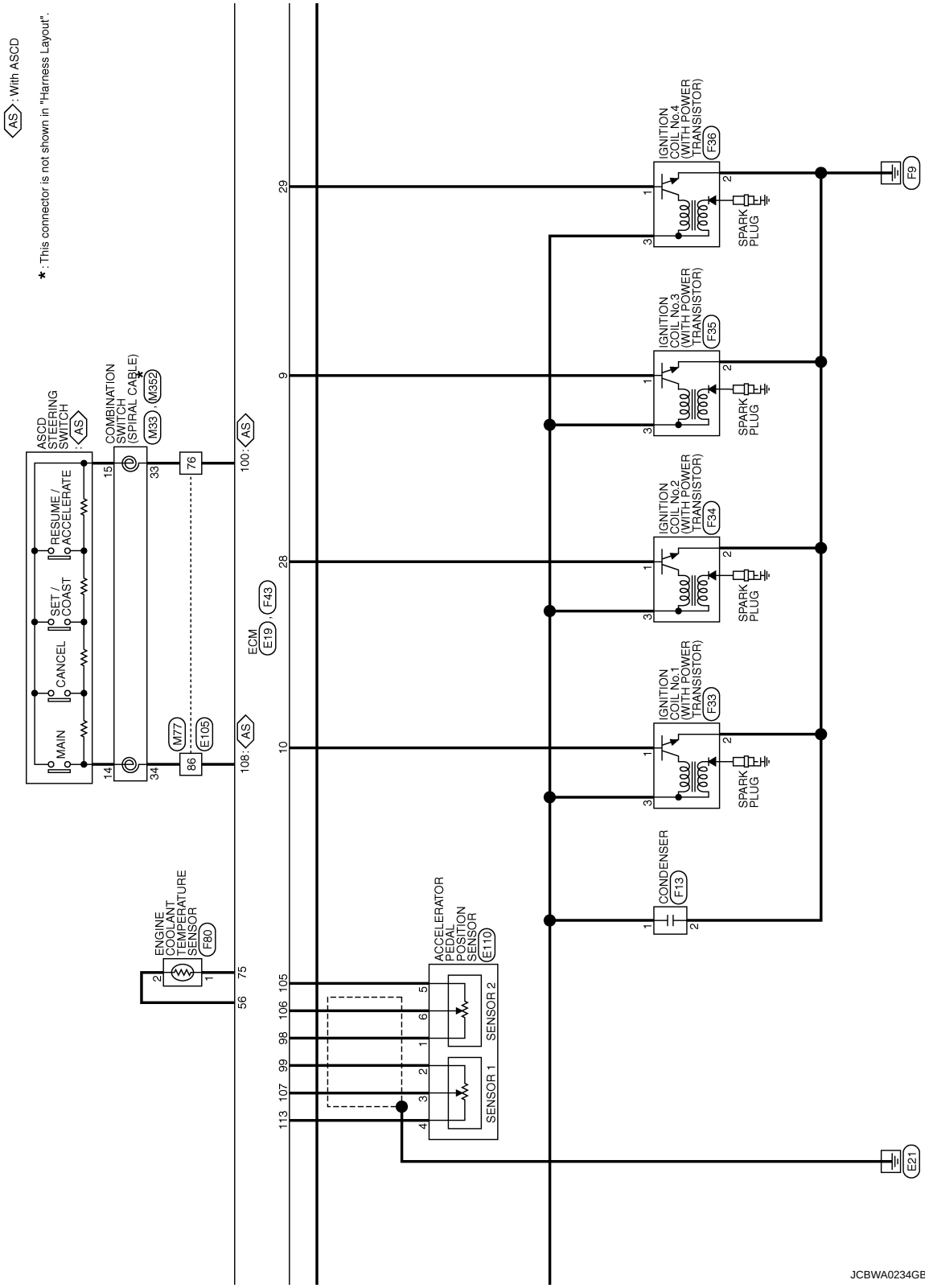
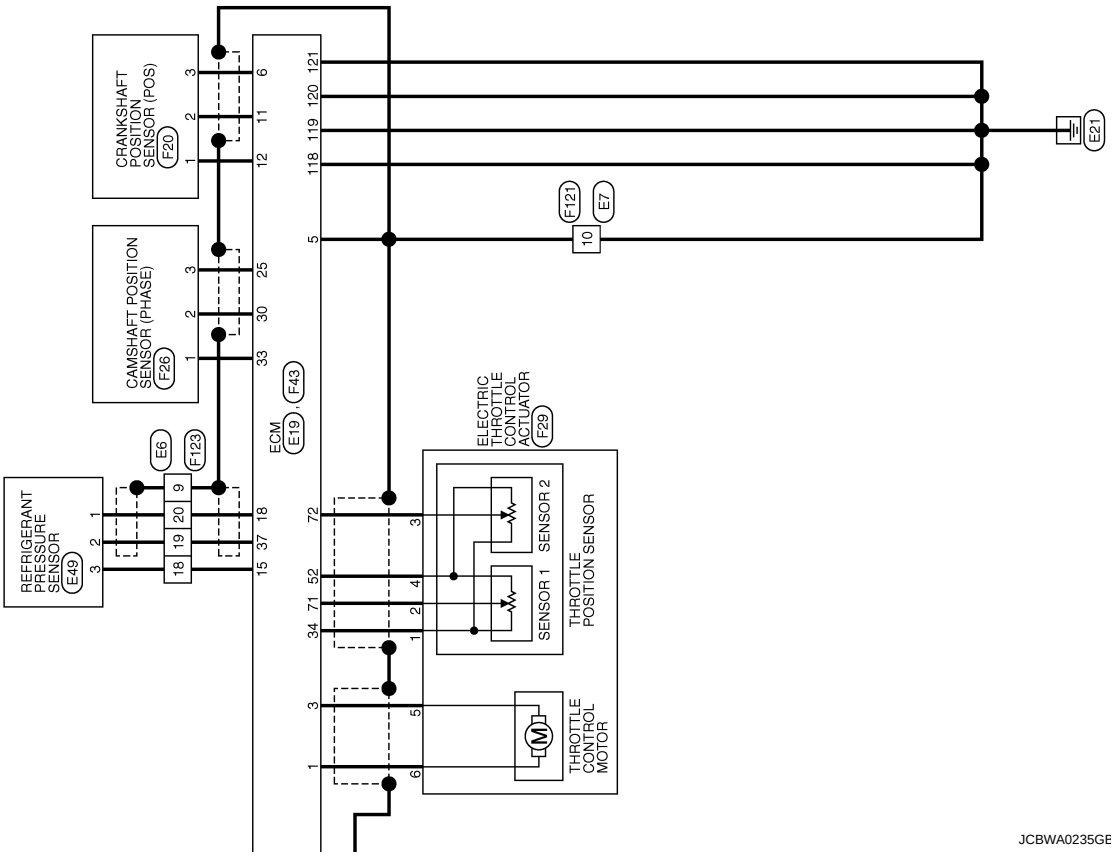



C : With CVT
M : With M/T
AS : With ASCD
ASCD BRAKE SWITCH
E112 : AS
MASS AIR FLOW SENSOR
E18
INTAKE AIR TEMPERATURE SENSOR
F123
E6
F43
ECM
E19
To CAN system
DATA LINE
DATA LINE
DATA LINK CONNECTOR
M4
M76
IGNITION SWITCH ON or START
10A 1
E105
M77
10A 8
10A 11
STOP LAMP SWITCH
E114 : M
STOP LAMP SWITCH
E115 : C
To shift lock system
COMBINATION METER
(MALFUNCTION INDICATOR,
SET : AS, CRUISE : AS)
M34
IPDM E/R
(INTELLIGENT
POWER
DISTRIBUTION
MODULE
ENGINE ROOM)
E10, E11, E13,
E14, E15
20A 62
ECM RELAY
15A 61
THROTTLE CONTROL MOTOR RELAY
E7
F121
JCBWA0232GB


C : With CVT
M : With M/T
AS : With ASCD
PARK / NEUTRAL POSITION SWITCH (F48) : M
PARK / NEUTRAL POSITION SWITCH (F21) : C
P R N D L
KNOCK SENSOR (F16)
AIR FUEL RATIO (A/F) SENSOR 1 (F27)
HEATED OXYGEN SENSOR 2 (F31)
F123
E6
FUEL INJECTOR No.4 (F40)
FUEL INJECTOR No.3 (F39)
FUEL INJECTOR No.2 (F38)
FUEL INJECTOR No.1 (F37)
F121
E7
ECM (E19) : (F43)
94 : AS
ASCD CLUTCH SWITCH (E11) : AS
INTAKE VALVE TIMING CONTROL SOLENOID VALVE (F45)
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (F32)
JCBWA0233GE


AS : With ASCD
* : This connector is not shown in "Harness Layout".
ASCD STEERING SWITCH AS
RESUME / ACCELERATE
SET / COAST
CANCEL
MAIN
COMBINATION SWITCH (SPIRAL CABLE)* M352 M33
M77 E105
ENGINE COOLANT TEMPERATURE SENSOR F80
ECM E19 : F43
ACCELERATOR PEDAL POSITION SENSOR E110
SENSOR 1
SENSOR 2
IGNITION COIL No.4 (WITH POWER TRANSISTOR) F36
IGNITION COIL No.3 (WITH POWER TRANSISTOR) F35
IGNITION COIL No.2 (WITH POWER TRANSISTOR) F34
IGNITION COIL No.1 (WITH POWER TRANSISTOR) F33
CONDENSER F13
SPARK PLUG
F9
E21
JCBWA0234GB


CRANKSHAFT POSITION SENSOR (POS)
F20
CAMSHAFT POSITION SENSOR (PHASE)
F26
REFRIGERANT PRESSURE SENSOR
E49
E6
F123
ECM
E19
F43
ELECTRIC THROTTLE CONTROL ACTUATOR
F29
THROTTLE POSITION SENSOR
SENSOR 1
SENSOR 2
THROTTLE CONTROL MOTOR
F121
E7
E21
JCBWA0235GE

ENGINE CONTROL SYSTEM (QR ENGINE)

Connector No.	B1
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-CS16-TM4

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
99	R	–

Connector No.	B40
Connector Name	FUEL LEVEL SENSOR UNIT AND FUEL PUMP
Connector Type	E05FGY-RS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
3	B	–
5	R	–

Connector No.	E6
Connector Name	WIRE TO WIRE
Connector Type	TK24MW-1Y

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	V	–[With QR engine]
2	SB	–
5	Y	–[With QR engine]
6	W	–[With gasoline engine]
9	SHIELD	–[With QR engine]
15	LG	–
16	O	–[With QR engine]
17	BR	–[With QR engine]
18	L	–
19	LG	–[With QR engine]
20	V	–
21	GR	–[With gasoline engine]
22	SHIELD	–

Connector No.	B66
Connector Name	WIRE TO WIRE
Connector Type	NS04FW-CS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	R	–
2	B	–

Connector No.	B67
Connector Name	WIRE TO WIRE
Connector Type	NS04MW-CS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	R	–
2	B	–

Connector No.	E7
Connector Name	WIRE TO WIRE
Connector Type	NS16MW-CS

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
3	O	–
5	LG	–[With gasoline engine]
6	W	–[With gasoline engine]
10	B	–
11	GR	–
12	R	–
14	P	–[With gasoline engine]

Connector No.	E10
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	M06FW-LC

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
4	W	–
7	P	–
8	G	–

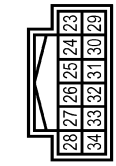
JCBWA0236GB

ENGINE CONTROL SYSTEM (QR ENGINE)

Connector No.	E11
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	M06FB-LC

Terminal No.	Color of Wire	Signal Name [Specification]
11	B	–

Connector No.	E13
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	TH12FW-NH

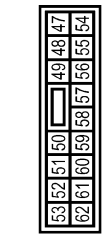


Terminal No.	Color of Wire	Signal Name [Specification]
25	B	–
26	P	–
27	L	–
31	V	–
32	LG	–
33	GR	–

Connector No.	E14
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS12FBR-CS

Terminal No.	Color of Wire	Signal Name [Specification]
40	V	–
41	LG	–
46	W	–

Connector No.	E15
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS16FW-CS

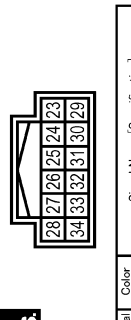


Terminal No.	Color of Wire	Signal Name [Specification]
47	GR	– [With gasoline engine]
48	R	– [With gasoline engine]
50	G	–
51	W	–
52	P	–
55	O	–
58	LG	– [Except M/T]
60	SB	–
61	O	–

Connector No.	E18
Connector Name	MASS AIR FLOW SENSOR
Connector Type	RH06FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	BR	– [With QR engine]
2	W	–
3	Y	– [With QR engine]
4	O	– [With QR engine]
5	R	– [With QR engine]

Connector No.	E19
Connector Name	ECM
Connector Type	BAA32FB-AHY8



Terminal No.	Color of Wire	Signal Name [Specification]
82	L	VEHCAN-H
84	R	BRAKE
87	Y	KLINE
89	O	BATT
90	P	VEHCAN-L
93	O	IGNSW
94	GR	BNCSW
98	B	GNDA-APS2
99	W	GNDA-APS1
100	B	GND-ASCDSW
105	V	AVCC-APS2
106	G	APS2
107	R	APS1
108	V	ASCDSW
113	LG	AVCC-APS1
115	R	VBR
118	B	GND
119	B	GND
120	B	GND
121	B	GND

Connector No.	E49
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Type	RK03FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	V	–
2	LG	– [With QR engine]
3	L	–

JCBWA0237GE

ENGINE CONTROL SYSTEM (QR ENGINE)

Connector No.	E53
Connector Name	COOLING FAN MOTOR-1
Connector Type	RS04FGY-PR

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–
2	G	–
3	B	–
4	B	–

Connector No.	E54
Connector Name	COOLING FAN MOTOR-2
Connector Type	RS04FGY-PR

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	O	–
2	O	–
3	P	–
4	GR	–

Connector No.	E57
Connector Name	COOLING FAN RELAY-4
Connector Type	MS02FL-M2

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	V	–
2	O	–
3	P	–
5	G	–

Connector No.	E59
Connector Name	COOLING FAN RELAY-5
Connector Type	MS02FL-M2

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	G	–
2	V	–
3	GR	–
5	B	–

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
4	V	–
6	W	–
12	P	–
20	P	–
21	Y	–
22	L	–
30	L	–
76	B	–
86	V	–
99	W	–

Connector No.	E110
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Type	RH06FB

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	B	–[With QR engine]
2	W	–[With gasoline engine]
3	R	–[With QR engine]
4	LG	–[With gasoline engine]
5	V	–[With QR engine]
6	G	–[With gasoline engine]

Connector No.	E111
Connector Name	ASCD CLUTCH SWITCH
Connector Type	M02FBR-LC

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	P	–
2	GR	–

Connector No.	E112
Connector Name	ASCD BRAKE SWITCH
Connector Type	M02FBR-LC

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–
2	GR	–[With ESP]
2	P	–[Without ESP]

JCBWA0238GE

ENGINE CONTROL SYSTEM (QR ENGINE)

Connector No.	E114
Connector Name	STOP LAMP SWITCH
Connector Type	M02FB-LC

Terminal No.	Color of Wire	Signal Name [Specification]
1	V	–
2	P	–

Connector No.	E115
Connector Name	STOP LAMP SWITCH
Connector Type	M04FW-LC

Terminal No.	Color of Wire	Signal Name [Specification]
1	V	–
2	P	–
3	O	–
4	LG	–

Connector No.	F13
Connector Name	CONDENSER
Connector Type	M02FW-LC

Terminal No.	Color of Wire	Signal Name [Specification]
1	BR	–
2	B	–

Connector No.	F16
Connector Name	KNOCK SENSOR
Connector Type	E02FG-RS-LGY

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–
2	O	–

Connector No.	F20
Connector Name	CRANKSHAFT POSITION SENSOR (POS)
Connector Type	RH03FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	P	–[With QR engine]
2	B	–[With QR engine]
3	W	–

Connector No.	F21
Connector Name	PARK / NEUTRAL POSITION SWITCH
Connector Type	RK08FG

Terminal No.	Color of Wire	Signal Name [Specification]
1	GR	–
2	Y	–

Connector No.	F26
Connector Name	CAMSHAFT POSITION SENSOR (PHASE)
Connector Type	RH03FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	P	–
2	Y	–[With QR engine]
3	G	–[With QR engine]

Connector No.	F27
Connector Name	AIR FUEL RATIO (A/F) SENSOR 1
Connector Type	AFZ04FGY

Terminal No.	Color of Wire	Signal Name [Specification]
1	V	AF(+)
2	LG	AF(–)
3	Y	HEATER(–)
4	W	HEATER(+)

JCBWA0239GE

ENGINE CONTROL SYSTEM (QR ENGINE)

Connector No.	F29
Connector Name	ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Type	RH06FB

H.S.

1 2 3 4 5 6

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–[With QR engine]
2	G	–[With QR engine]
3	B	–[With QR engine]
4	R	–[With QR engine]
5	P	–[With QR engine]
6	L/Y	–[With QR engine]

Connector No.	F31
Connector Name	HEATED OXYGEN SENSOR 2
Connector Type	AFZ04FB

H.S.

1 2 3 4

Terminal No.	Color of Wire	Signal Name [Specification]
1	L	–
2	BR	–
3	Y	–
4	P	–

Connector No.	F32
Connector Name	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Connector Type	E02FL–RS–LGY

H.S.

1 2

Terminal No.	Color of Wire	Signal Name [Specification]
1	P	–[With QR engine]
2	Y	–

Connector No.	F33
Connector Name	IGNITION COIL No.1 (WITH POWER TRANSISTOR)
Connector Type	E03FGY–RS

H.S.

1 2 3

Terminal No.	Color of Wire	Signal Name [Specification]
1	SB	–
2	B	–
3	BR	–

Connector No.	F34
Connector Name	IGNITION COIL No.2 (WITH POWER TRANSISTOR)
Connector Type	E03FGY–RS

H.S.

1 2 3

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–
2	B	–
3	BR	–

Connector No.	F35
Connector Name	IGNITION COIL No.3 (WITH POWER TRANSISTOR)
Connector Type	E03FGY–RS

H.S.

1 2 3

Terminal No.	Color of Wire	Signal Name [Specification]
1	R	–
2	B	–
3	BR	–

Connector No.	F36
Connector Name	IGNITION COIL No.4 (WITH POWER TRANSISTOR)
Connector Type	E03FGY–RS

H.S.

1 2 3

Terminal No.	Color of Wire	Signal Name [Specification]
1	G	–
2	B	–
3	BR	–

Connector No.	F37
Connector Name	FUEL INJECTOR No.1
Connector Type	HS02FGY

H.S.

1 2

Terminal No.	Color of Wire	Signal Name [Specification]
1	O	–
2	GR	–

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ENGINE CONTROL SYSTEM (QR ENGINE)

Connector No.	F38
Connector Name	FUEL INJECTOR No.2
Connector Type	HS02FGY

Terminal No.	Color of Wire	Signal Name [Specification]
1	O	–
2	BR	–

Connector No.	F39
Connector Name	FUEL INJECTOR No.3
Connector Type	HS02FGY

Terminal No.	Color of Wire	Signal Name [Specification]
1	O	–
2	SB	–[With QR engine]

Connector No.	F40
Connector Name	FUEL INJECTOR No.4
Connector Type	HS02FGY

Terminal No.	Color of Wire	Signal Name [Specification]
1	O	–
2	P	–

Connector No.	F43
Connector Name	ECM
Connector Type	BAA76FB-AHY5

Terminal No.	Color of Wire	Signal Name [Specification]
1	L/Y	MOTOR1
2	R	VMOT1
3	P	MOTOR2
4	Y	AFH1
5	B	GND
6	W	POS
9	R	IGN#3
10	SB	IGN#1
11	B	GND-POS
12	P	AVCC-POS
15	L	AVCC-PDPRES
18	V	GNDA-PDPRES
20	G	SSOFF
21	P	INJ#4
22	LG	MOTRLY1
23	BR	INJ#2
25	G	PHASE#1
27	LG	NEUT-H
28	W	IGN#2
29	G	IGN#4
30	Y	GNDA-PHASE#1
33	P	AVCC-PHASE#1
34	W	AVCC-TPS
37	LG	PDPRES
39	Y	O2HR1
42	Y	EVAP
44	O	KNK2
46	L	GNDA-O2SR1
48	BR	GNDA-TA1
51	L	QA1–
52	R	GNDA-TPS
53	LG	AF–1
54	Y	AF+1
56	O	GNDA-TW
59	GR	INJ#1
60	SB	INJ#3
62	O	CVTC#1
63	W	KNK1
65	P	O2SR1
67	W	TA1
71	G	TPS1
72	B	TPS2
73	Y	QA1+
75	P	TW
78	L	FPR

Connector No.	F45
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
Connector Type	E02FG-RS-LGY

Terminal No.	Color of Wire	Signal Name [Specification]
1	O	–
2	BR	–

JCBWA0241GE

ENGINE CONTROL SYSTEM (QR ENGINE)

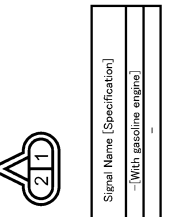
Connector No.	F48
Connector Name	PARK / NEUTRAL POSITION SWITCH
Connector Type	RK02FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	LG	–[With gasoline engine]
2	SB	–

Connector No.	F80
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Type	E02FGY-RS

Terminal No.	Color of Wire	Signal Name [Specification]
1	P	–
2	O	–

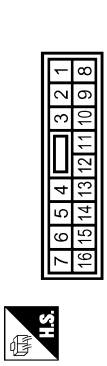
Connector No.	F123
Connector Name	WIRE TO WIRE
Connector Type	TK24FW-1V



Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–[With QR engine]
2	SB	–
5	Y	–[With QR engine]
6	W	–[With gasoline engine]
9	SHIELD	–[With QR engine]
15	GR	–
16	O	–[With QR engine]
17	BR	–[With QR engine]
18	L	–
19	LG	–[With QR engine]
20	V	–

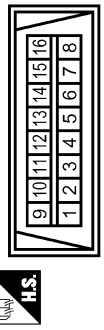
21	L	–[With gasoline engine]
22	SHIELD	–

Connector No.	F121
Connector Name	WIRE TO WIRE
Connector Type	NS16FW-CS



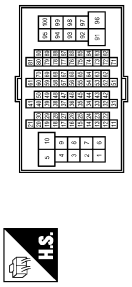
Terminal No.	Color of Wire	Signal Name [Specification]
3	O	–
5	LG	–[With gasoline engine]
6	G	–[With gasoline engine]
10	B	–
11	BR	–
12	P	–[With QR engine]
14	R	–[With QR engine]

Connector No.	M4
Connector Name	DATA LINK CONNECTOR
Connector Type	BD16FW



Terminal No.	Color of Wire	Signal Name [Specification]
4	B	–
5	B	–
6	L	–
7	O	–
8	W	–
14	P	–
16	Y	–

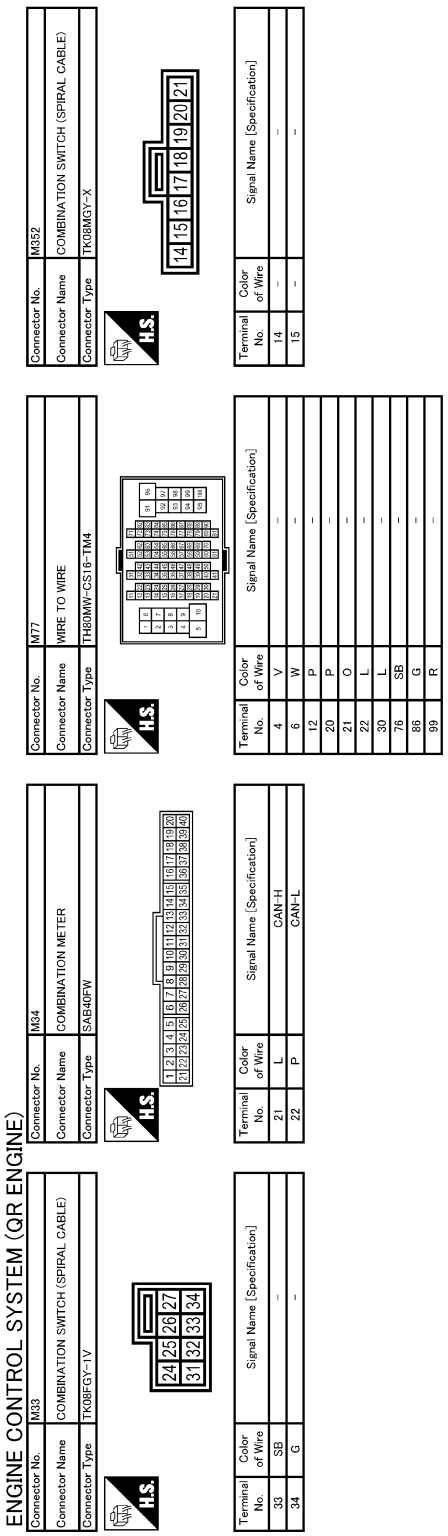
Connector No.	M11
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4



Terminal No.	Color of Wire	Signal Name [Specification]
99	R	–

JCBWA0242GB

ENGINE CONTROL SYSTEM (QR ENGINE)



JCBWA0243GE

Fail Safe

INFOID:0000000001528540

NON DTC RELATED ITEM

Engine operating condition in fail-safe mode	Detected items	Remarks	Reference page
Engine speed will not rise more than 2,500 rpm due to the fuel cut	Malfunction indicator lamp circuit	When there is an open circuit on MI circuit, the ECM cannot warn the driver by lighting up MI 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 MI circuit is open by means of operating fail-safe function. The fail-safe function also operates when above diagnoses except MI circuit are detected and demands the driver to repair the malfunction.	ECQ-601

DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail-safe mode	
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.	
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 temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after following condition. CONSULT-III displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT-III display)
		Just as ignition switch is turned ON or START	40°C (104°F)
		Approx. 4 minutes after engine starting	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
		When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	
P0122 P0123 P0222 P0223 P2132 P2133 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.	
P0500	Vehicle speed sensor	When the fail-safe system for vehicle speed sensor is activated, the cooling fan operates (Highest) while engine is running.	
P0643	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P0605	ECM	(When ECM calculation function is malfunctioning:) ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. ECM deactivates ASCD operation.	
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 control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P2101	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	

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

INFOID:0000000001528541

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	• U1000 U1001 CAN communication line • U1010 CAN communication • P0101 P0102 P0103 Mass air flow sensor • P0112 P0113 Intake air temperature sensor • P0117 P0118 P0125 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1299 P2109 P2135 Throttle position sensor • P0327 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0500 Vehicle speed sensor • P0562 P0563 Battery voltage • P0605 ECM • P1610 - P1615 NATS • P1706 Park/neutral position (PNP) switch • P0201, P0202, P0203, P0204 FUEL INJECTOR • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	• P0031 Air fuel ratio (A/F) sensor 1 heater • P0036 P0037 P0038 Heated oxygen sensor 2 heater • P0130 P0131 P0132 Air fuel ratio (A/F) sensor 1 • P0136 Heated oxygen sensor 2 • P0444 P0445 EVAP canister purge volume control solenoid valve • P1111 Intake valve timing control solenid • P1217 Engine over temperature (OVERHEAT) • P1805 Brake switch • P2101 Electric throttle control function • P2100 P2103 Throttle control motor relay
3	• P0011 Intake valve timing control • P1212 TCS connuniation line • P1320 Ignition coil • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD vehicle speed sensor • P1715 Primary speed sensor • P2119 Electric throttle control actuator

DTC Index

INFOID:0000000001528542

×:Applicable —: Not applicable

DTC*1		Items (CONSULT-III screen terms)	Trip	MI	Reference page
CONSULT-III	ECM*2				
U1000	1000*3	CAN COMM CIRCUIT	1	×	ECQ-451
U1001	1001*3	CAN COMM CIRCUIT	2	—	ECQ-451
U1010	1010	CONTROL UNIT(CAN)	1	×	ECQ-452
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	**Flashing*4**	**—**
P0011	0011	INT/V TIM CONT-B1	2	—	ECQ-453
P0031	0031	A/F SEN1 HTR (B1)	2	×	ECQ-456
P0036	0036	HO2S2 HTR (B1)	2	×	ECQ-459
P0037	0037	HO2S2 HTR (B1)	2	×	ECQ-459
P0038	0038	HO2S2 HTR (B1)	2	×	ECQ-459
P0101	0101	MAF SEN/CIRCUIT-B1	1	×	ECQ-462
P0102	0102	MAF SEN/CIRCUIT-B1	2	×	ECQ-467
P0103	0103	MAF SEN/CIRCUIT-B1	1	×	ECQ-467
P0112	0112	IAT SEN/CIRCUIT-B1	2	×	ECQ-472
P0113	0113	IAT SEN/CIRCUIT-B1	2	×	ECQ-472
P0117	0117	ECT SEN/CIRC	1	×	ECQ-475
P0118	0118	ECT SEN/CIRC	1	×	ECQ-475
P0122	0122	TP SEN 2/CIRC-B1	1	×	ECQ-478
P0123	0123	TP SEN 2/CIRC-B1	1	×	ECQ-478
P0125	0125	ECT SENSOR	2	×	ECQ-482
P0130	0130	A/F SENSOR1 (B1)	2	×	ECQ-484
P0131	0131	A/F SENSOR1 (B1)	2	×	ECQ-487
P0132	0132	A/F SENSOR1 (B1)	2	×	ECQ-490
P0136	0136	HO2S2 (B1)	2	×	ECQ-493
P0201	0201	INJECTOR CIRC-CYL1	2	—	ECQ-497
P0202	0202	INJECTOR CIRC-CYL2	2	—	ECQ-497
P0203	0203	INJECTOR CIRC-CYL3	2	—	ECQ-497
P0204	0204	INJECTOR CIRC-CYL4	2	—	ECQ-497
P0222	0222	TP SEN 1/CIRC-B1	1	×	ECQ-500
P0223	0223	TP SEN 1/CIRC-B1	1	×	ECQ-500
P0327	0327	KNOCK SEN/CIRC-B1	2	—	ECQ-504
P0335	0335	CKP SEN/CIRCUIT	2	×	ECQ-506
P0340	0340	CMP SEN/CIRC-B1	2	×	ECQ-510
P0444	0444	PURG VOLUME CONT/V	2	×	ECQ-514
P0445	0445	PURG VOLUME CONT/V	2	×	ECQ-514
P0500	0500	VEH SPEED SEN/CIRC*5	2	×	ECQ-517
P0562	0562	SYSTEM VOLTAGE	2	—	ECQ-519
P0563	0563	SYSTEM VOLTAGE	2	—	ECQ-520
P0605	0605	ECM	1 or 2	× or —	ECQ-521
P1111	1111	INJECTOR CIRC-CYL1	2	×	ECQ-523

DTC*1		Items (CONSULT-III screen terms)	Trip	MI	Reference page
CONSULT-III	ECM*2				
P1212	1212	TCS/CIRC	2	—	ECQ-526
P1217	1217	ENG OVER TEMP	1	×	ECQ-527
P1225	1225	CTP LEARNING-B1	1	×	ECQ-567
P1299	1299	CTP LEARNING	1	×	ECQ-533
P1320	1320	IGN SIGNAL PRIMARY	2	—	ECQ-536
P1564	1564	ASCD SW	1	—	ECQ-541
P1572	1572	ASCD BRAKE SW	1	—	ECQ-544
P1574	1574	ASCD VHL SPD SEN	1	—	ECQ-551
P1610	1610	LOCK MODE	2	—	SEC-41
P1611	1611	ID DISCARD IMM-ECM	2	—	SEC-38
P1612	1612	CHAIN OF ECM-IMMU	2	—	SEC-40
P1614	1614	CHAIN OF IMMU-KEY	2	—	SEC-53
P1615	1615	DIFFERENCE OF KEY	2	—	SEC-43
P1706	1706	P-N POS SW/CIRCUIT	2	×	ECQ-553
P1715	1715	IN PULY SPEED	2	—	ECQ-556
P1805	1805	BRAKE SW/CIRCUIT	1	—	ECQ-558
P2100	2100	ETC MOT PWR-B1	1	×	ECQ-561
P2101	2101	ETC FNCTN/CIRC-B1	1	×	ECQ-563
P2103	2103	ETC MOT PWR	1	×	ECQ-561
P2109	2109	CTP LEARNING	1	×	ECQ-567
P2119	2119	ETC ACTR-B1	1	×	ECQ-568
P2122	2122	APP SEN 1/CIRC	1	×	ECQ-570
P2123	2123	APP SEN 1/CIRC	1	×	ECQ-570
P2127	2127	APP SEN 2/CIRC	1	×	ECQ-574
P2128	2128	APP SEN 2/CIRC	1	×	ECQ-574
P2135	2135	TP SENSOR-B1	1	×	ECQ-578
P2138	2138	APP SENSOR	1	×	ECQ-582

*1: 1st trip DTC No. is the same as DTC No.

*2: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*3: The troubleshooting for this DTC needs CONSULT-III.

*4: When engine is running, MI may flash. For details, refer toECQ-428, "Diagnosis Description"

*5: When the fail-safe operations for both self-diagnoses occur, the MI illuminates.

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:0000000001528545

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		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)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	ECQ-598
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			ECQ-642
	Fuel injector circuit	1	1	2	3	2		2	2			2			ECQ-497
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			ECQ-414
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		ECQ-602
	Incorrect idle speed adjustment						1	1	1	1		1			ECQ-366
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	ECQ-563, ECQ-568
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			ECQ-367
	Ignition circuit	1	1	2	2	2		2	2			2			ECQ-537
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			ECQ-447
Mass air flow sensor circuit		1	1	2	2	2		2	2			2			ECQ-462, ECQ-467
Engine coolant temperature sensor circuit					3		3			3					ECQ-475, ECQ-482
Air fuel ratio (A/F) sensor 1 circuit			1	2	3	2		2	2			2			ECQ-484, ECQ-487, ECQ-490, ECQ-154, ECQ-291
Throttle position sensor circuit							2			2					ECQ-478, ECQ-500, ECQ-567, ECQ-531, ECQ-578
Accelerator pedal position sensor circuit				3	2	1									ECQ-570, ECQ-574, ECQ-582
Knock sensor circuit				2								3			ECQ-504

	SYMPTOM													Reference page
	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)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Crankshaft position sensor (POS) circuit	2	2												ECQ-506
Camshaft position sensor (PHASE) circuit	3	2												ECQ-510
Vehicle speed signal circuit		2	3		3						3			ECQ-517
ECM	2	2	3	3	3	3	3	3	3	3	3			ECQ-521, ECQ-521
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			ECQ-453
PNP switch circuit			3		3		3	3			3			ECQ-553
Refrigerant pressure sensor circuit		2				3			3		4			ECQ-603
Electrical load signal circuit							3							ECQ-596
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-179
ABS actuator and electric unit (control unit)			4											BRC-59

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

		SYMPTOM													Reference page
		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)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FL-9
	Fuel piping			5	5	5		5	5			5			EM-166
	Vapor lock														—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—
Air	Air duct	5	5	5	5	5	5	5	5	5		5			EM-152
	Air cleaner														EM-150
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)														EM-152
	Electric throttle control actuator														EM-152
	Air leakage from intake manifold/ Collector/Gasket														EM-152
Cranking	Battery	1	1	1		1		1	1			1		1	PG-133
	Generator circuit														CHG-6
	Starter circuit	3													STR-5
	Signal plate	6													EM-182
	PNP switch	4													TM-403 or TM-511
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-202
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-211
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mecha-nism	Timing chain	5	5	5	5	5		5	5			5			EM-193
	Camshaft														EM-170
	Intake valve timing control														EM-193
	Intake valve												3		EM-193
	Exhaust valve														

		SYMPTOM													Reference page
		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)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			EM-155, EX-10
	Three way catalyst														
	HC adsorption catalyst														
Lubrica-tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-161, LU-22, LU-19, LU-20
	Oil level (Low)/Filthy oil														LU-16
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-48
	Thermostat									5					CO-58
	Water pump														CO-55
	Water gallery														CO-33
	Cooling fan									5					CO-53
	Coolant level (Low)/Contaminat-ed coolant														CO-41
NATS (NISSAN Vehicle Immobilizer System)		1	1												SEC-16

1 - 6: The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

Description

INFOID:0000000001528546

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 1,800 rpm under no load (for example, the selector lever position is neutral and engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, ECQ-377, "System Description".

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000001555501

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the “SRS AIRBAG” and “SEAT BELT” of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the “SRS AIRBAG”.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:0000000001583160

NOTE:

- This Procedure is applied only to models with Intelligent Key system and NATS (NISSAN ANTI-THEFT SYSTEM).
- Remove and install all control units after disconnecting both battery cables with the ignition knob in the ″LOCK″ position.
- Always use CONSULT-III to perform self-diagnosis as a part of each function inspection after finishing work. If DTC is detected, perform trouble diagnosis according to self-diagnostic results.

For models equipped with the Intelligent Key system and NATS, an electrically controlled steering lock mechanism is adopted on the key cylinder.

For this reason, if the battery is disconnected or if the battery is discharged, the steering wheel will lock and steering wheel rotation will become impossible.

If steering wheel rotation is required when battery power is interrupted, follow the procedure below before starting the repair operation.

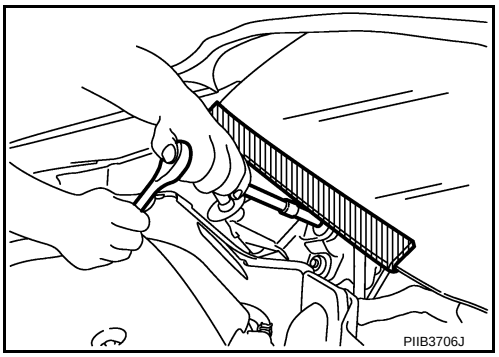
OPERATION PROCEDURE

1. Connect both battery cables.
   NOTE:
   Supply power using jumper cables if battery is discharged.
2. Use the Intelligent Key or mechanical key to turn the ignition switch to the ″ACC″ position. At this time, the steering lock will be released.
3. Disconnect both battery cables. The steering lock will remain released and the steering wheel can be rotated.
4. Perform the necessary repair operation.
5. When the repair work is completed, return the ignition switch to the ″LOCK″ position before connecting the battery cables. (At this time, the steering lock mechanism will engage.)
6. Perform a self-diagnosis check of all control units using CONSULT-III.

Precaution for Procedure without Cowl Top Cover

INFOID:0000000001555523

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



Precautions For Xenon Headlamp Service

INFOID:0000000001583158

WARNING:

Comply with the following warnings to prevent any serious accident.

- **Disconnect the battery cable (negative terminal) or the power supply fuse before installing, removing, or touching the xenon headlamp (bulb included). The xenon headlamp contains high-voltage generated parts.**
- **Never work with wet hands.**
- **Check the xenon headlamp ON-OFF status after assembling it to the vehicle. Never turn the xenon headlamp ON in other conditions. Connect the power supply to the vehicle-side connector. (Turning it ON outside the lamp case may cause fire or visual impairments.)**
- **Never touch the bulb glass immediately after turning it OFF. It is extremely hot.**

CAUTION:

Comply with the following cautions to prevent any error and malfunction.

- **Install the xenon bulb securely. (Insufficient bulb socket installation may melt the bulb, the connector, the housing, etc. by high-voltage leakage or corona discharge.)**
- **Never perform HID circuit inspection with a tester.**
- **Never touch the xenon bulb glass with hands. Never put oil and grease on it.**
- **Dispose of the used xenon bulb after packing it in thick vinyl without breaking it.**
- **Never wipe out dirt and contamination with organic solvent (thinner, gasoline, etc.).**

On Board Diagnostic (OBD) System of Engine and CVT

INFOID:0000000001528550

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MI) to warn the driver of a malfunction causing emission deterioration.

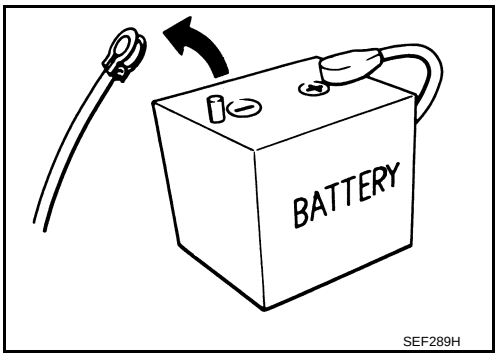
CAUTION:

- **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 MI to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI 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-120, "Description".**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MI 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 MI to light up due to the malfunction of the EVAP system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

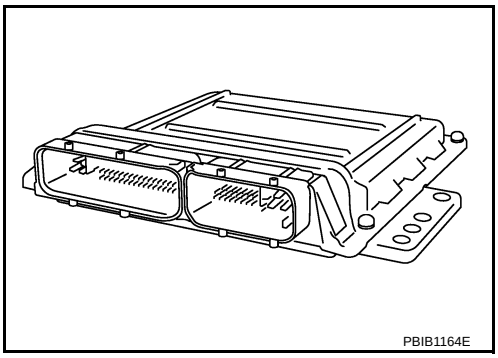
General Precautions

INFOID:0000000001528551

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.**

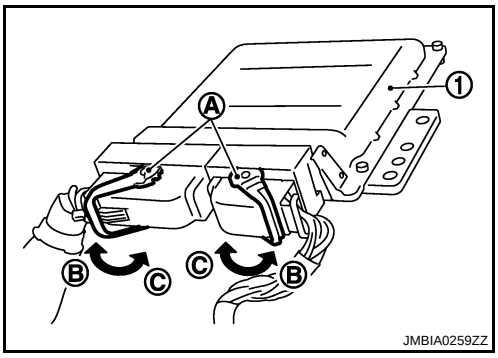


- **Do not disassemble ECM.**
- **If a battery cable is disconnected, the memory will return to the ECM value.**
  The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- **If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.**
- **Diagnostic trouble codes**
- **1st trip diagnostic trouble codes**
- **Freeze frame data**
- **1st trip freeze frame data**
- **Test values**

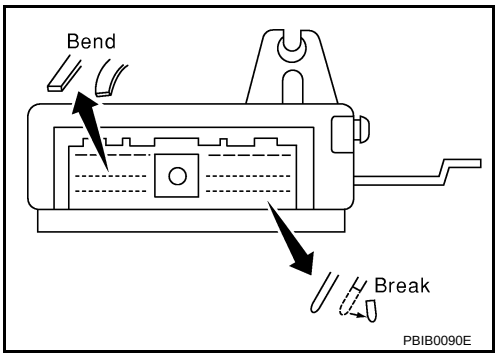


- **When connecting ECM harness connector (A), fasten (B) it securely with a lever as far as it will go as shown in the figure.**

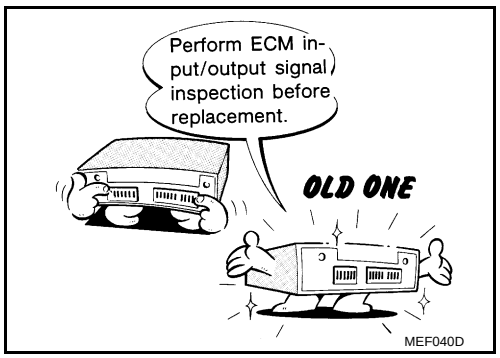
1. ECM
B. Loosen
C. fasten



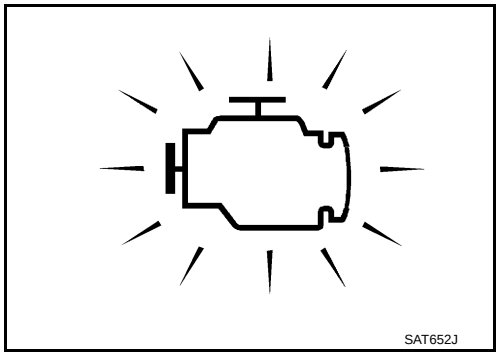
- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can 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.**



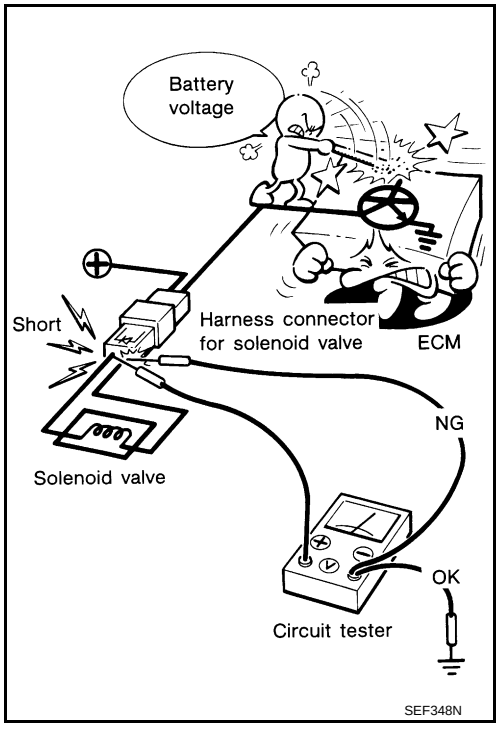
- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to ECQ-605, "Reference Value".**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**



- **After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check.** The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.

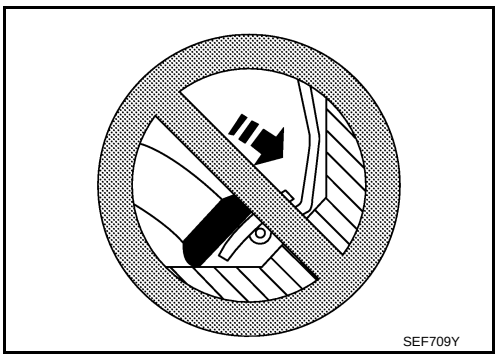


- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

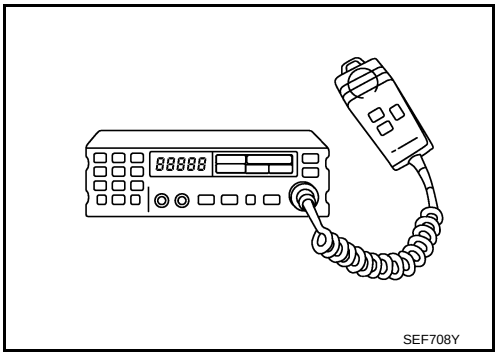


- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**

- **Do not depress accelerator pedal when starting.**
- **Immediately after starting, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**


SEF709Y

- **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.**



SEF708Y

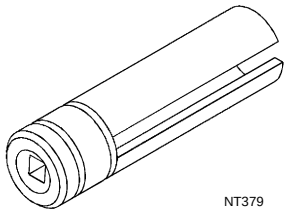
PREPARATION

PREPARATION

Special Service Tools

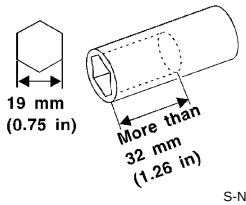
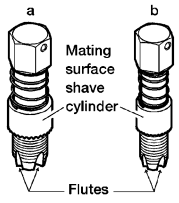
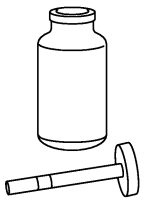
INFOID:0000000001528552

NOTE:
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number Tool name	Description
KV10117100 Heated oxygen sensor wrench  NT379	Loosening or tightening heated oxygen sensors with 22 mm (0.87 in) hexagon nut

Commercial Service Tools

INFOID:0000000001528553

Tool name	Description
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner  AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor** **b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor**
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)  S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

ON-VEHICLE REPAIR

FUEL PRESSURE

Inspection

INFOID:0000000001528555

FUEL PRESSURE RELEASE

With CONSULT-III

1. Turn ignition switch ON.
2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode with CONSULT-III.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.

With CONSULT-III

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.
5. Reinstall fuel pump fuse after servicing fuel system.

FUEL PRESSURE CHECK

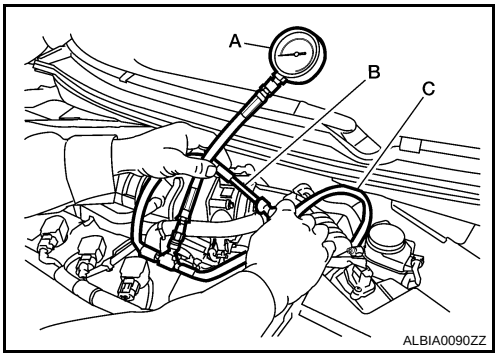
CAUTION:

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

NOTE:

- **Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because T31 models do not have fuel return system.**
- **Use Fuel Pressure Gauge Kit to check fuel pressure.**

1. Release fuel pressure to zero.
2. Connect fuel tube (B) adapter to quick connector.



A : Fuel pressure gauge
C : Fuel feed hose

3. Turn ignition switch ON and check for fuel leakage.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

At idling : Approximately 350 kPa (3.5bar, 3.57 kg/cm^2, 51 psi)

6. If result is unsatisfactory, check fuel hoses and fuel tubes for clogging.
   If OK, Replace “fuel filter and fuel pump assembly”.
   If NG, Repair or replace.

EVAPORATIVE EMISSION SYSTEM

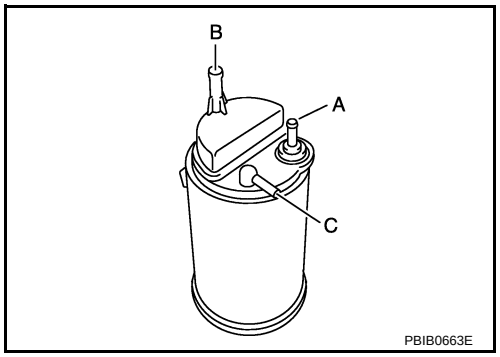
Inspection

INFOID:0000000001528556

1. Visually inspect EVAP vapor lines for improper attachment and for cracks, damage, loose connections, chafing and deterioration.
2. Check EVAP canister as follows:

a. Block port (B). Orally blow air through port (A). Check that air flows freely through port (C).

b. Block port (A). Orally blow air through port (B). Check that air flows freely through port (C).

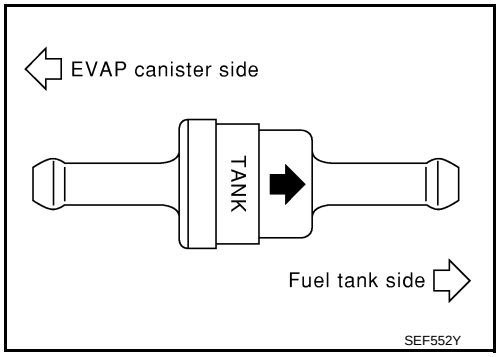


3. Visually inspect the fuel check valve for cracks, damage, loose connections chafing and deterioration.
4. Check fuel check valve as follows:

a. Blow air through connector on the fuel tank side. A considerable resistance should be felt and a portion of air flow should be directed toward the EVAP canister side.

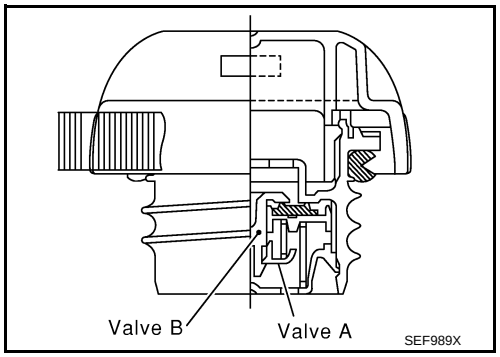
b. Blow air through connector on EVAP canister side. Air flow should be smoothly directed toward fuel tank side.

c. If fuel check valve is suspected or not properly functioning in step 1 and 2 above, replace it.



5. Inspect fuel tank filler cap vacuum relief valve for clogging, sticking, etc.

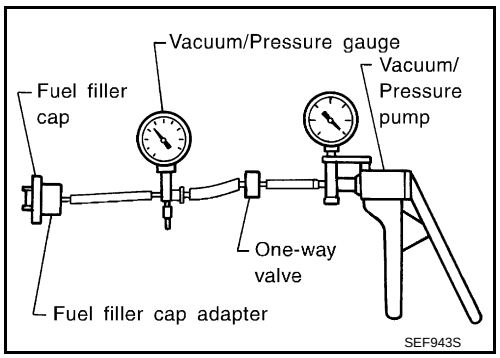
a. Wipe clean valve housing.



b. Check valve opening pressure and vacuum.

Pressure:	15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum:	–6.0 to –3.4 kPa (–0.06 bar to –-0.034bar, –0.061 to –0.035 kg/cm^2, –0.87 to –0.49 psi)

c. If out of specification, replace fuel filler cap as an assembly.



SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000001528560

Transmission	Condition	Specification
CVT	No load* (in P or N position)	650 ± 50 rpm
M/T	No load* (in Neutral position)	650 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Timing

INFOID:0000000001528561

Transmission	Condition	Specification
CVT	No load* (in P or N position)	9.75 ± 5° BTDC
M/T	No load* (in Neutral position)	9.75 ± 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

Mass Air Flow Sensor

INFOID:0000000001528563

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	0.8 – 1.2V*
Mass air flow (Using CONSULT-III)	1.0 – 4.0 g·m/sec at idle* 2.0 – 10.0 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.