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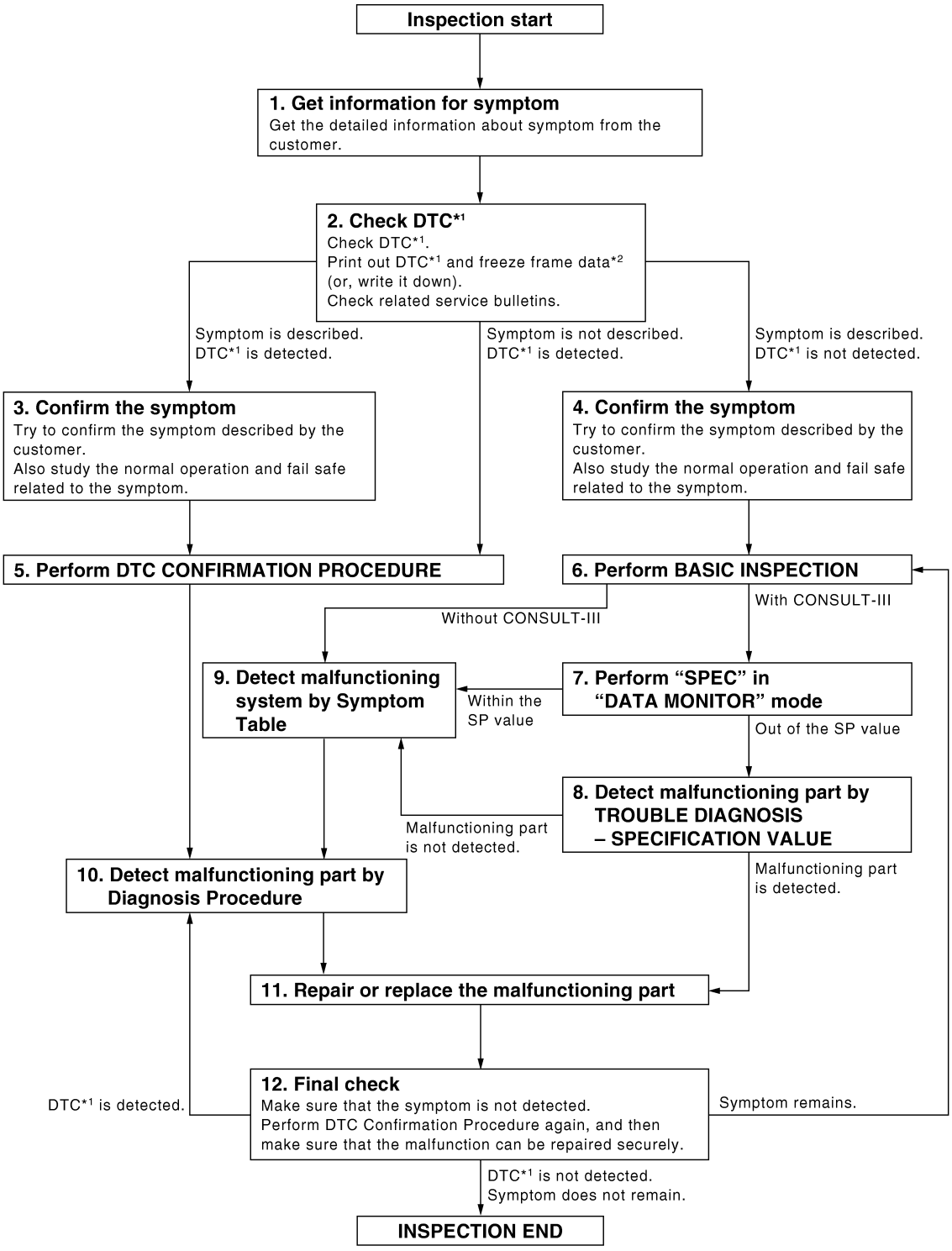
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000001161121

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 EC-20, "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 EC-94, "Diagnosis Description".)
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to EC-366, "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 EC-370, "Description" and EC-358, "Fail Safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
Also study the normal operation and fail safe related to the symptom. Refer to EC-370, "Description" and EC-358, "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 EC-360, "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 EC-361, "DTC Index".

6.PERFORM BASIC INSPECTION

Perform EC-22, "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 EC-116, "Component Function Check".

Is the measurement value within the SP value?

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

8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-117, "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 EC-366, "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-58, "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 EC-328, "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 EC-94, "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. (Refer to EC-94, "Diagnosis Description".) If the completion of SRT is needed, drive vehicle under the specific DRIVING PATTERN in EC-363, "How to Set SRT Code".

Diagnostic Work Sheet

INFOID:0000000001161122

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.

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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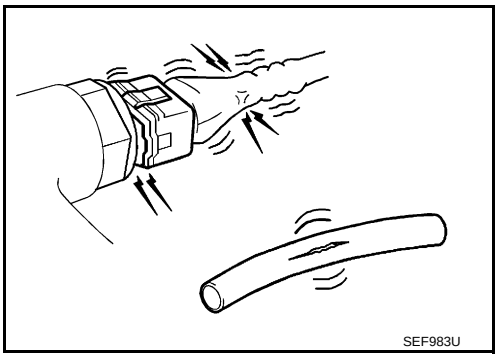
INSPECTION AND ADJUSTMENT
BASIC INSPECTION

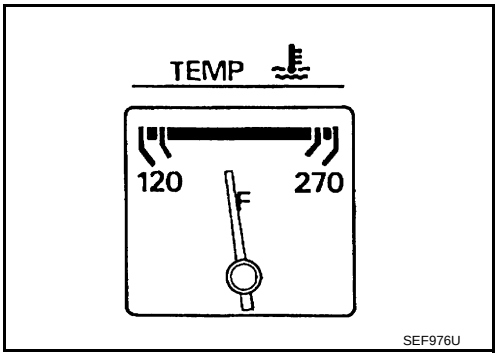
BASIC INSPECTION : Special Repair Requirement

INFOID:0000000001161123

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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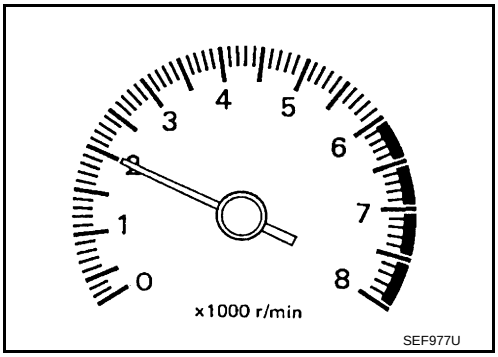


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5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT-III or GST.

Is any DTC detected?

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



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2.REPAIR OR REPLACE

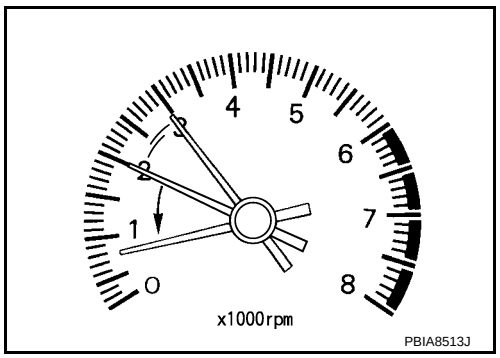
Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> 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 EC-26, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-380, "Idle Speed".



Is the inspection result normal?

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

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-26, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

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

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

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

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 7.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   For procedure, refer to EC-26, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-380, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the Following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-202, "Diagnosis Procedure".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-198, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace. Then GO TO 4.

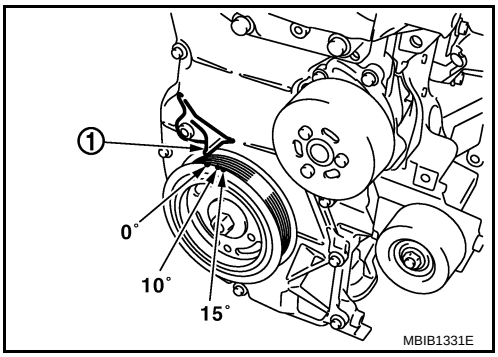
9. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-7, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement" or SEC-83, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement".

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.
   For procedure, refer to EC-26, "IGNITION TIMING : Special Repair Requirement".
   For specification, refer to EC-380, "Ignition Timing".



1 : Timing indicator

Is the inspection result normal?

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

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-26, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

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

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

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

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 14.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

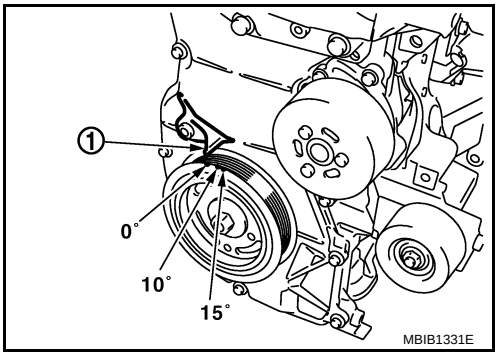
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   For procedure, refer to EC-26, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-380, "Idle Speed".

Is the inspection result normal?

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

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.
   For procedure, refer to EC-26, "IGNITION TIMING : Special Repair Requirement".
   For specification, refer to EC-380, "Ignition Timing".



1 : Timing indicator

Is the inspection result normal?

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

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-50, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 17.

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

17. DETECT MALFUNCTIONING PART

Check the following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-202, "Diagnosis Procedure".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-198, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair or replace. Then GO TO 4.

18. 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 SEC-7, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement" or SEC-83, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement".

>> GO TO 4.

19. INSPECTION END

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

>> INSPECTION END

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description

INFOID:0000000001161124

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement

INFOID:0000000001161125

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

Refer to SEC-7, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement".

>> GO TO 2.

2. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-26, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

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

>> GO TO 4.

4. PERFORM IDLE AIR VOLUME LEARNING

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

>> END

IDLE SPEED

IDLE SPEED : Description

INFOID:0000000001161126

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

IDLE SPEED : Special Repair Requirement

INFOID:0000000001161127

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:0000000001161128

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

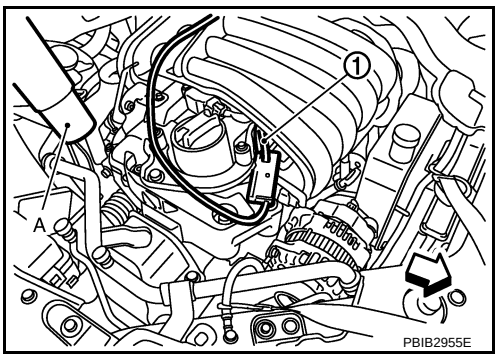
IGNITION TIMING : Special Repair Requirement

INFOID:0000000001161129

1.CHECK IGNITION TIMING

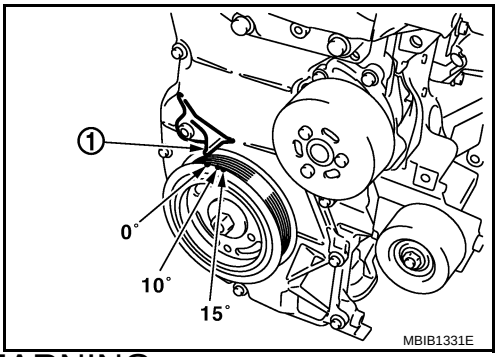
1. Attach timing light to No.1 ignition coil wire harness (1) as shown.

   2 : Timing light
   ⇦ : Vehicle front



2. Check ignition timing.

   1 : Timing indicator



>> INSPECTION END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description

INFOID:0000000001161130

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 Re-

quirement

INFOID:0000000001161131

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:0000000001161132

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

THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement

INFOID:0000000001161133

1.START

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
   Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

>> END

IDLE AIR VOLUME LEARNING

IDLE AIR VOLUME LEARNING : Description

INFOID:0000000001161134

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

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

IDLE AIR VOLUME LEARNING : Special Repair Requirement

INFOID:0000000001161135

1.PRECONDITIONING

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

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 100°C (158 - 212°F)
- Park/neutral position switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
  On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up

- For A/T models with CONSULT-III

- Drive vehicle until “ATF TEMP SE 1” in “DATA MONITOR” mode of “A/T” system indicates less than 0.9V.

- For A/T models without CONSULT-III and M/T models.

- Drive vehicle for 10 minutes

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 3.

2. IDLE AIR VOLUME LEARNING

With CONSULT-III

1. Perform Accelerator Pedal Released Position Learning. Refer to EC-26, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
3. Start engine and warm it up to normal operating temperature.
4. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.
5. Touch “START” and wait 20 seconds.

Is “CMPLT” displayed on CONSULT-III screen?

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

3. IDLE AIR VOLUME LEARNING

Without CONSULT-III

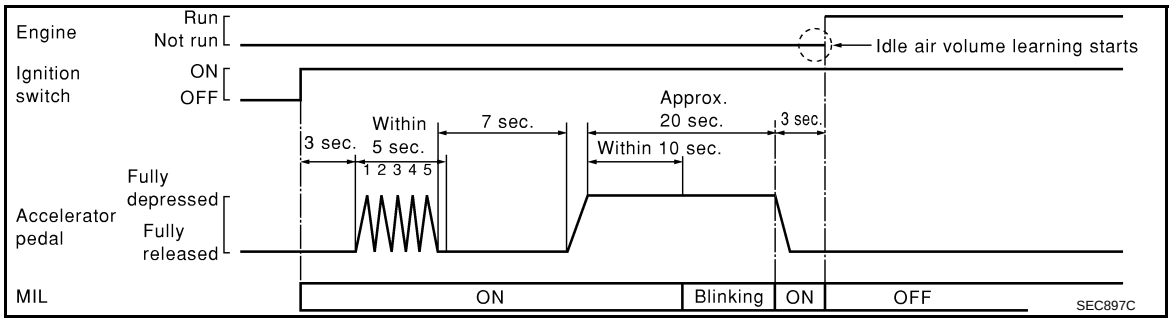
NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

1. Perform Accelerator Pedal Released Position Learning. Refer to EC-26, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
3. Start engine and warm it up to normal operating temperature.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
6. Repeat the following procedure quickly five times within 5 seconds.

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

7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MI stops blinking and turned ON.
8. Fully release the accelerator pedal within 3 seconds after the MI turned ON.
9. Start engine and let it idle.
10. Wait 20 seconds.



>> GO TO 4.

4. CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.
For specification, refer to EC-380, "Idle Speed" and EC-380, "Ignition Timing".

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following

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

Is the inspection result normal?

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

6. DETECT MALFUNCTIONING PART

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.
It is useful to perform “TROUBLE DIAGNOSIS - SPECIFICATION VALUE”. Refer to EC-116, "Component Function Check".
If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:

- Engine stalls.
- Erroneous idle.

>> INSPECTION END

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description

INFOID:0000000001161136

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:0000000001161137

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.

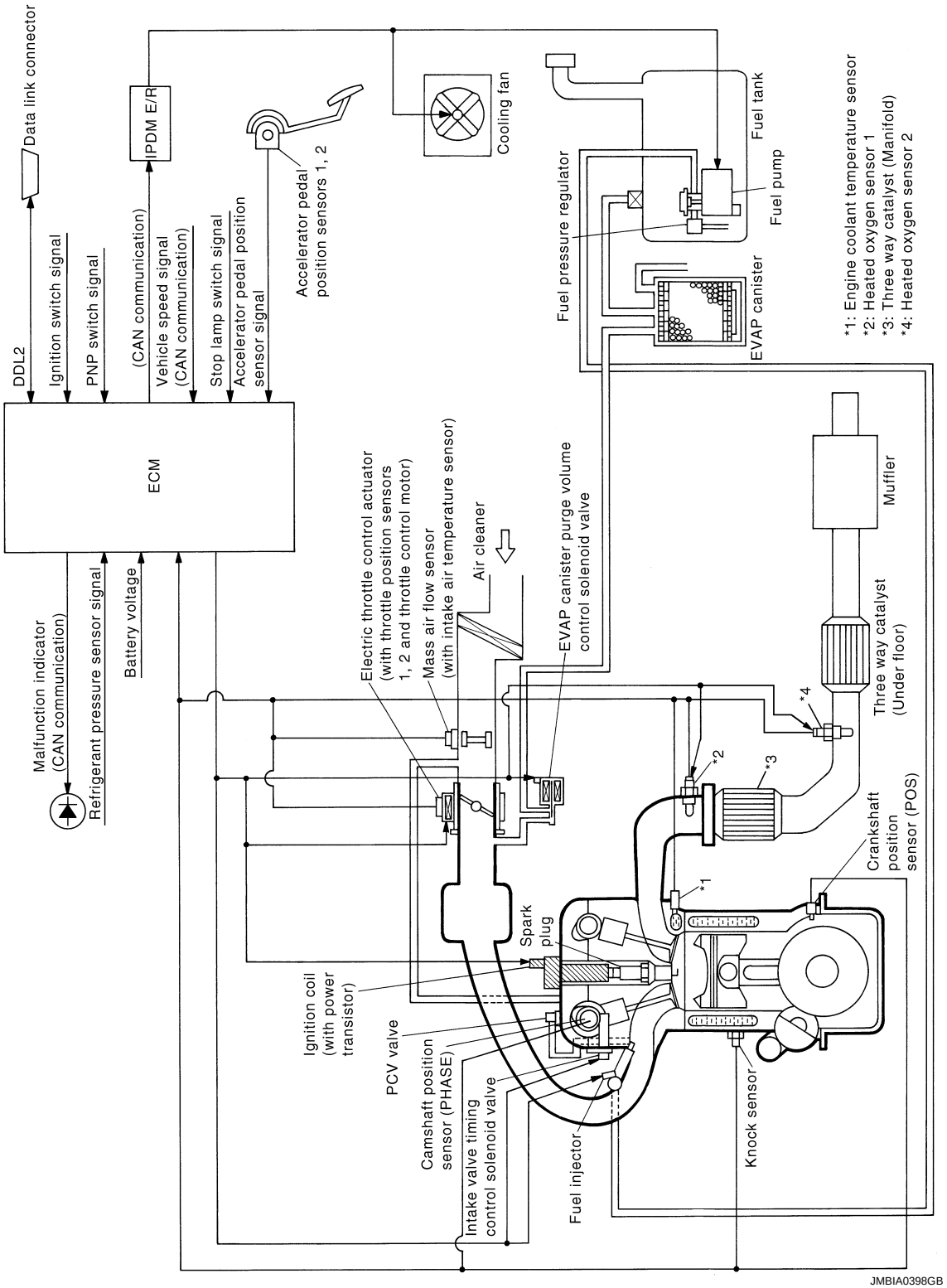
>> END

FUNCTION DIAGNOSIS

ENGINE CONTROL SYSTEM

System Diagram

INFOID:0000000001161138



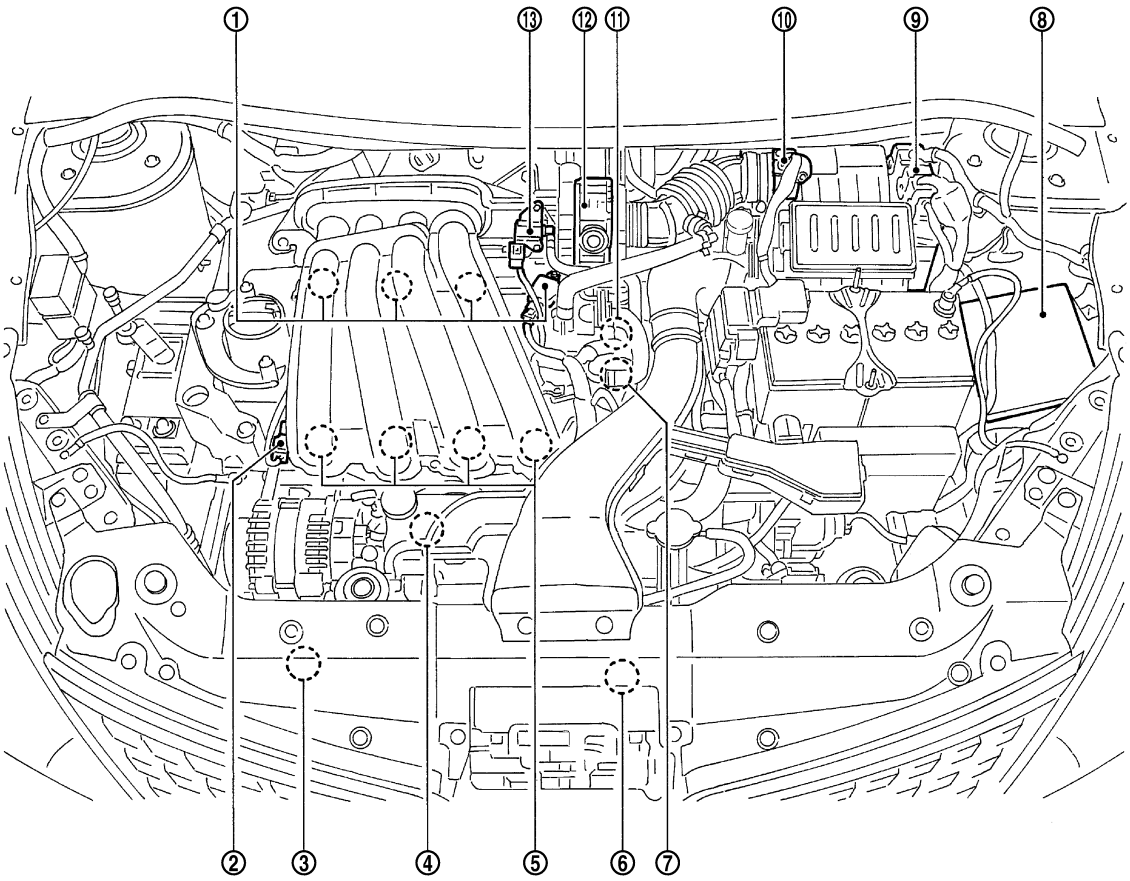
System Description

INFOID:0000000001161139

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

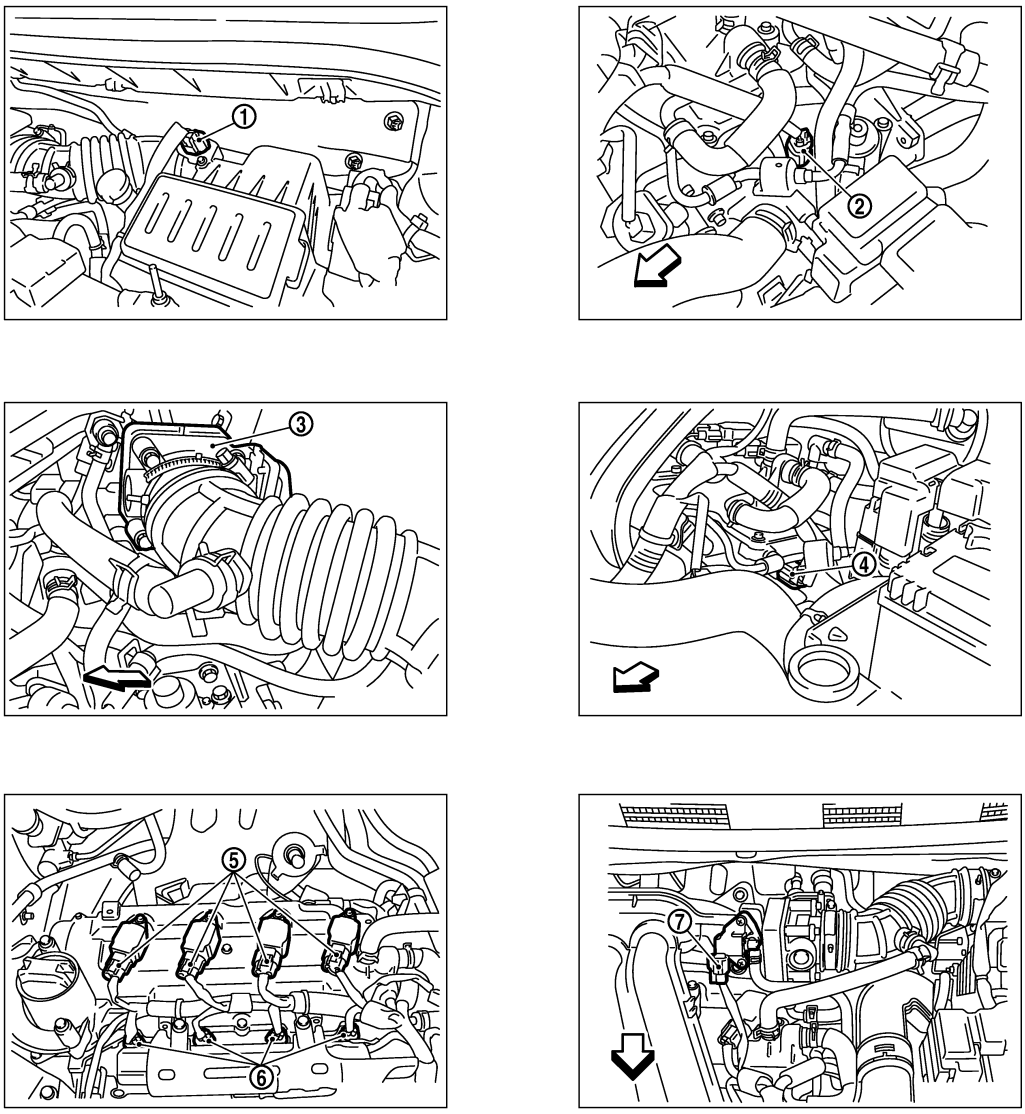
Component Parts Location

INFOID:0000000001161140



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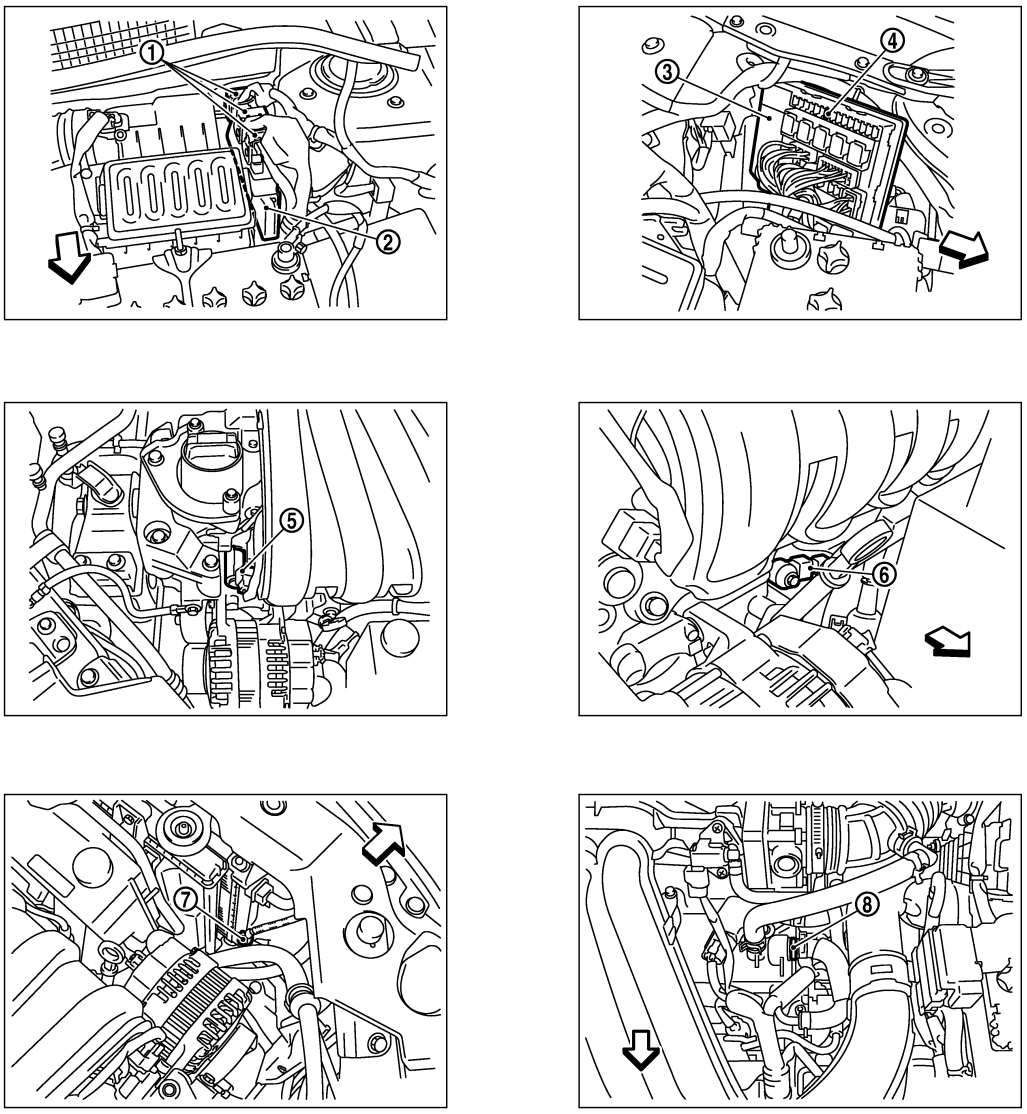
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Camshaft position sensor (PHASE)
5. Ignition coil (with power transistor)
6. Fuel injector
7. EVAP canister purge volume control solenoid valve

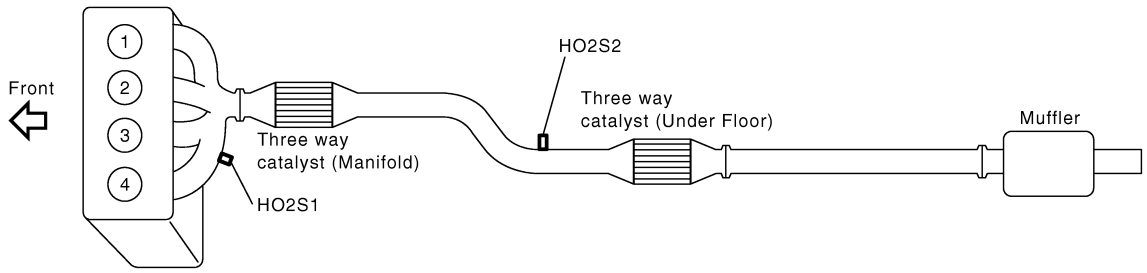
⇦ Vehicle front



PBIB2941E

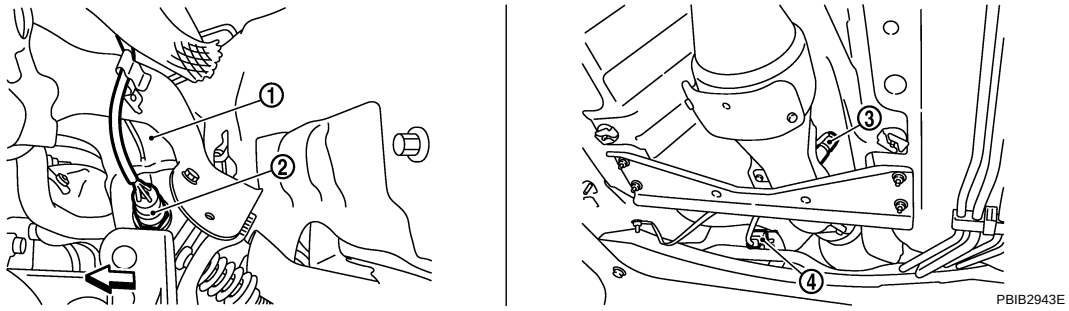
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

⇦ Vehicle front



No. of sensor
Location of a sensor in relation the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on

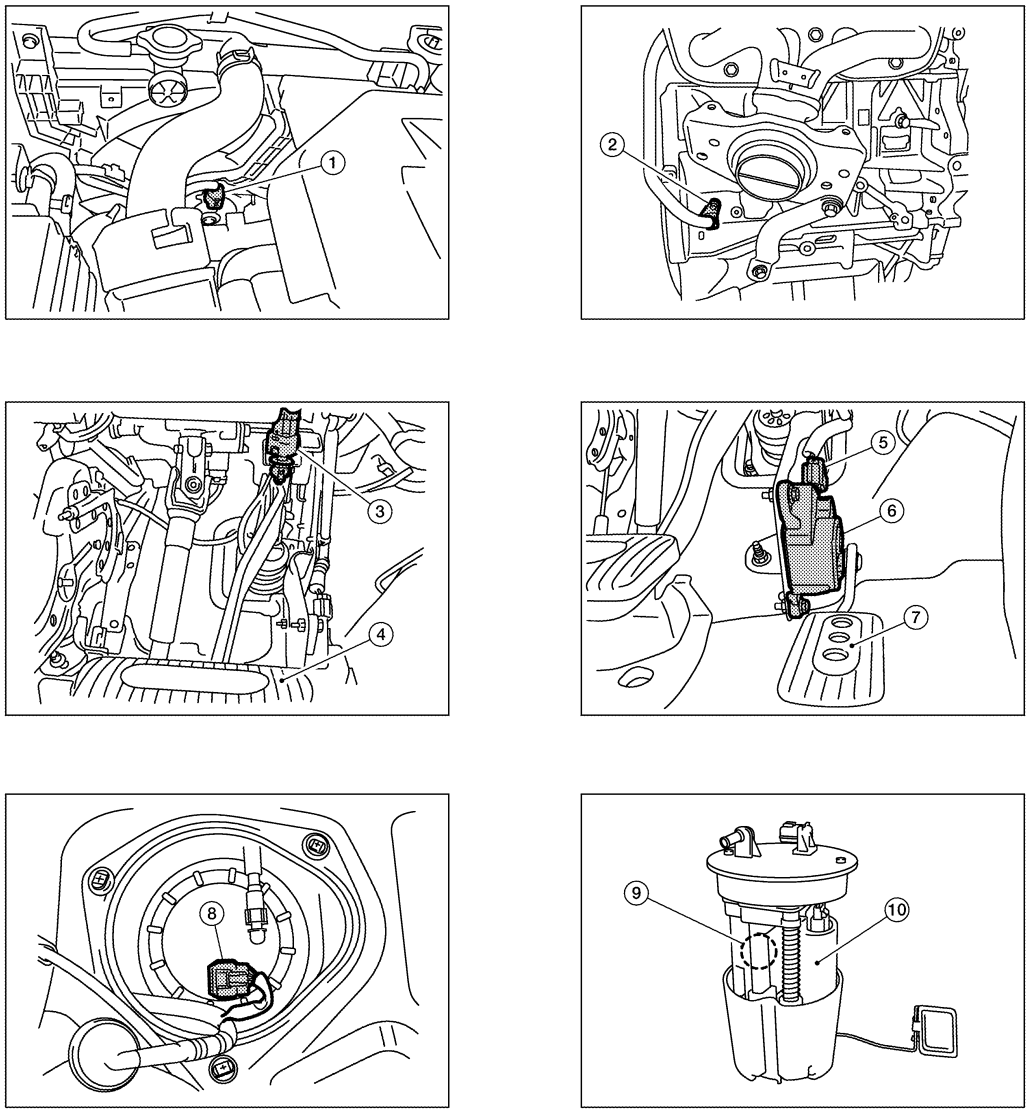
PBIB2942E



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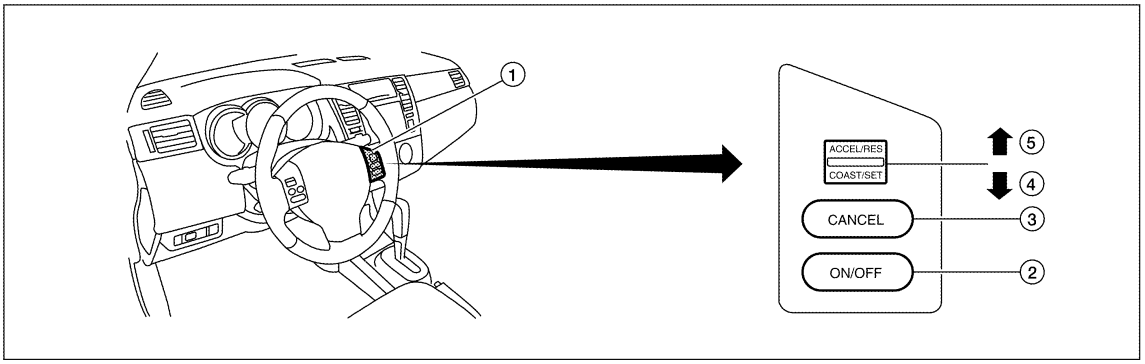
1. Exhaust manifold
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

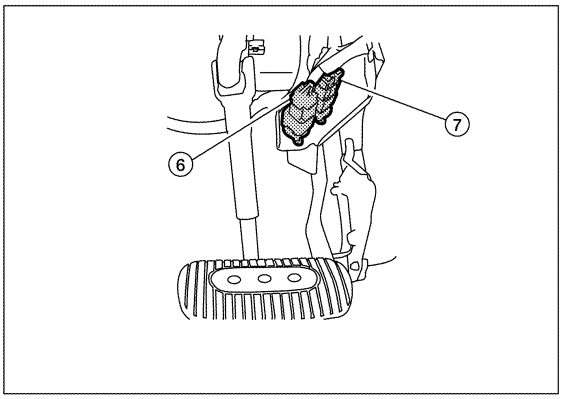
⇦ Vehicle front

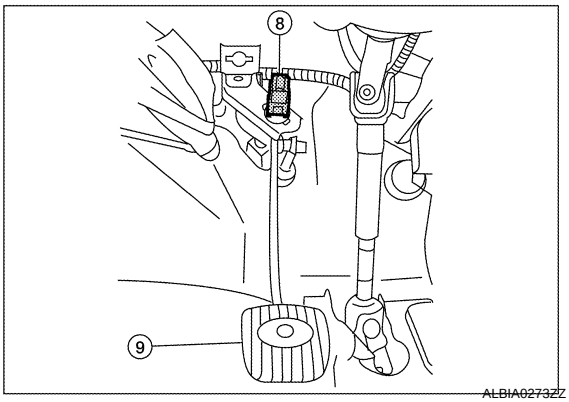


AWBIA0044ZZ

1. Cooling fan motor harness connector
2. Crankshaft position sensor
3. Stop lamp switch
4. Brake pedal
5. Accelerator pedal position sensor harness connector
6. Accelerator pedal position sensor
7. Accelerator pedal
8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
9. Fuel pressure regulator
10. Fuel pump







ALBIA0273ZZ

1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELERATE switch
6. ASCD brake switch
7. Stop lamp switch
8. ASCD clutch switch
9. Clutch pedal

Component Description

INFOID:0000000001161141

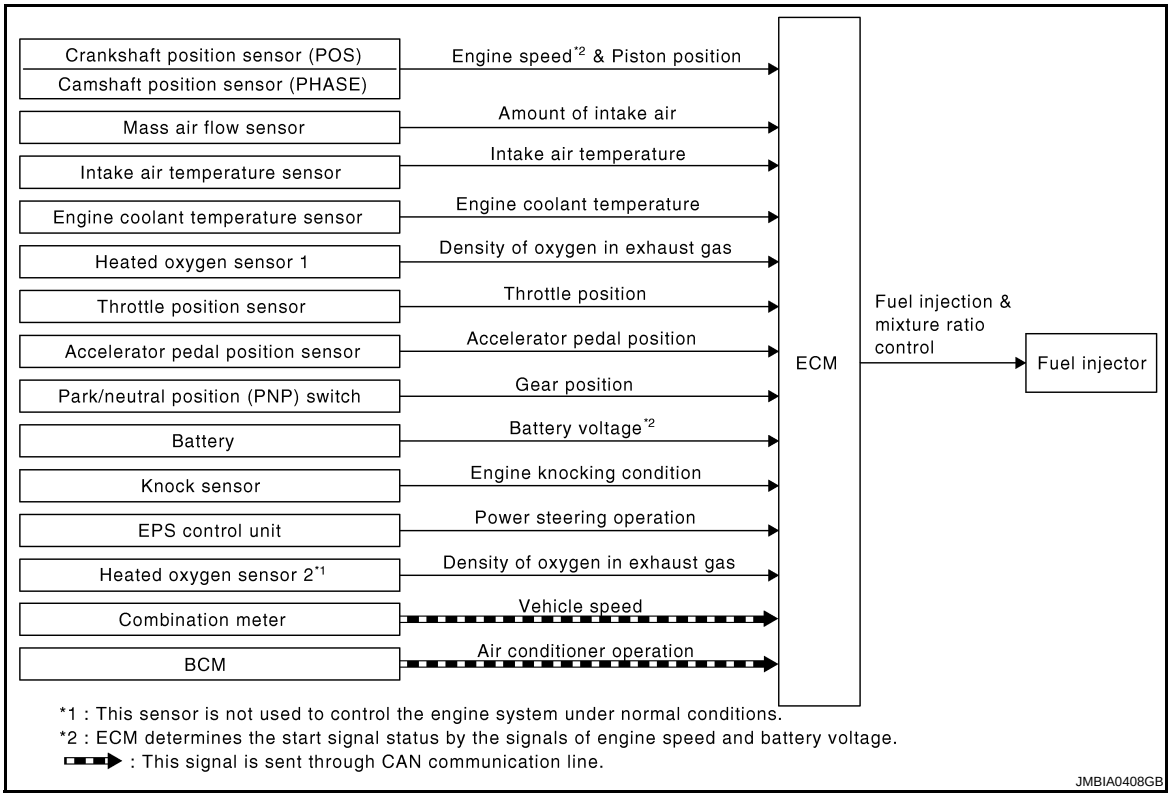
Component	Reference
Accelerator pedal position sensor	EC-286, "Description"
ASCD brake switch	EC-270, "Description"
ASCD steering switch	EC-267, "Description"
ASCD vehicle speed sensor	EC-278, "Description"
Camshaft position sensor (PHASE)	EC-201, "Description"
Crankshaft position sensor (POS)	EC-197, "Description"
Cooling fan motor	EC-307, "Description"
Electric throttle control actuator	EC-222, "Description"
Engine coolant temperature sensor	EC-142, "Description"
Fuel injector	EC-313, "Description"
Fuel pump	EC-316, "Description"
Heated oxygen sensor 1	EC-148, "Description"
Heated oxygen sensor 1 heater	EC-163, "Description"
Heated oxygen sensor 2	EC-166, "Description"
Heated oxygen sensor 2 heater	EC-176, "Description"
Ignition signal	EC-319, "Description"
Intake air temperature sensor	EC-139, "Description"
Intake valve timing control solenoid valve	EC-219, "Description"

Component	Reference
Knock sensor	EC-195, "Description"
Mass air flow sensor	EC-134, "Description"
Park/neutral position switch	EC-280, "Description"
PCV valve	EC-325, "Description"
Refrigerant pressure sensor	EC-326, "Description"
Stop lamp switch	EC-283, "Description"
Throttle control motor	EC-231, "Description"
Throttle control motor relay	EC-228, "Description"
Throttle position sensor	EC-187, "Description"
Vehicle speed sensor	EC-213, "Description"

MULTIPORT FUEL INJECTION SYSTEM

System Diagram

INFOID:0000000001161142



System Description

INFOID:0000000001161143

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		
Heated oxygen 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	Power steering operation		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
BCM	Air conditioner operation*2		
Combination meter	Vehicle speed*2		

*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.

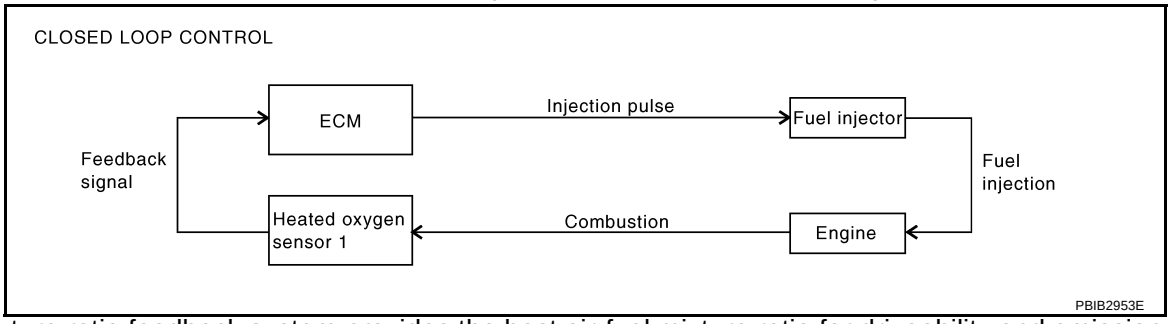
VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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 heated oxygen 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 heated oxygen sensor 1, refer to EC-148, "Description". This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of heated oxygen 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.

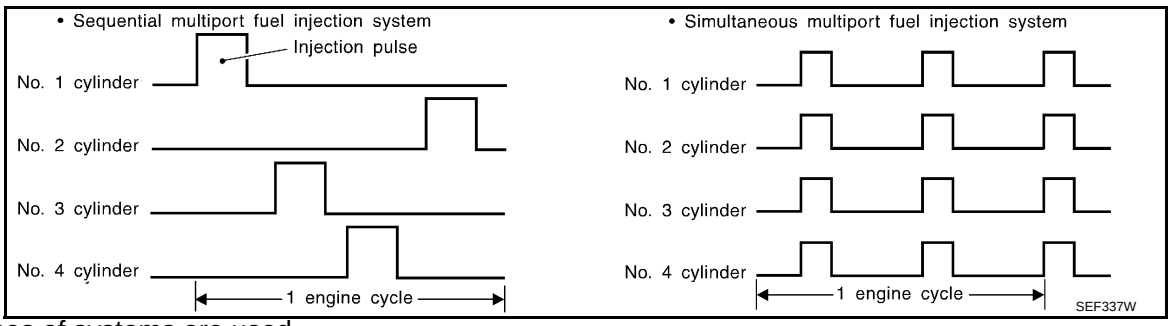
- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 or its circuit
- Insufficient activation of heated sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from heated oxygen 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 heated oxygen 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.

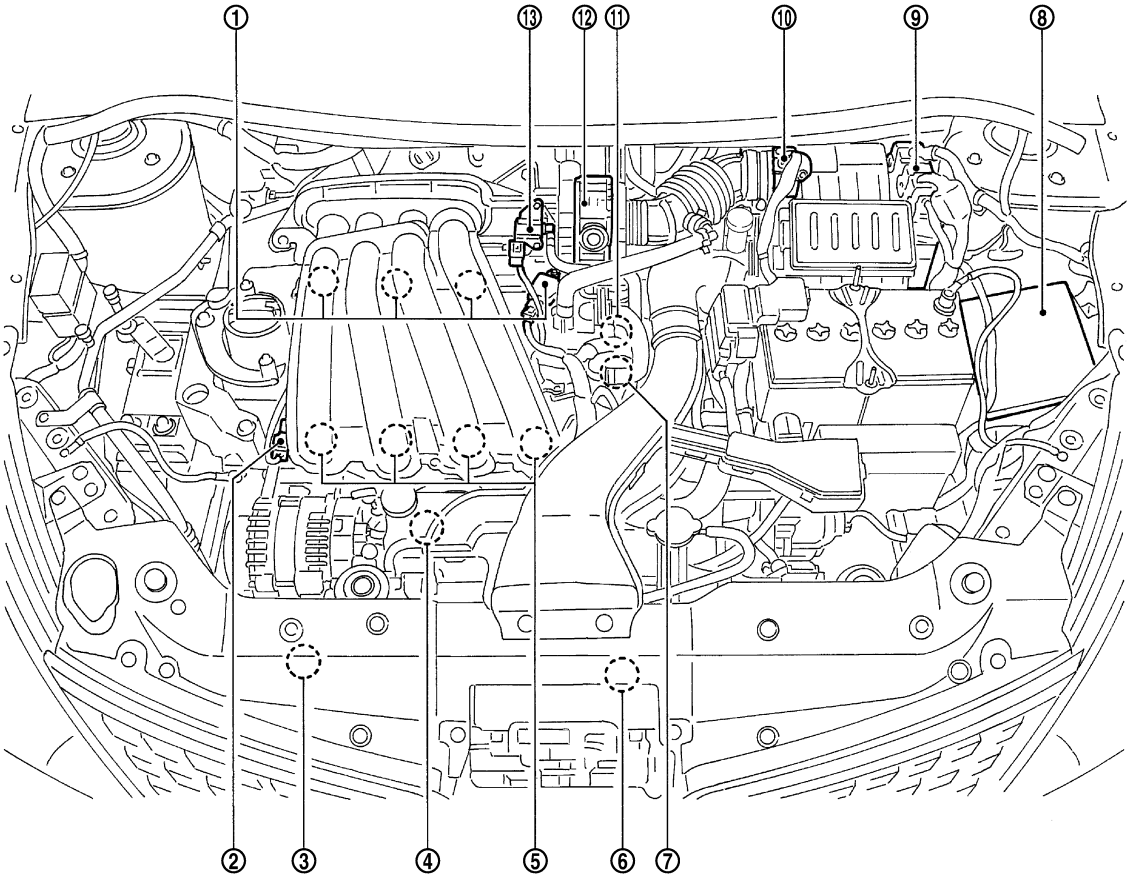
- Sequential Multiport Fuel Injection System
  Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.
- Simultaneous Multiport Fuel Injection System
  Fuel is injected simultaneously into all four cylinders twice each 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 when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

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

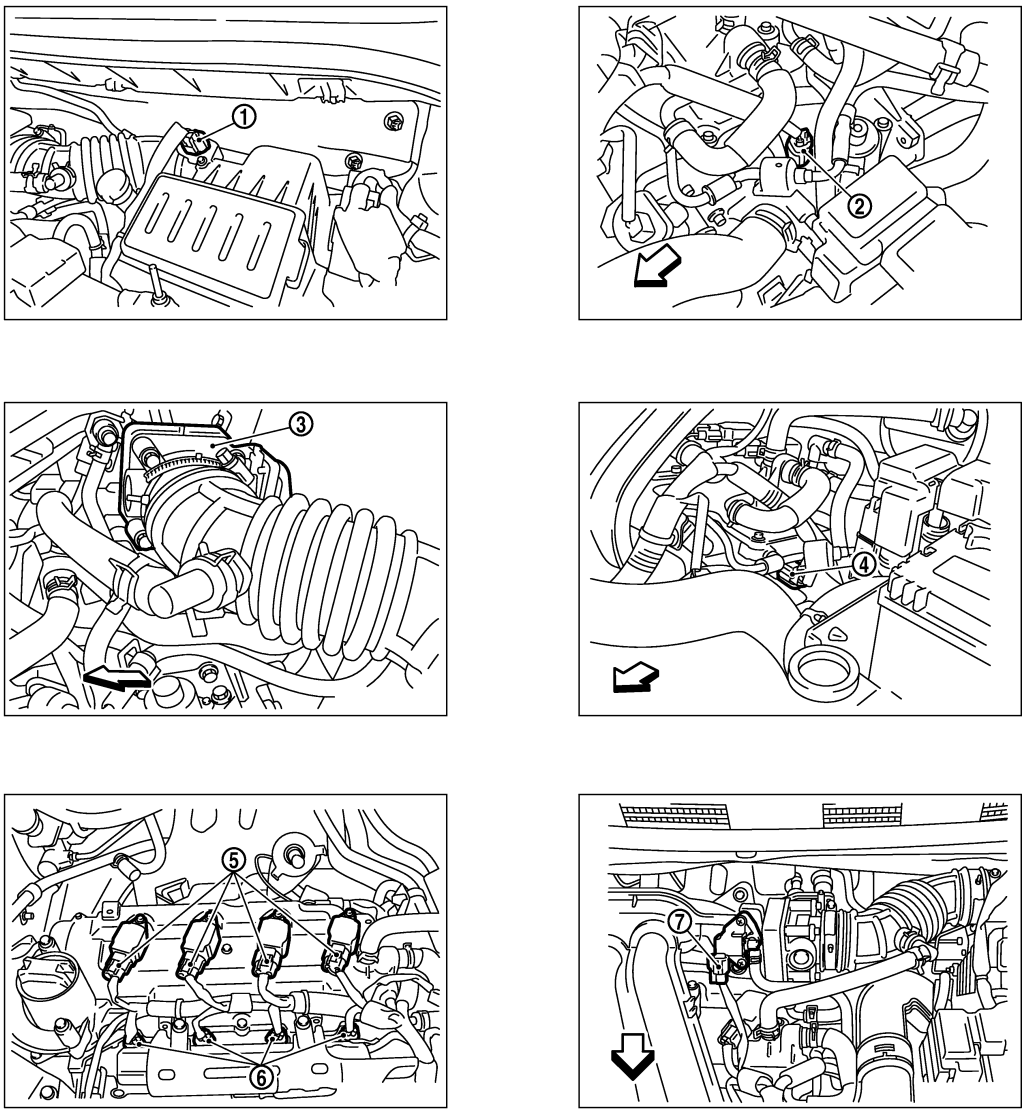
Component Parts Location

INFOID:0000000001677952



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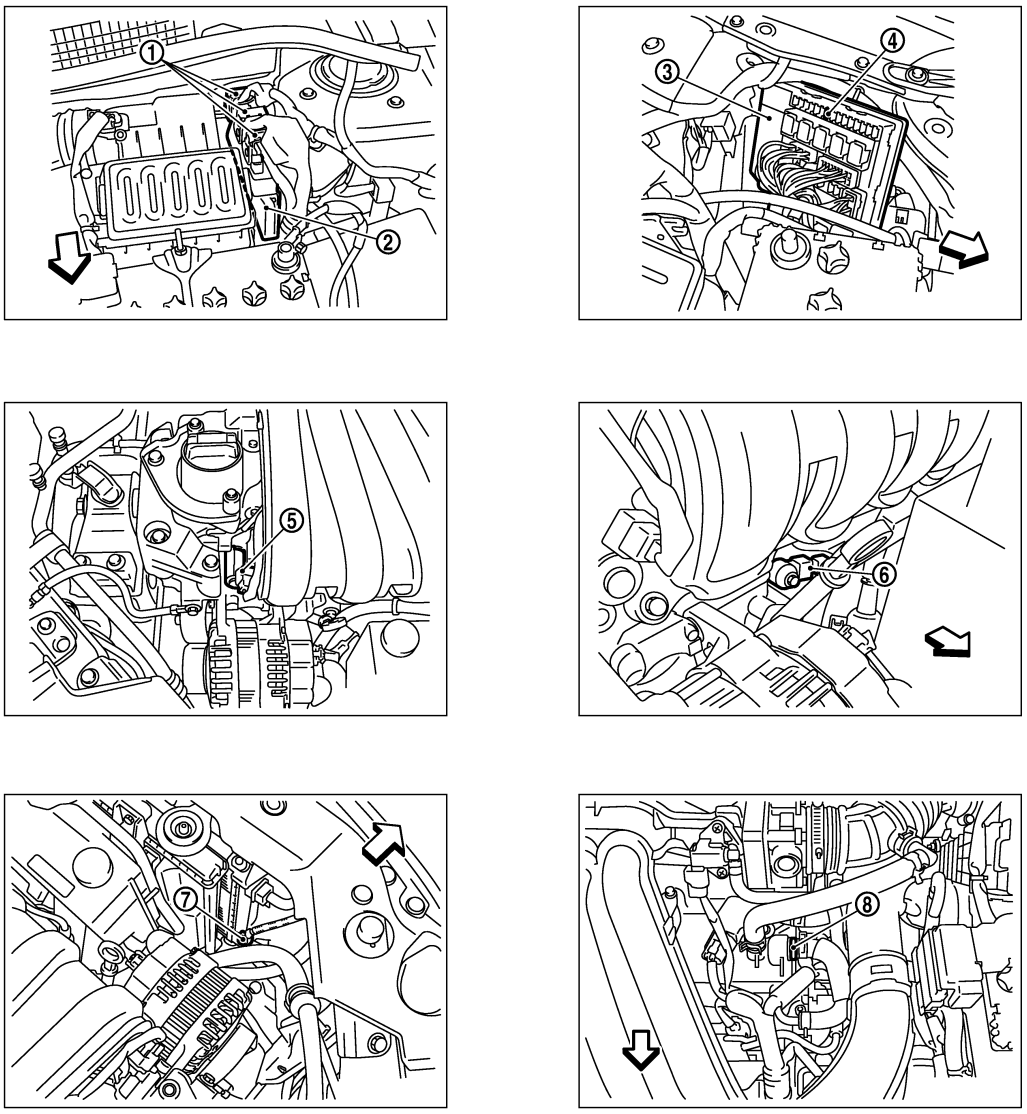
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Camshaft position sensor (PHASE)
5. Ignition coil (with power transistor)
6. Fuel injector
7. EVAP canister purge volume control solenoid valve

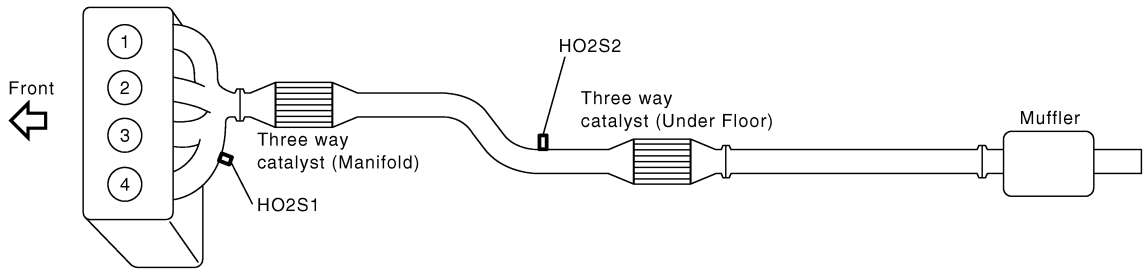
⇦ Vehicle front



PBIB2941E

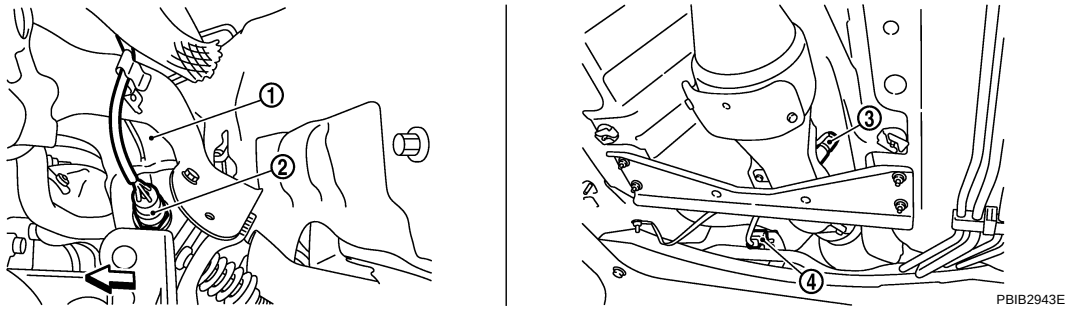
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

⇦ Vehicle front



No. of sensor
Location of a sensor in relation the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on

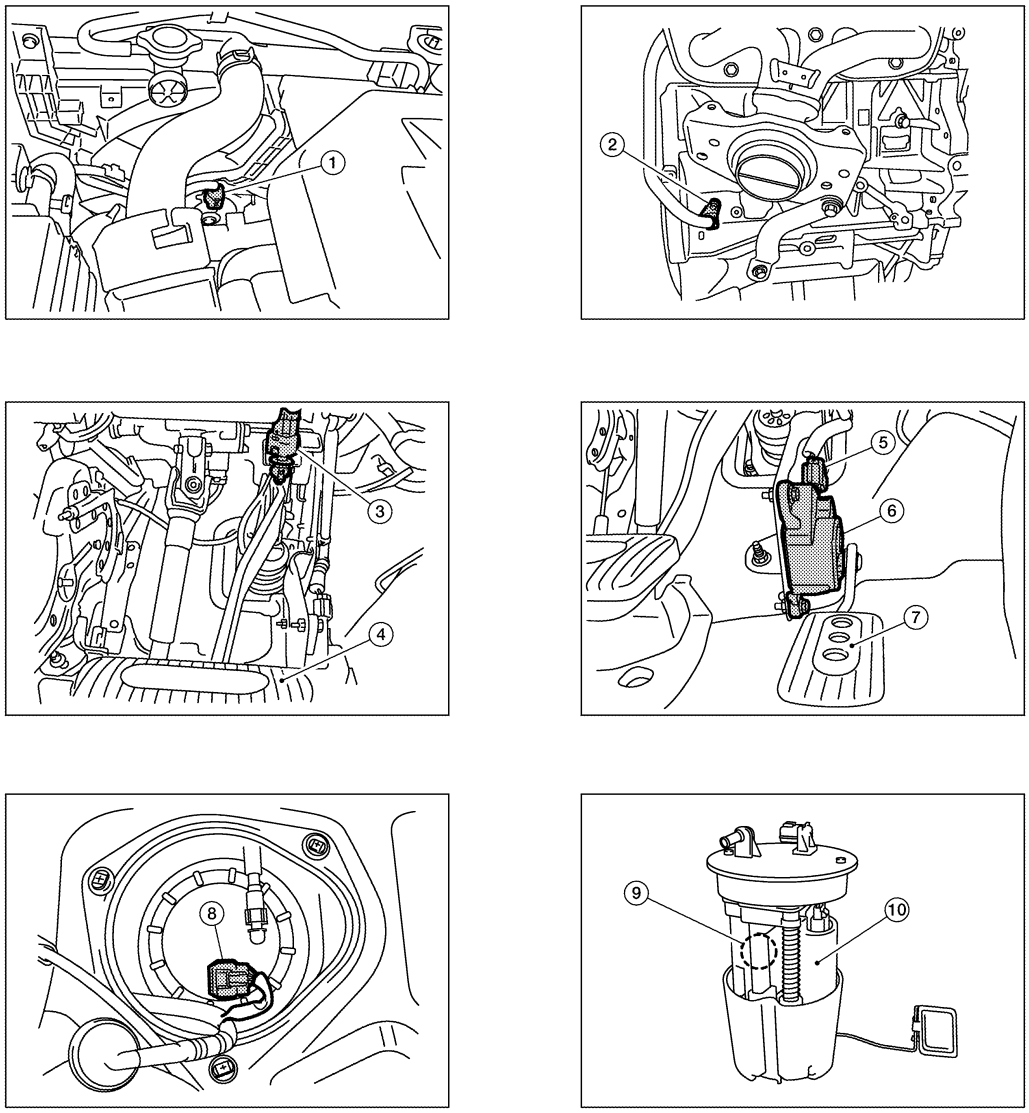
PBIB2942E



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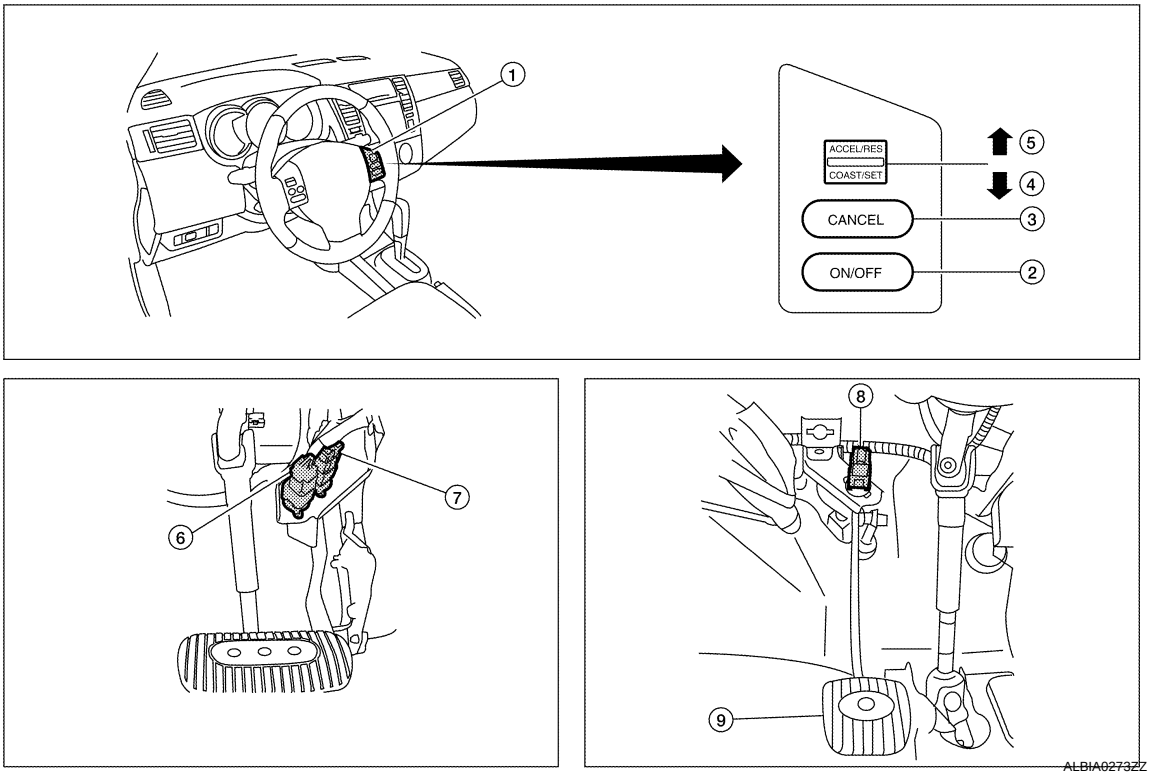
1. Exhaust manifold
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

⇦ Vehicle front



AWBIA0044ZZ

1. Cooling fan motor harness connector
2. Crankshaft position sensor
3. Stop lamp switch
4. Brake pedal
5. Accelerator pedal position sensor harness connector
6. Accelerator pedal position sensor
7. Accelerator pedal
8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
9. Fuel pressure regulator
10. Fuel pump



1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELERATE switch
6. ASCD brake switch
7. Stop lamp switch
8. ASCD clutch switch
9. Clutch pedal

Component Description

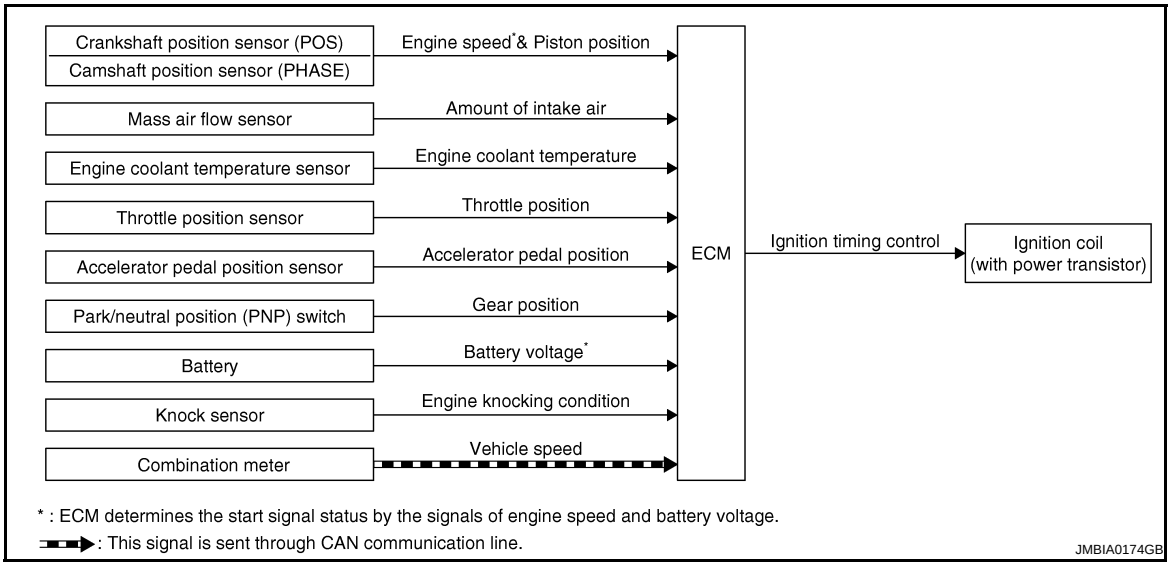
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Component	Reference
Accelerator pedal position sensor	EC-286, "Description"
Camshaft position sensor (PHASE)	EC-201, "Description"
Crankshaft position sensor (POS)	EC-197, "Description"
Engine coolant temperature sensor	EC-142, "Description"
Fuel injector	EC-313, "Description"
Heated oxygen sensor 1	EC-148, "Description"
Heated oxygen sensor 2	EC-166, "Description"
Intake air temperature sensor	EC-139, "Description"
Knock sensor	EC-195, "Description"
Mass air flow sensor	EC-134, "Description"
Park/neutral position (PNP) switch	EC-280, "Description"
Throttle position sensor	EC-261, "Description"
Vehicle speed sensor	EC-213, "Description"

ELECTRIC IGNITION SYSTEM

System Diagram

INFOID:0000000001161146



System Description

INFOID:0000000001161147

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.

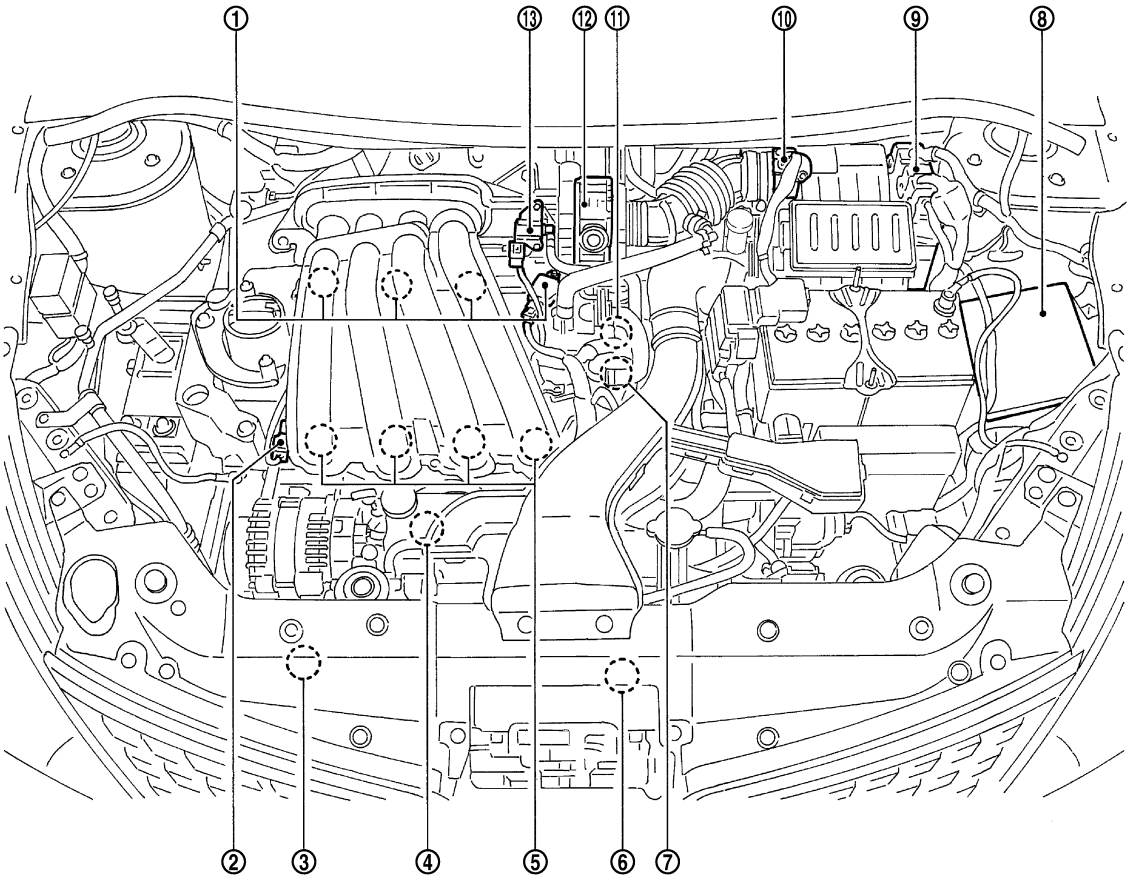
- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

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.

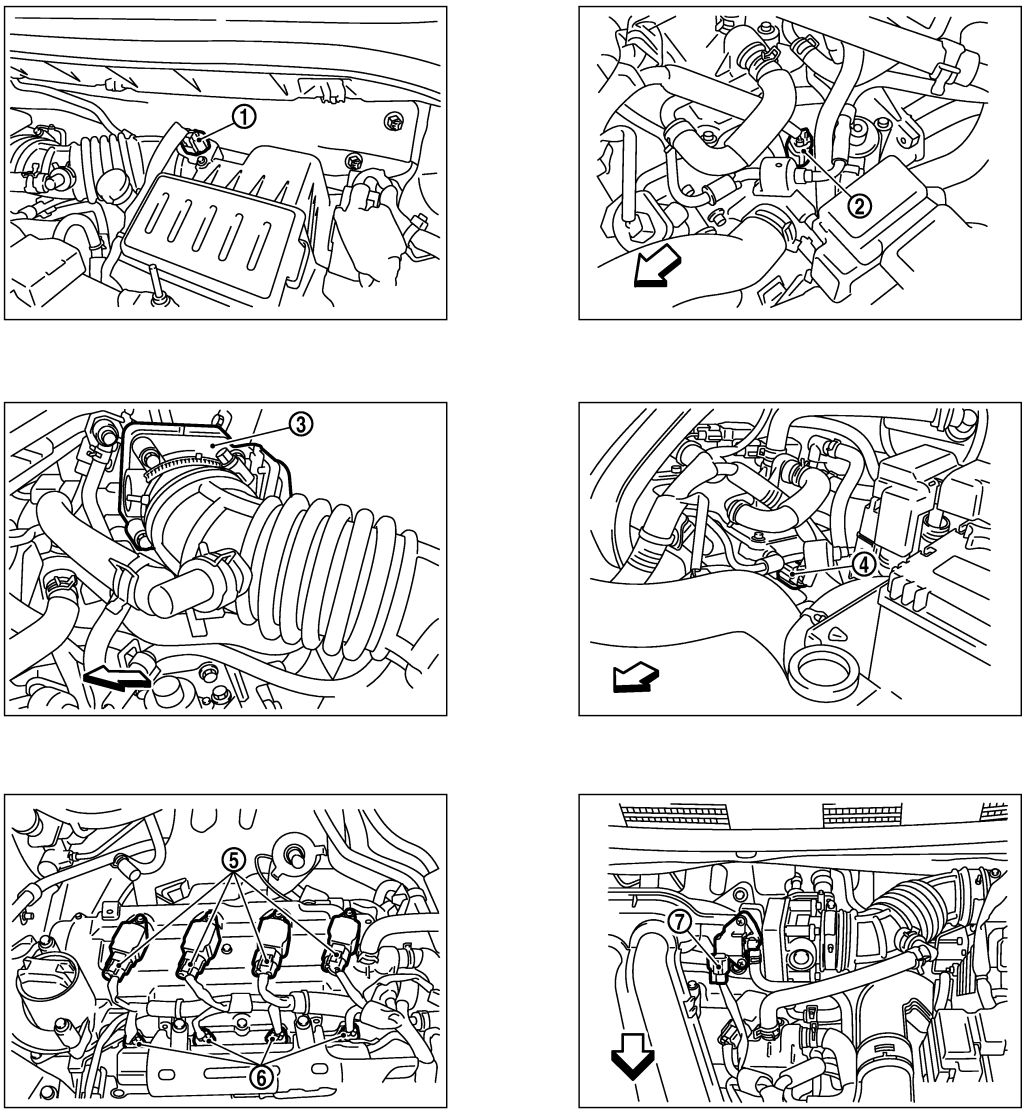
Component Parts Location

INFOID:0000000001677953



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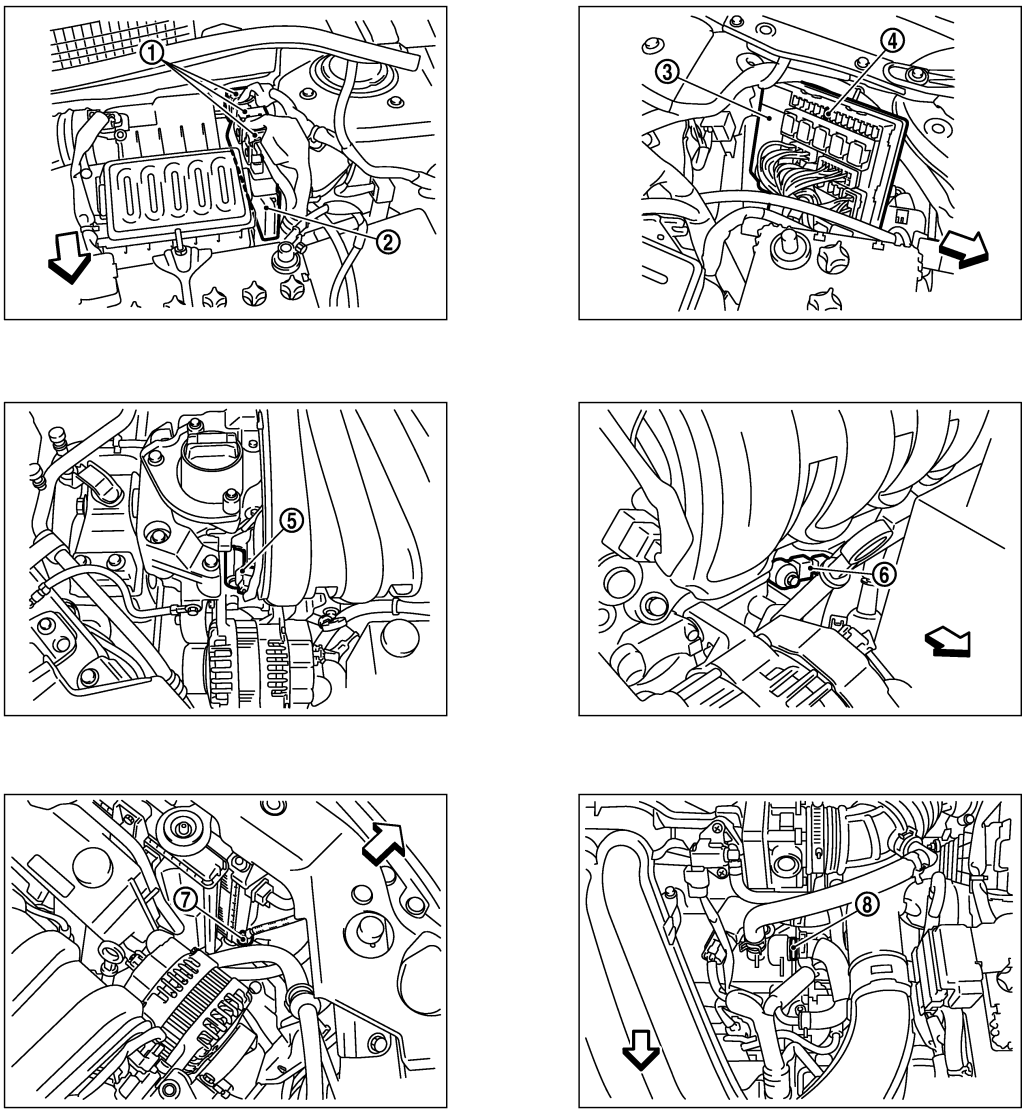
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Camshaft position sensor (PHASE)
5. Ignition coil (with power transistor)
6. Fuel injector
7. EVAP canister purge volume control solenoid valve

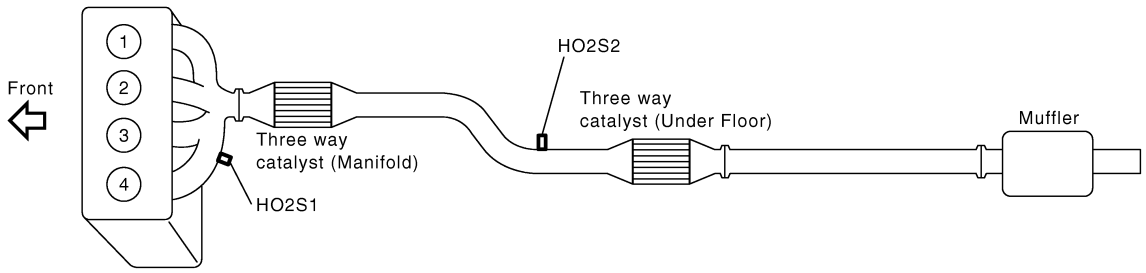
⇦ Vehicle front



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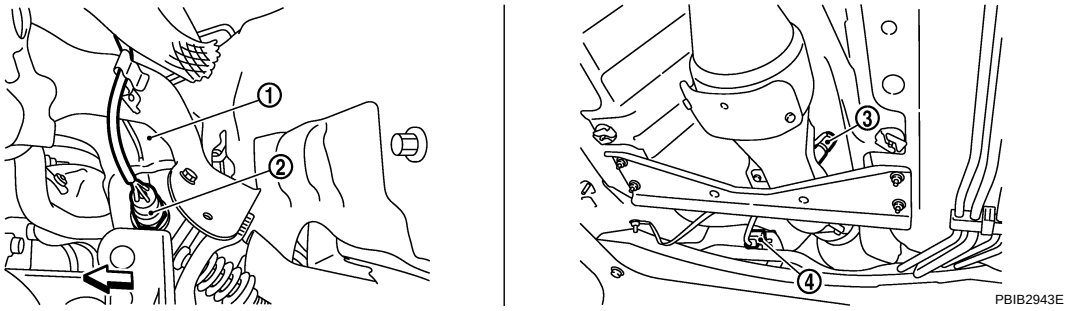
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

⇦ Vehicle front



No. of sensor
Location of a sensor in relation the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on

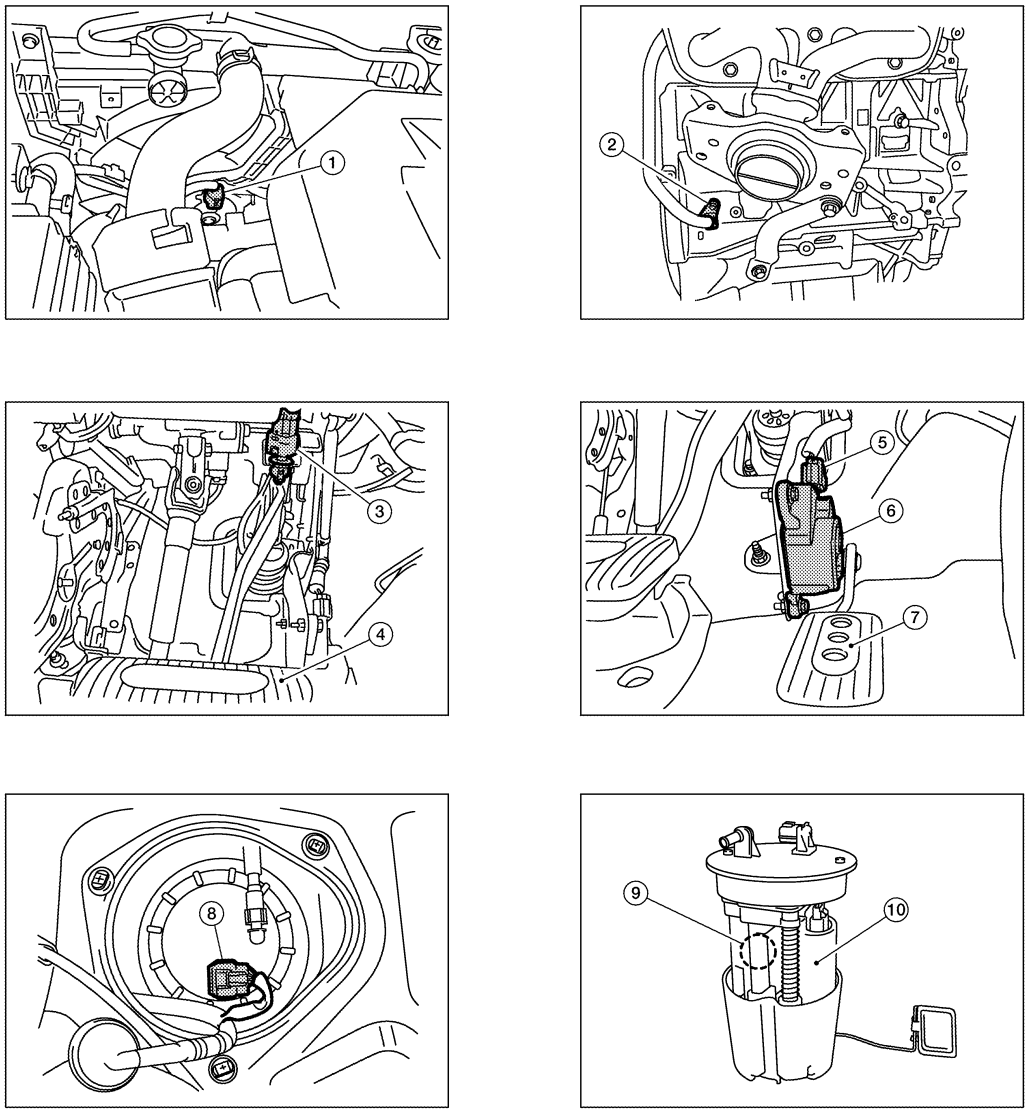
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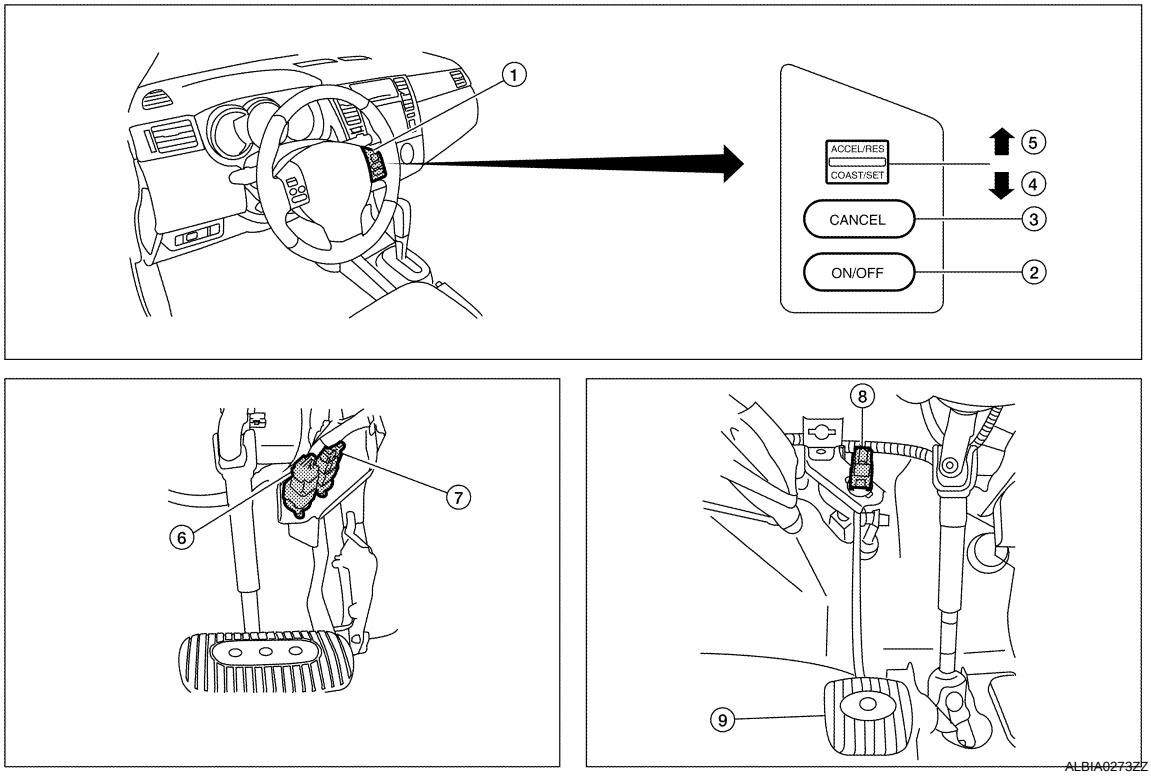
1. Exhaust manifold
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

⇦ Vehicle front



AWBIA0044ZZ

1. Cooling fan motor harness connector
2. Crankshaft position sensor
3. Stop lamp switch
4. Brake pedal
5. Accelerator pedal position sensor harness connector
6. Accelerator pedal position sensor
7. Accelerator pedal
8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
9. Fuel pressure regulator
10. Fuel pump



1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELERATE switch
6. ASCD brake switch
7. Stop lamp switch
8. ASCD clutch switch
9. Clutch pedal

Component Description

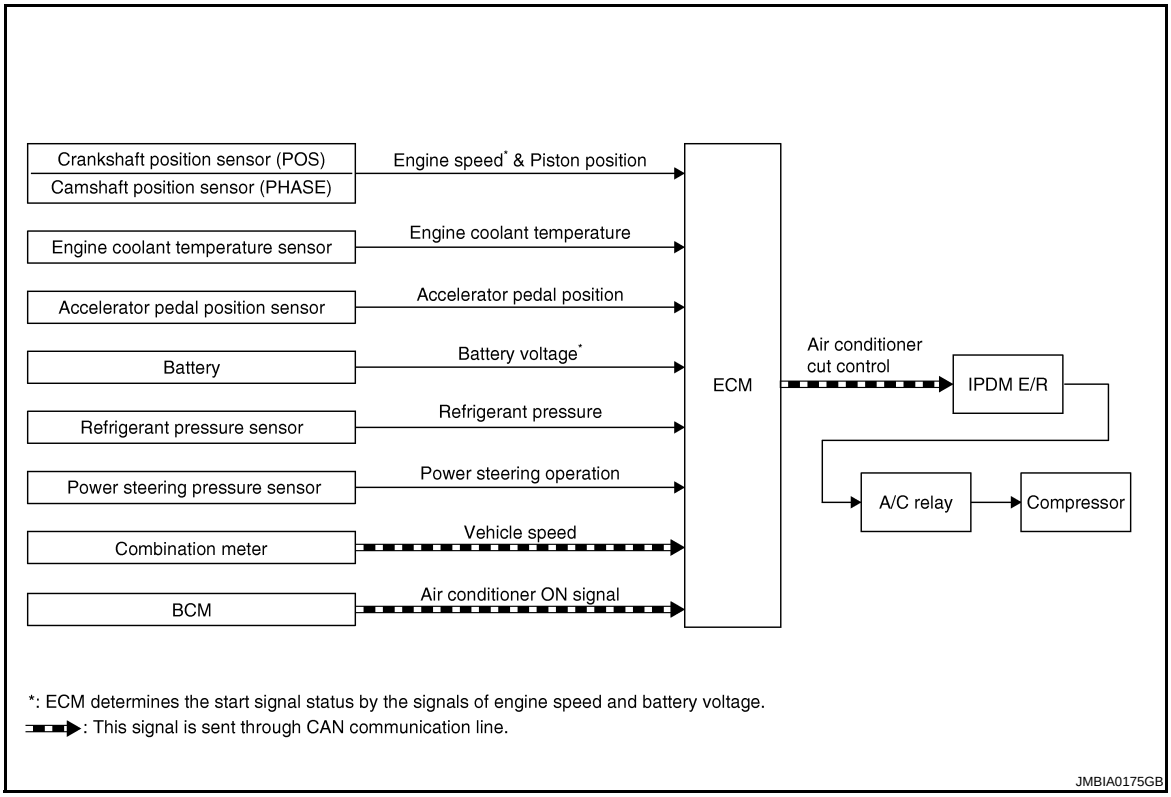
INFOID:0000000001161149

Component	Reference
Accelerator pedal position sensor	EC-286, "Description"
Camshaft position sensor (PHASE)	EC-201, "Description"
Crankshaft position sensor (POS)	EC-197, "Description"
Engine coolant temperature sensor	EC-142, "Description"
Ignition signal	EC-319, "Description"
Knock sensor	EC-195, "Description"
Mass air flow sensor	EC-134, "Description"
Park/neutral position (PNP) switch	EC-280, "Description"
Throttle position sensor	EC-145, "Description"
Vehicle speed sensor	EC-213, "Description"

AIR CONDITIONING CUT CONTROL

System Diagram

INFOID:0000000001161150



System Description

INFOID:0000000001161151

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

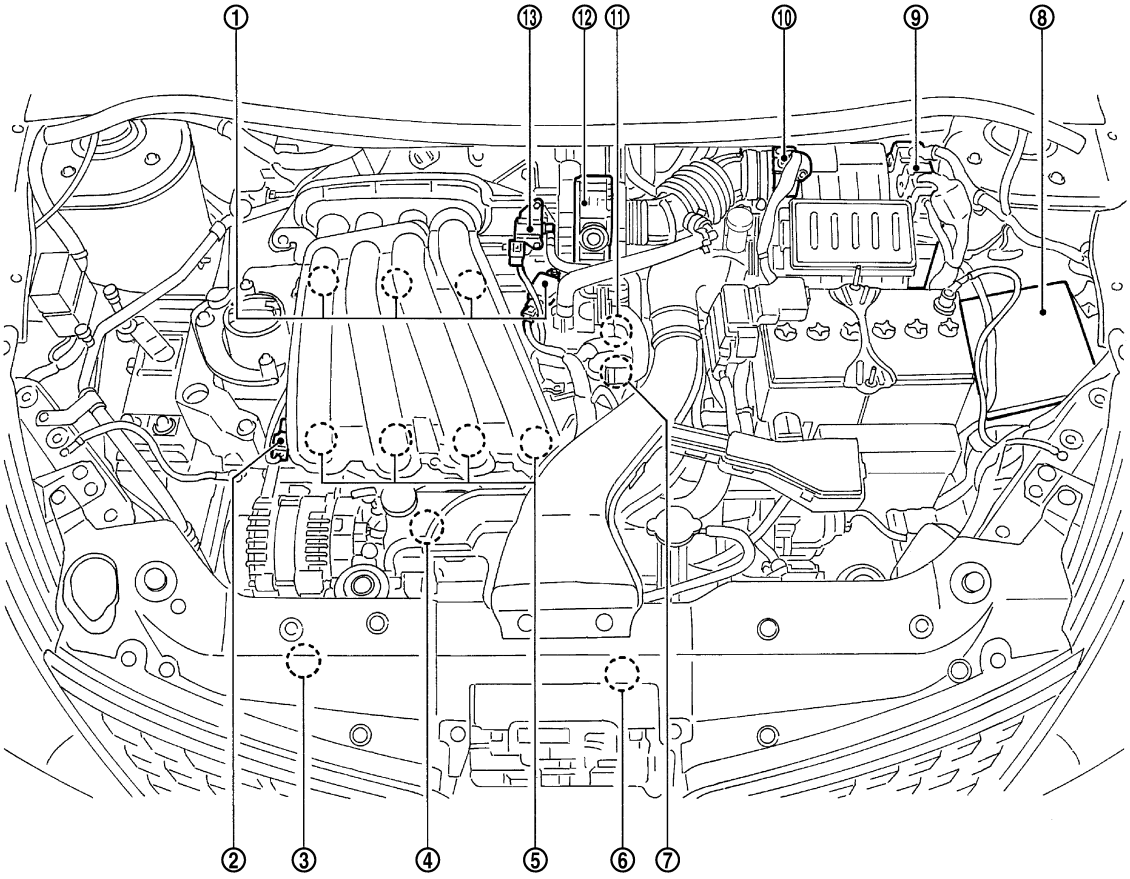
This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

- 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.

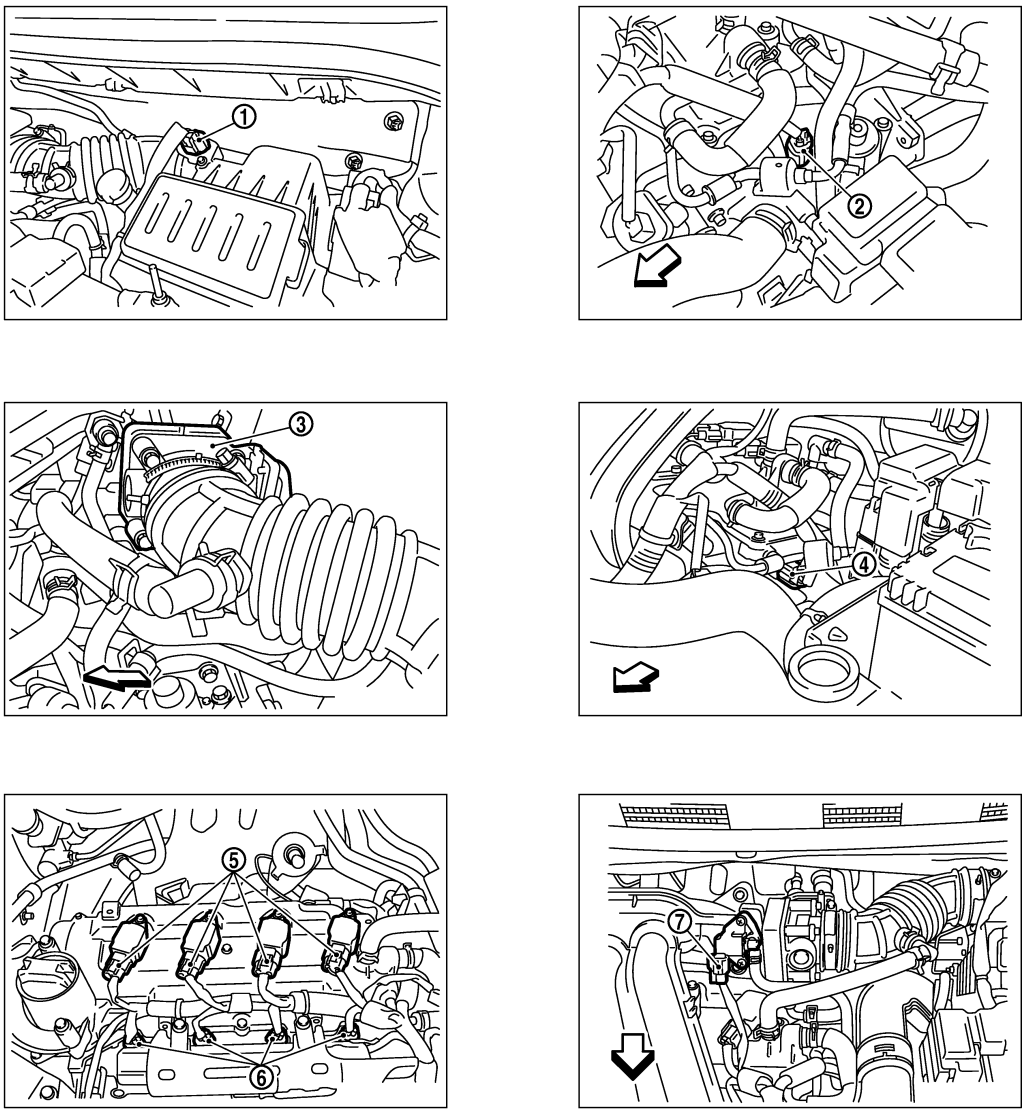
Component Parts Location

INFOID:0000000001677954



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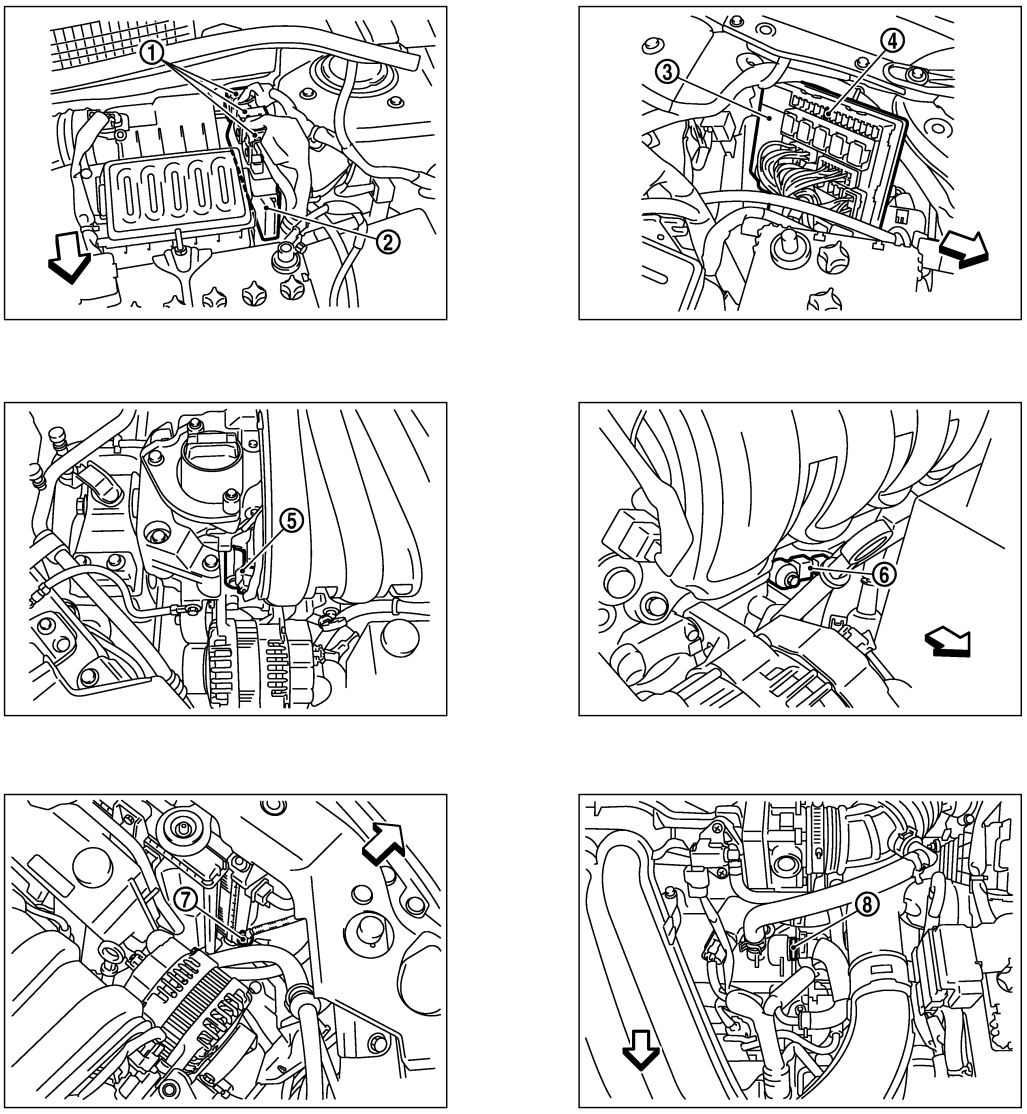
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Camshaft position sensor (PHASE)
5. Ignition coil (with power transistor)
6. Fuel injector
7. EVAP canister purge volume control solenoid valve

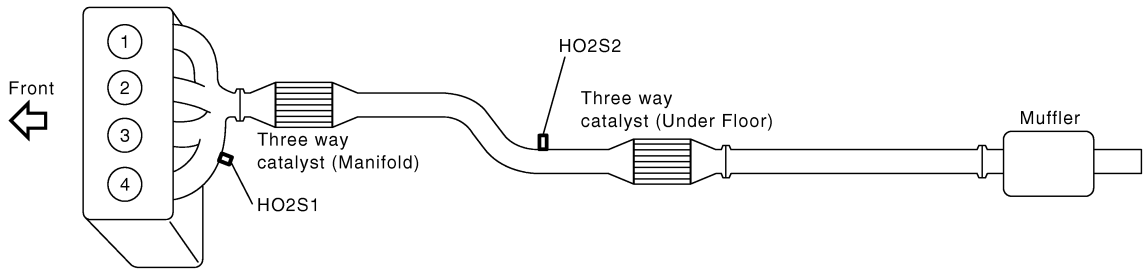
⇦ Vehicle front



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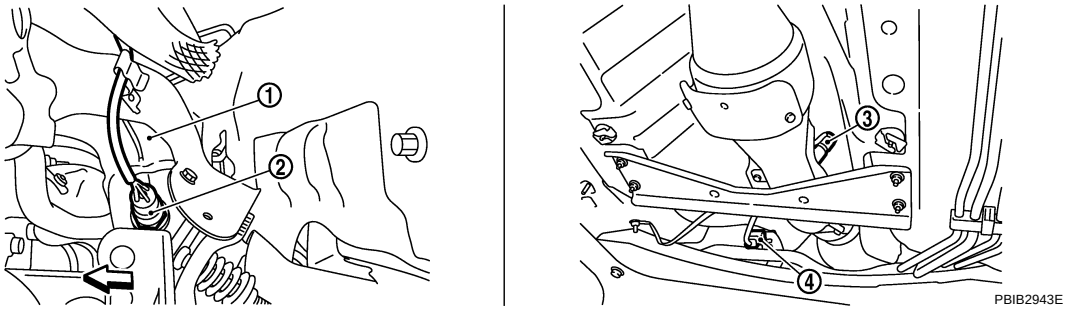
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

⇦ Vehicle front



No. of sensor
Location of a sensor in relation the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on

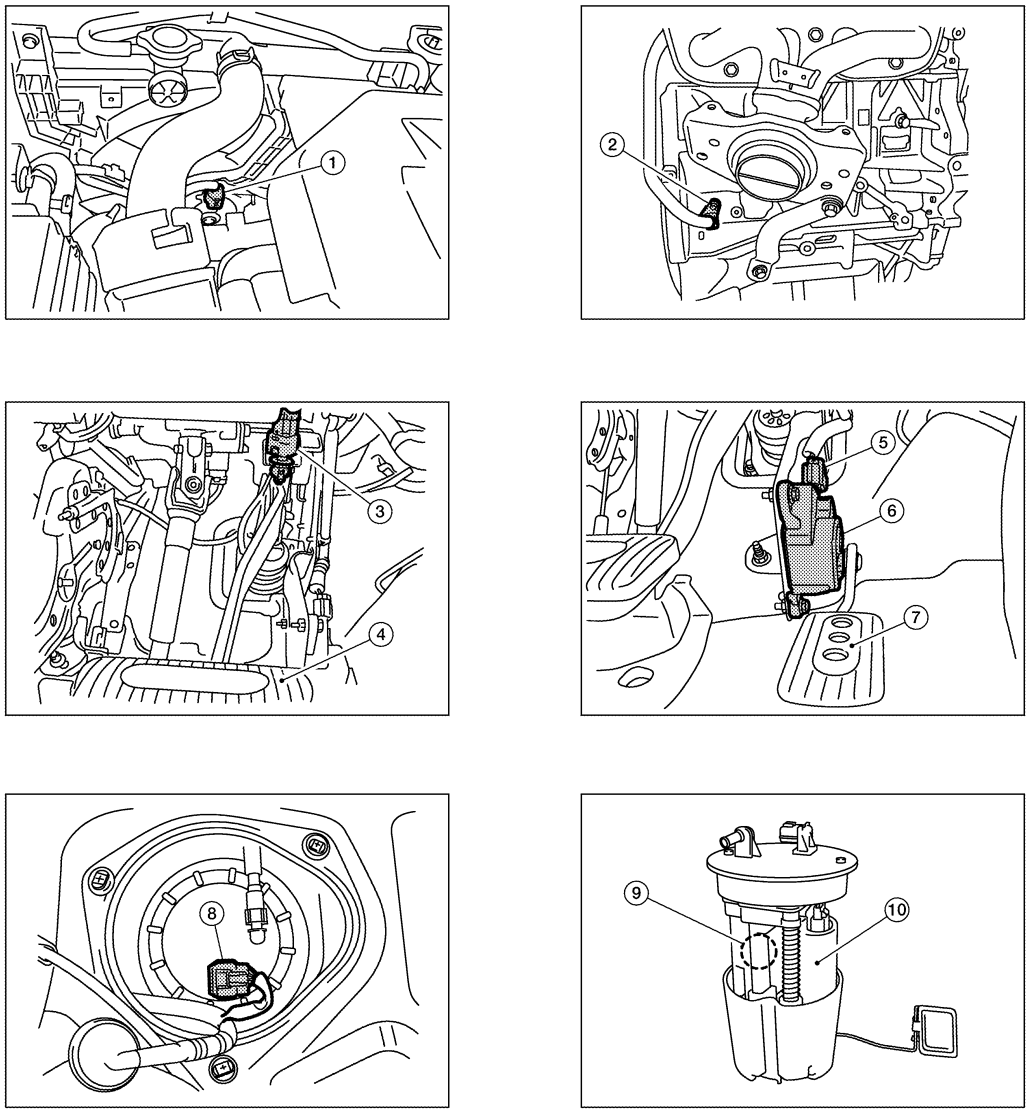
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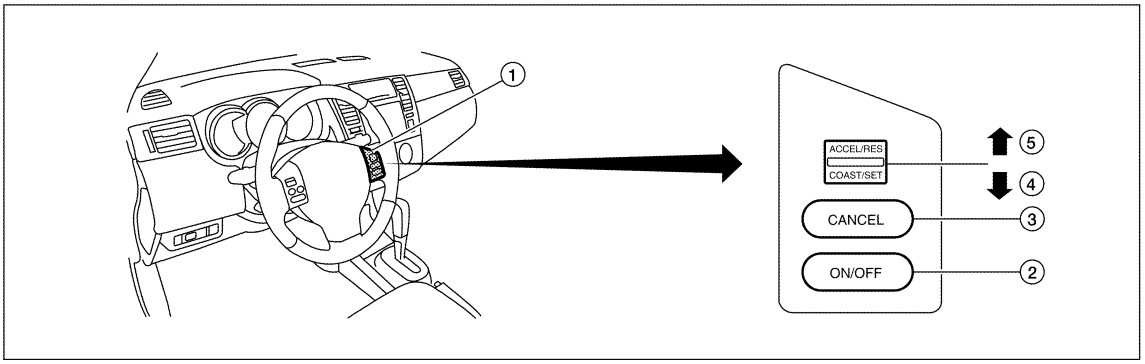
1. Exhaust manifold
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

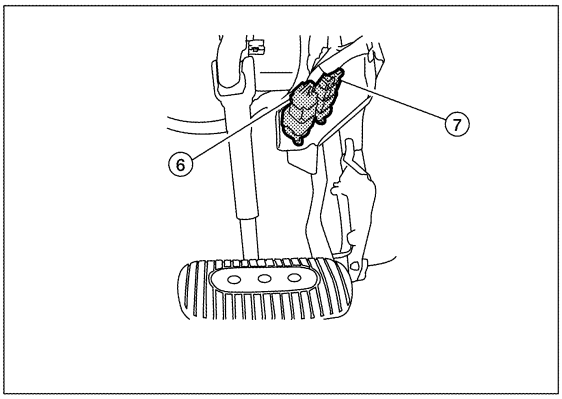
⇦ Vehicle front

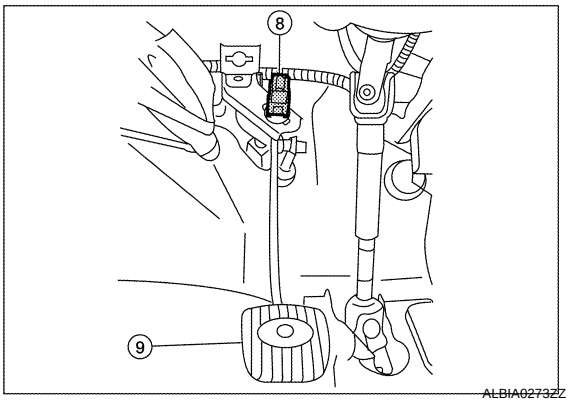


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1. Cooling fan motor harness connector
2. Crankshaft position sensor
3. Stop lamp switch
4. Brake pedal
5. Accelerator pedal position sensor harness connector
6. Accelerator pedal position sensor
7. Accelerator pedal
8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
9. Fuel pressure regulator
10. Fuel pump







ALBIA0273ZZ

1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELERATE switch
6. ASCD brake switch
7. Stop lamp switch
8. ASCD clutch switch
9. Clutch pedal

Component Description

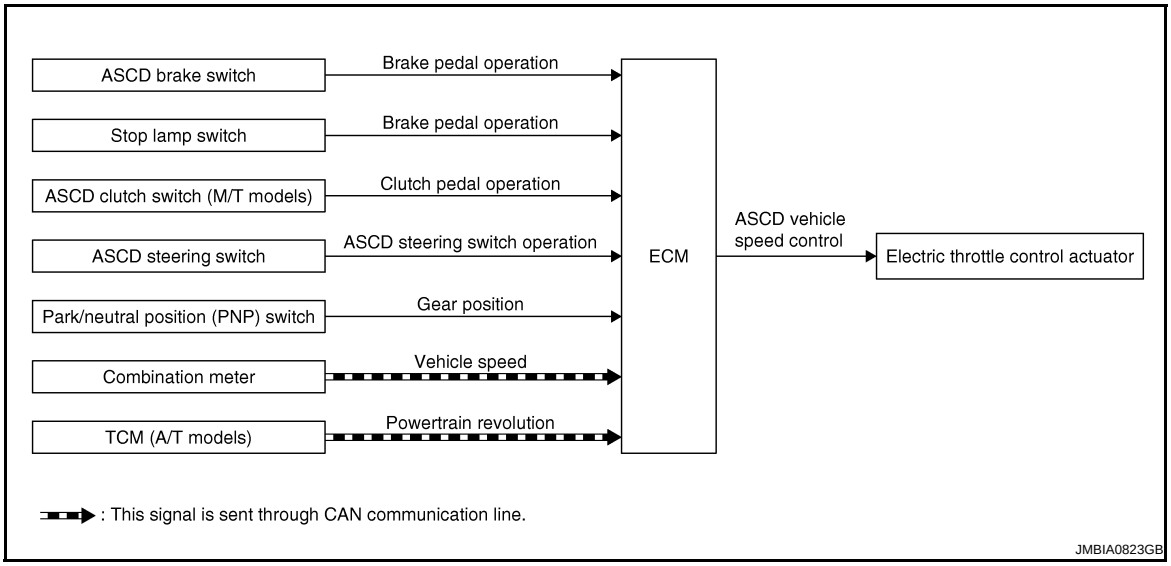
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Component	Reference
Accelerator pedal position sensor	EC-286, "Description"
Camshaft position sensor (PHASE)	EC-201, "Description"
Crankshaft position sensor (POS)	EC-197, "Description"
Engine coolant temperature sensor	EC-142, "Description"
Refrigerant pressure sensor	EC-326, "Description"
Vehicle speed sensor	EC-213, "Description"

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram

INFOID:0000000001161154



System Description

INFOID:0000000001161155

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			
ASCD clutch switch (M/T models)	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/neutral position switch	Gear position		
Combination meter	Vehicle speed*		
TCM (A/T 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 153 km/h (95 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 153 km/h (95 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 (A/T models).
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated

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

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

COAST OPERATION

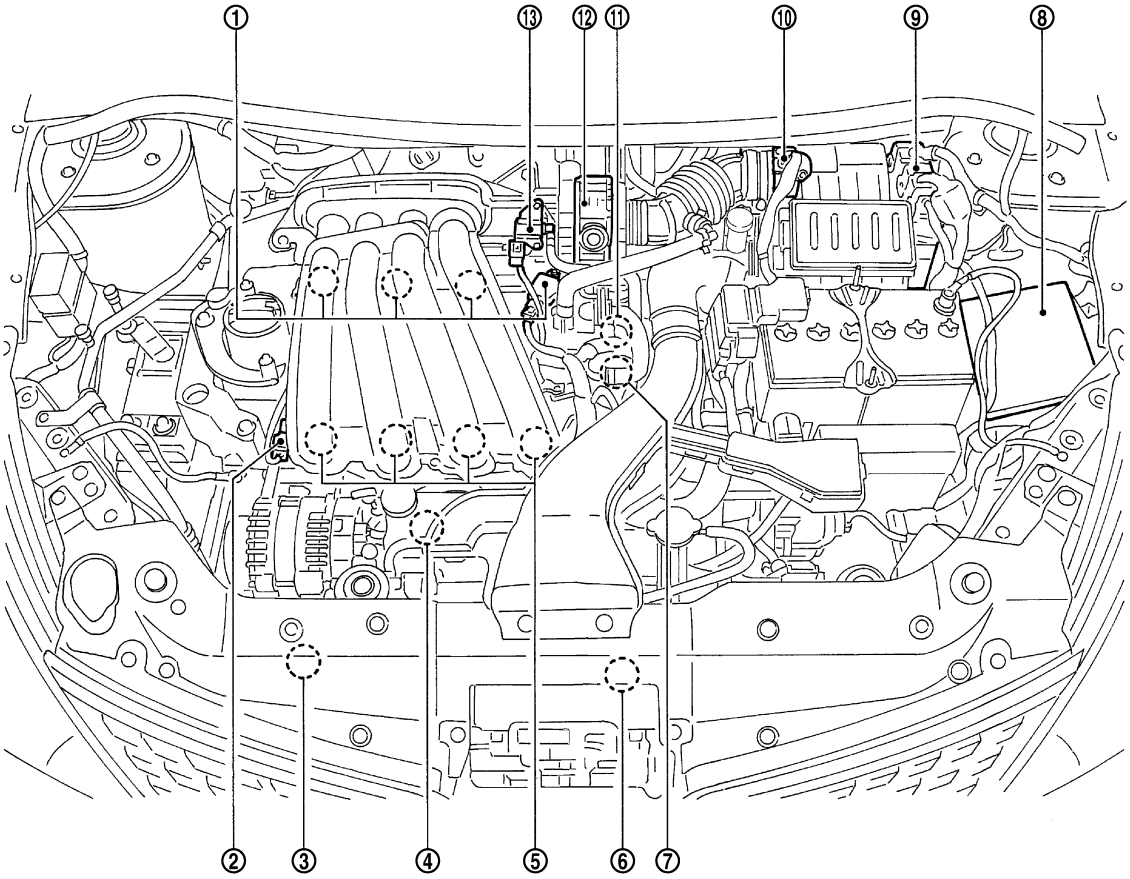
When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

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 (A/T models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 153km/h (95 MPH)

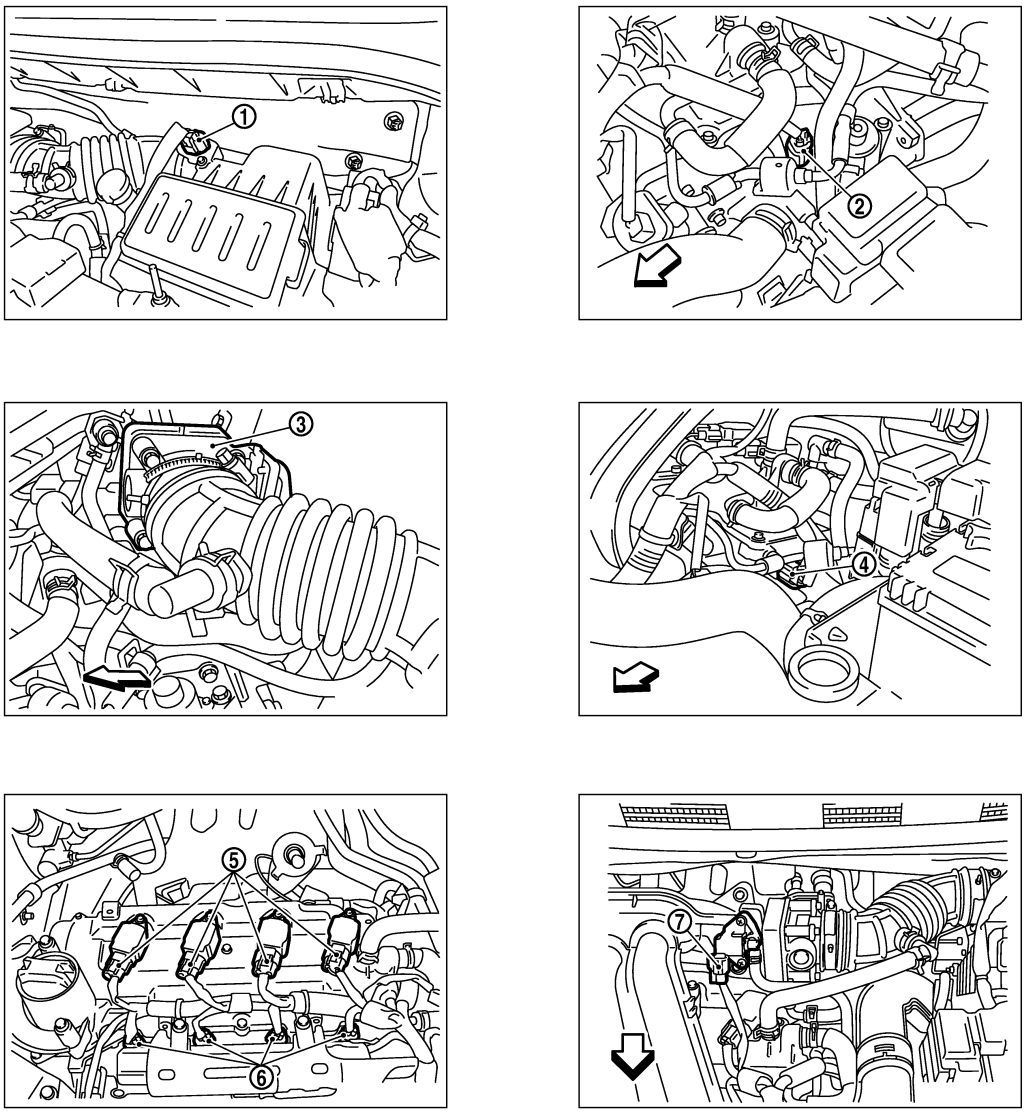
Component Parts Location

INFOID:0000000001677955



PBIB2939E

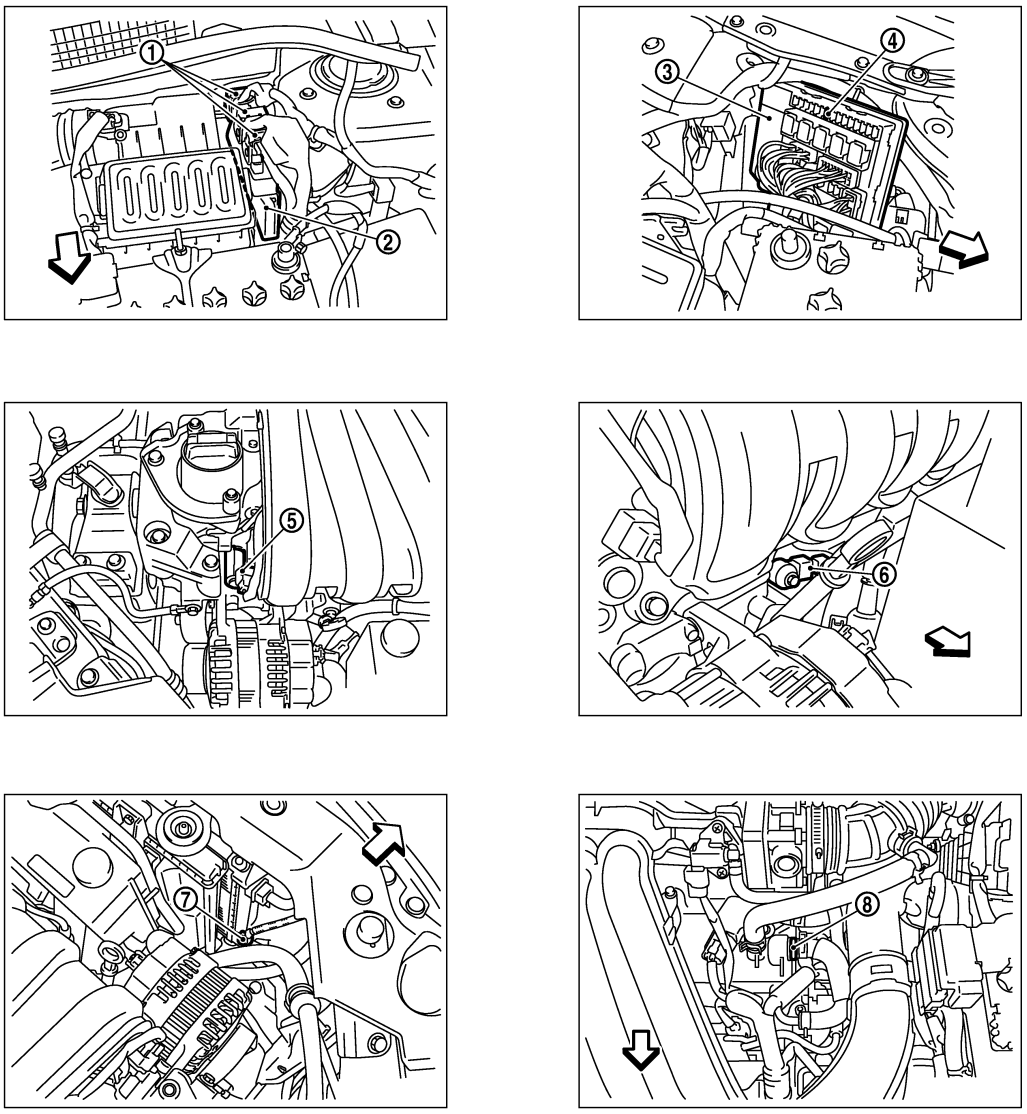
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Camshaft position sensor (PHASE)
5. Ignition coil (with power transistor)
6. Fuel injector
7. EVAP canister purge volume control solenoid valve

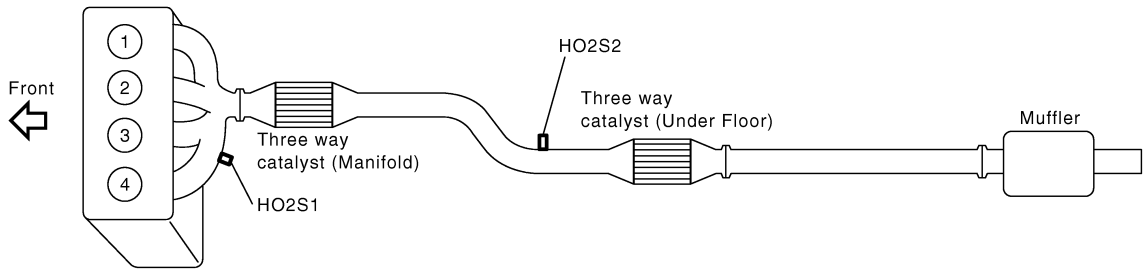
⇦ Vehicle front



PBIB2941E

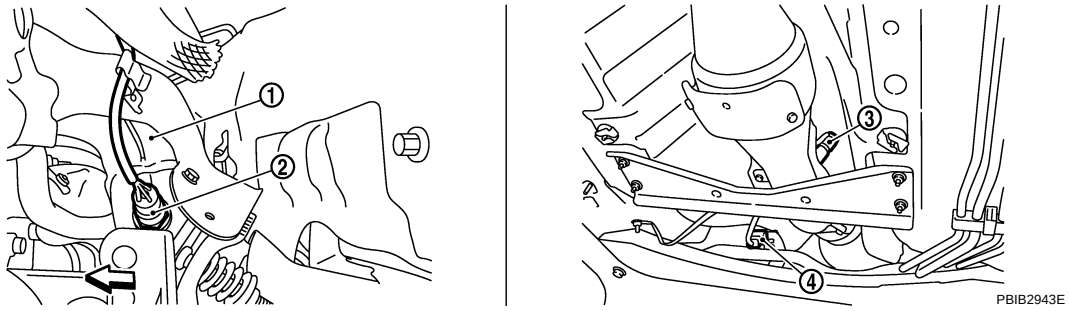
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

⇦ Vehicle front



No. of sensor
Location of a sensor in relation the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on

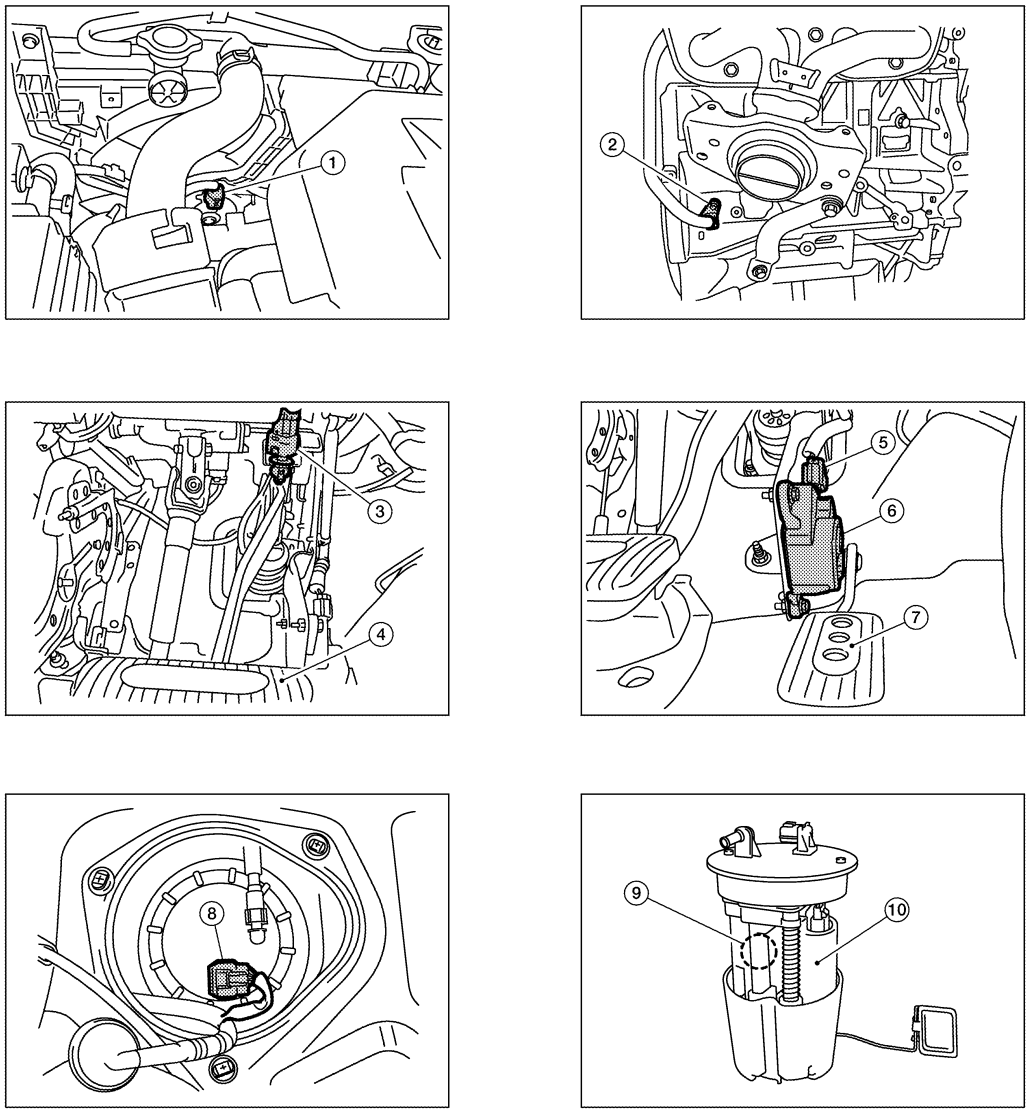
PBIB2942E



PBIB2943E

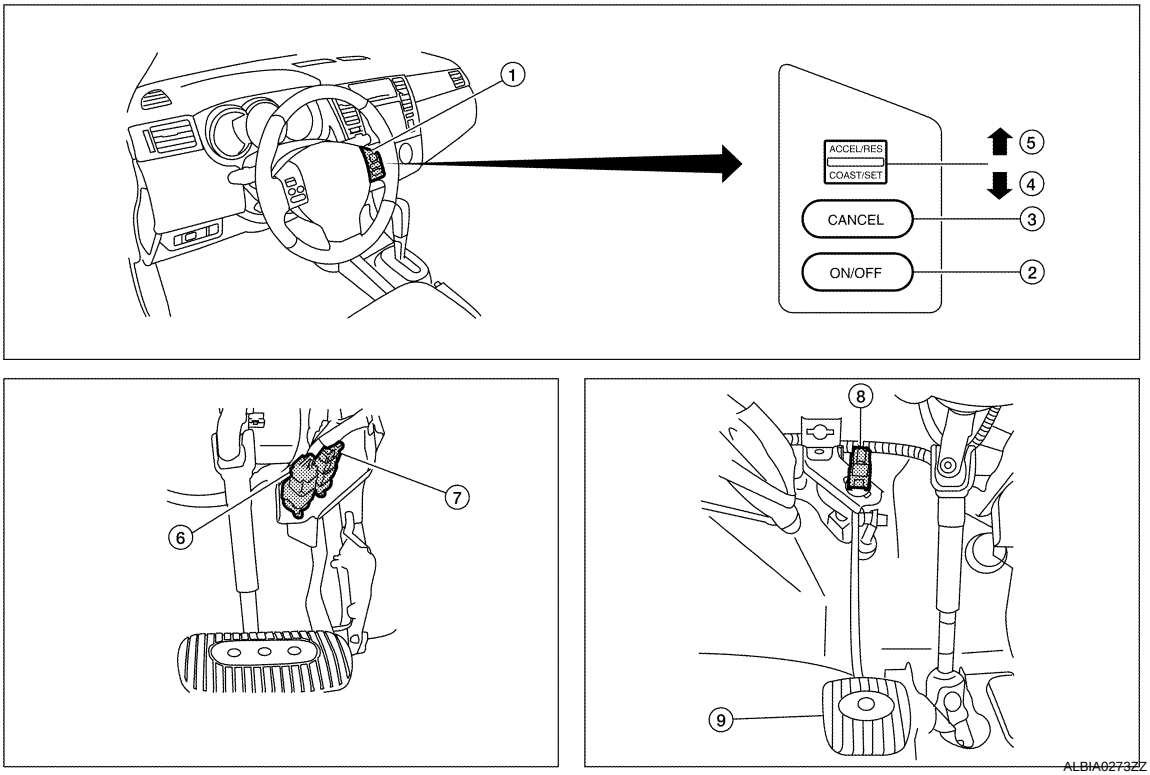
1. Exhaust manifold
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

⇦ Vehicle front



AWBIA0044ZZ

1. Cooling fan motor harness connector
2. Crankshaft position sensor
3. Stop lamp switch
4. Brake pedal
5. Accelerator pedal position sensor harness connector
6. Accelerator pedal position sensor
7. Accelerator pedal
8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
9. Fuel pressure regulator
10. Fuel pump



1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELERATE switch
6. ASCD brake switch
7. Stop lamp switch
8. ASCD clutch switch
9. Clutch pedal

Component Description

INFOID:0000000001161157

Component	Reference
ASCD steering switch	EC-267, "Description"
ASCD clutch switch	EC-270, "Description"
ASCD brake switch	EC-270, "Description"
ASCD indicator	EC-306, "Description"
Stop lamp switch	EC-283, "Description"
Electric throttle control actuator	EC-222, "Description"

CAN COMMUNICATION

System Description

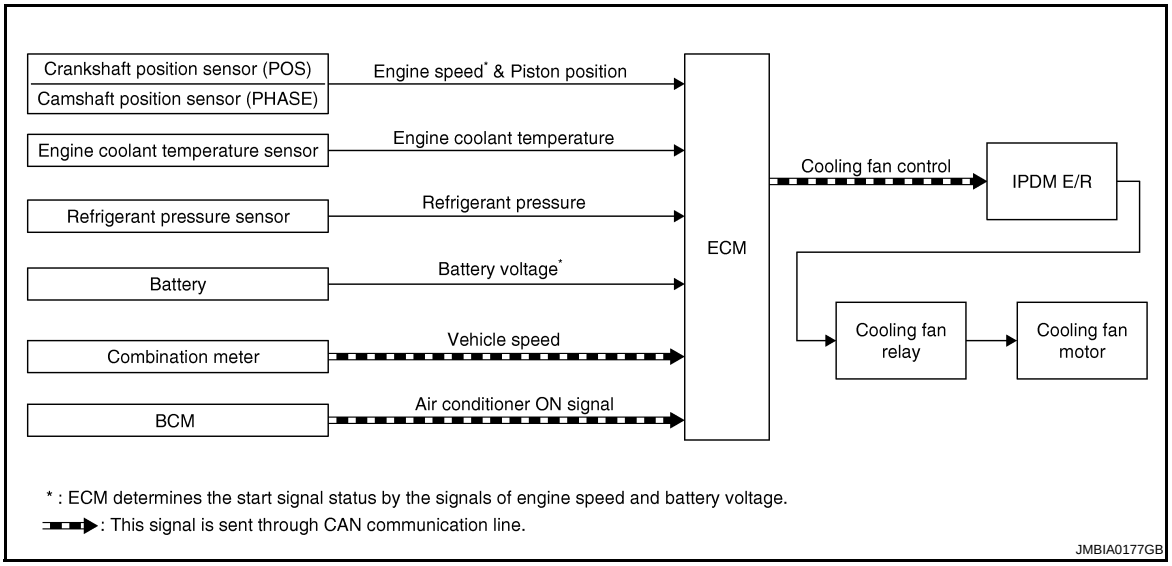
INFOID:0000000001161158

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-33, "CAN Communication Signal Chart", about CAN communication for detail.

COOLING FAN CONTROL

System Diagram

INFOID:0000000001161159



System Description

INFOID:0000000001161160

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.

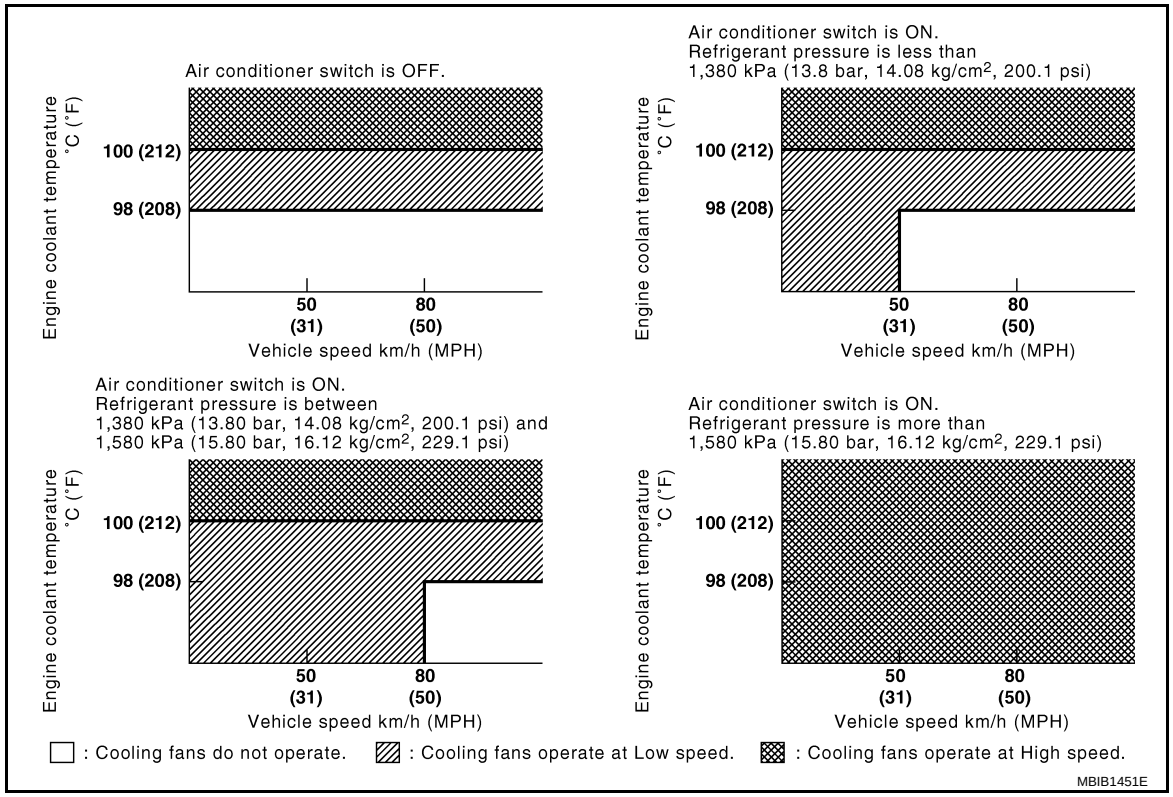
*2: This signal is sent to ECM through CAN communication line.

SYSTEM DESCRIPTION

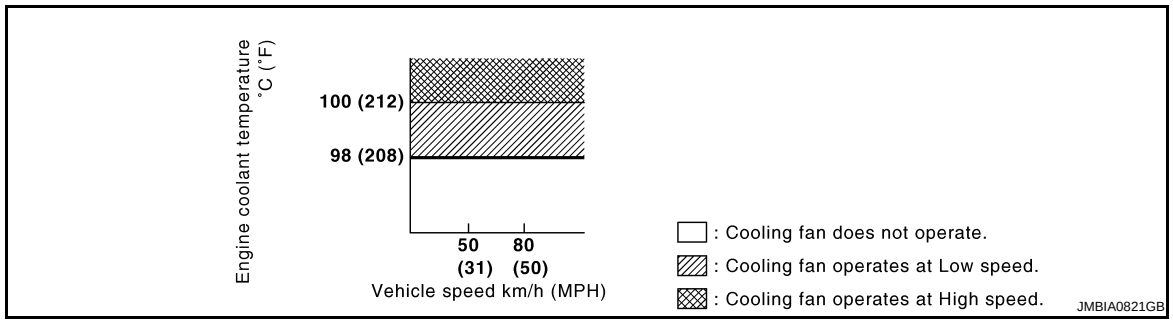
ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pressure, air conditioner ON signal. Then control system has 3-step control [HIGH/LOW/OFF].

Cooling Fan Operation

Models with A/C



Models without A/C



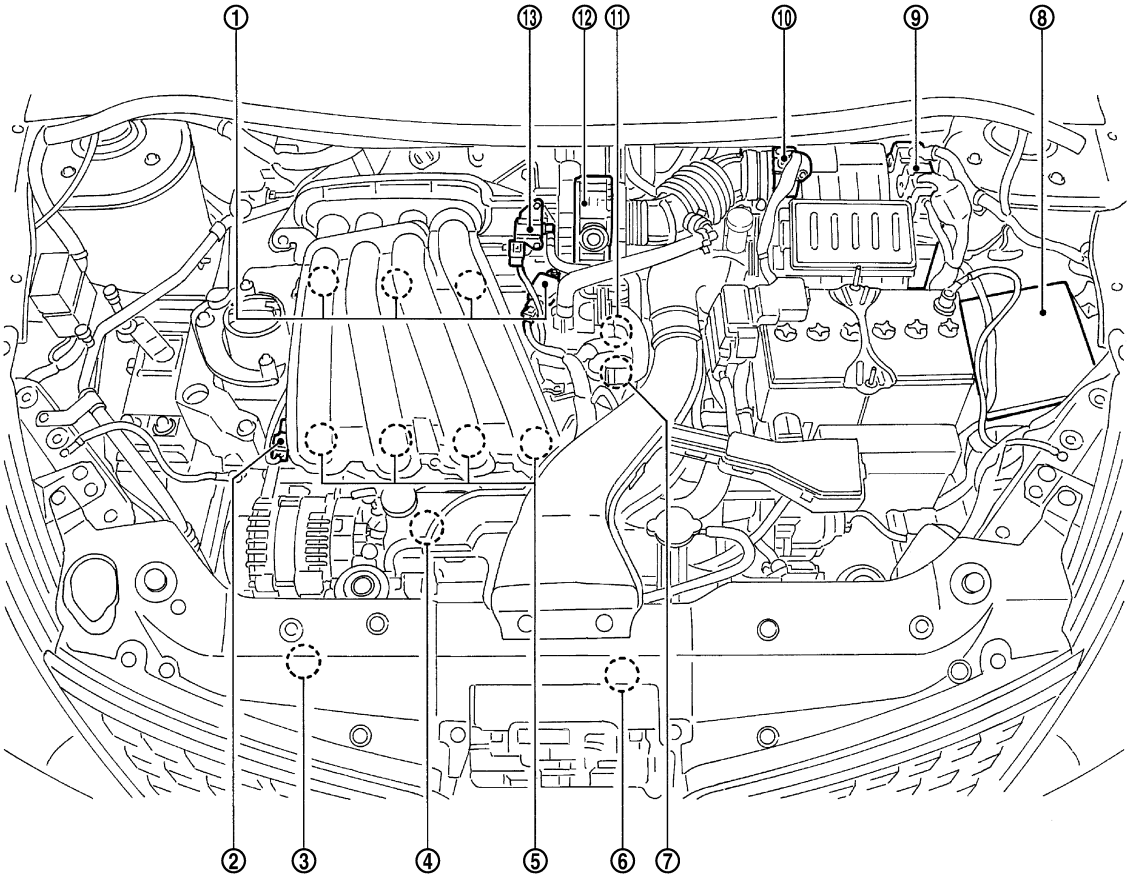
Cooling Fan Relay Operation

The ECM controls cooling fan relays through CAN communication line.

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

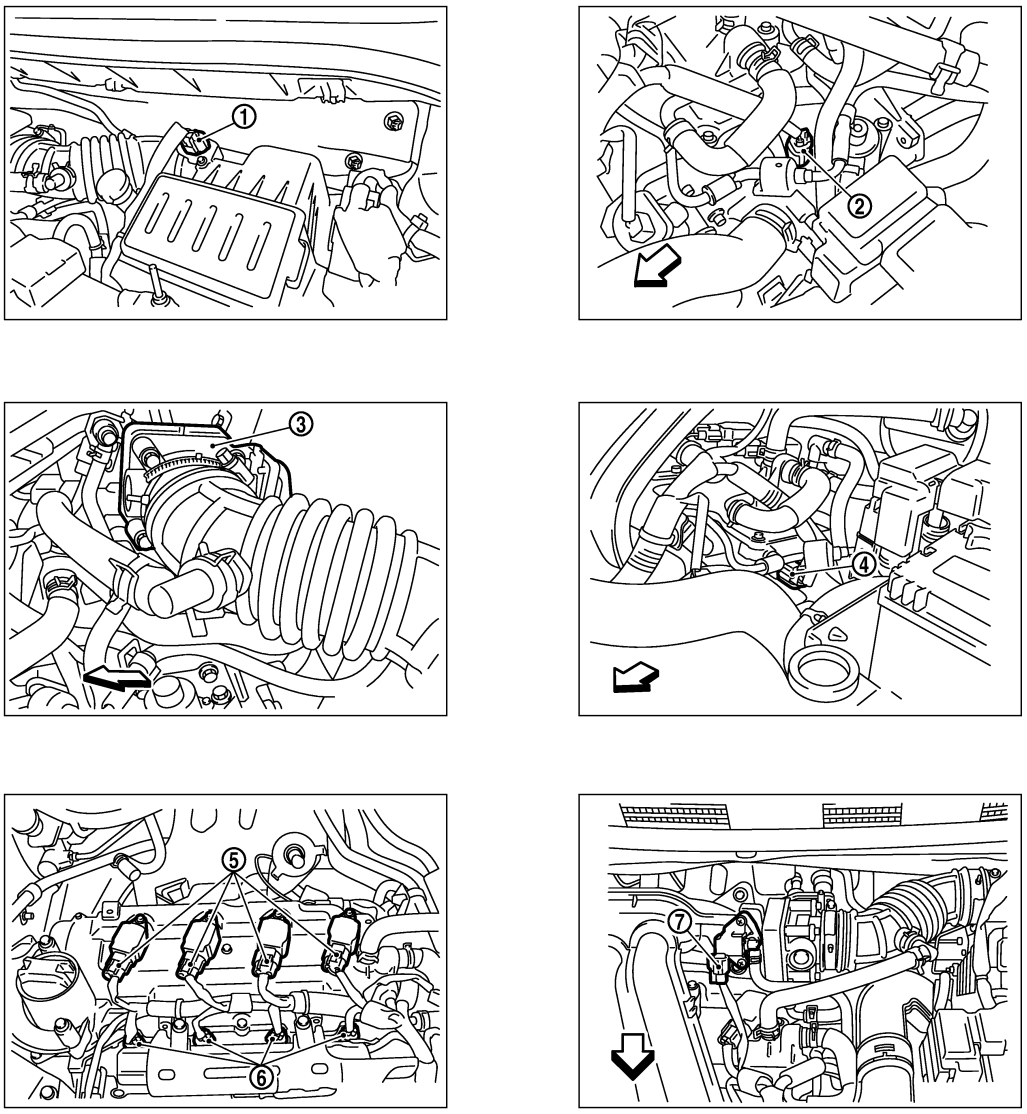
Component Parts Location

INFOID:0000000001677956



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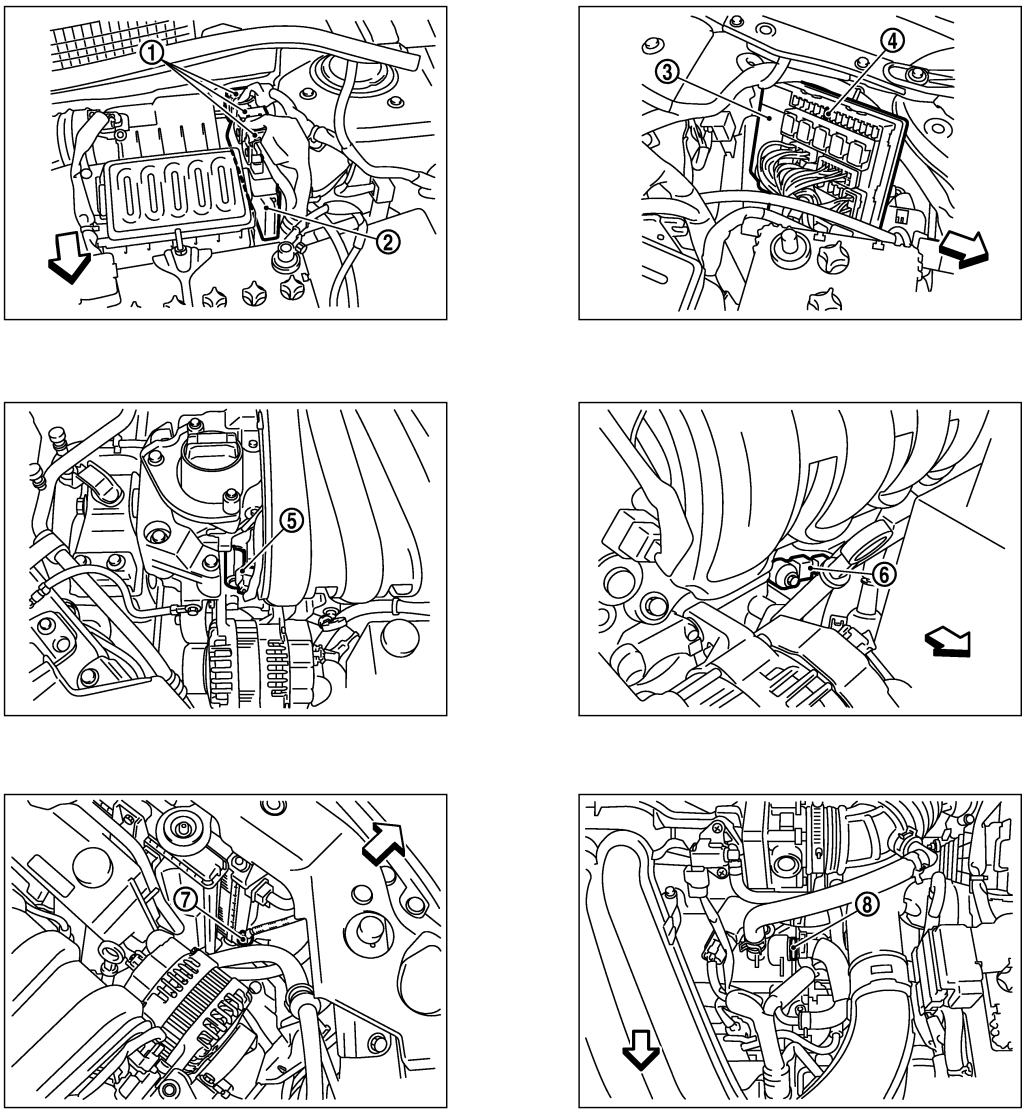
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Camshaft position sensor (PHASE)
5. Ignition coil (with power transistor)
6. Fuel injector
7. EVAP canister purge volume control solenoid valve

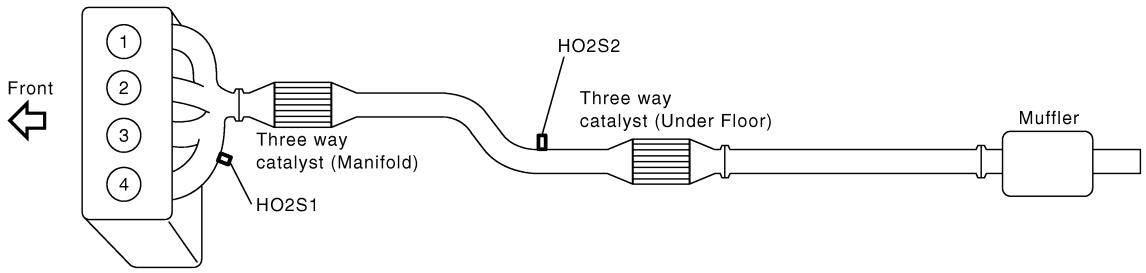
⇦ Vehicle front



PBIB2941E

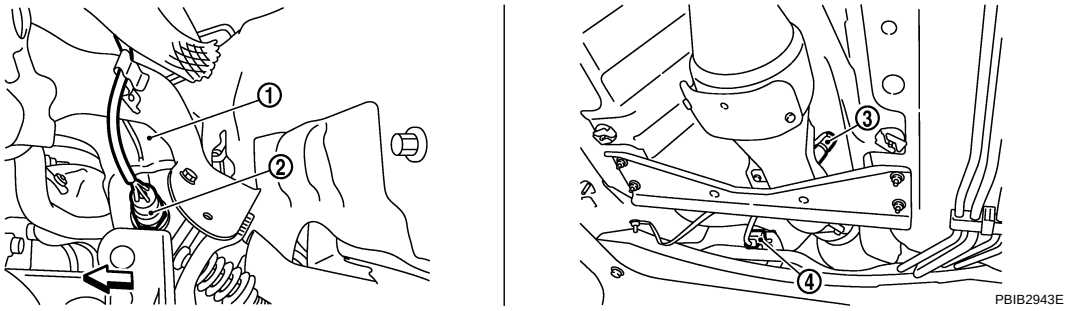
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

⇦ Vehicle front



No. of sensor
Location of a sensor in relation the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on

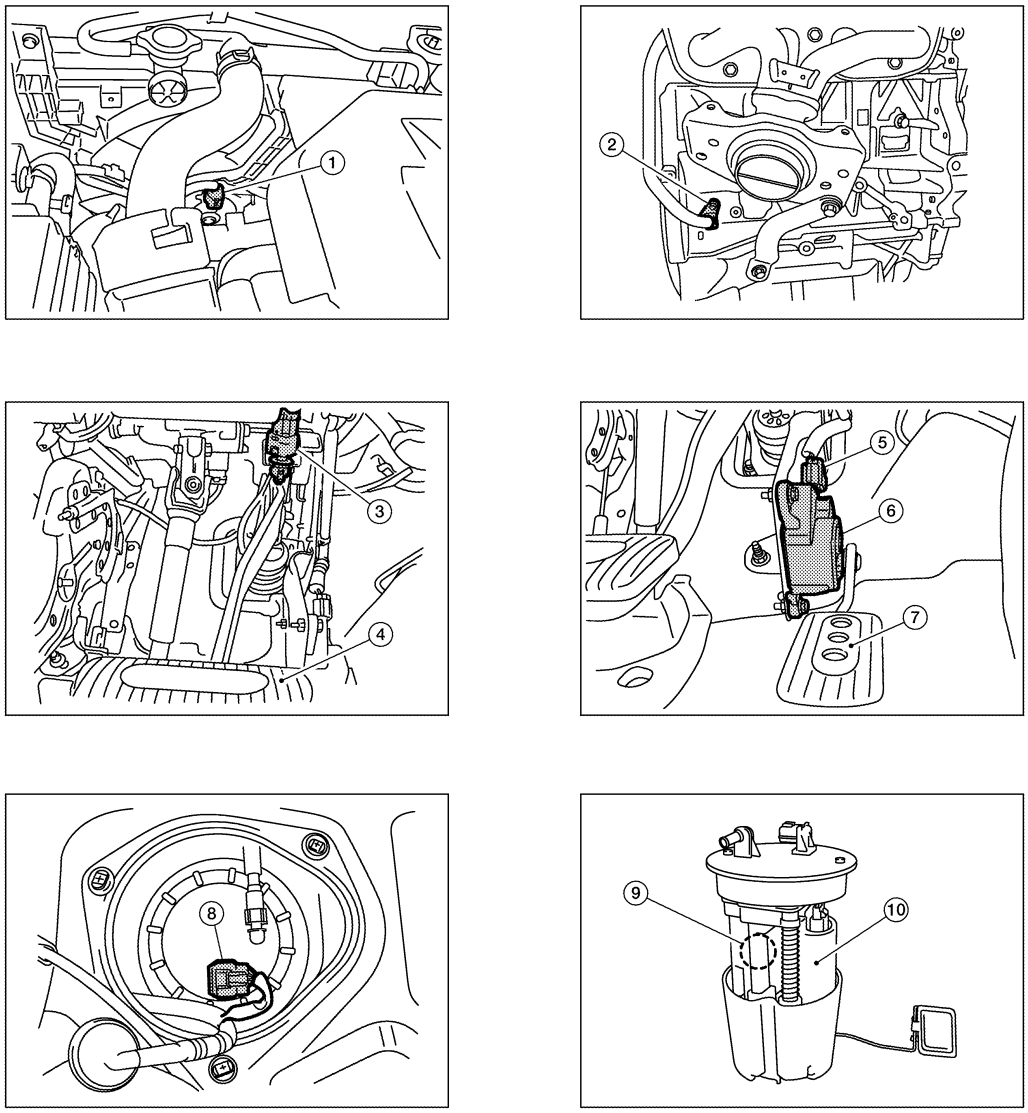
PBIB2942E



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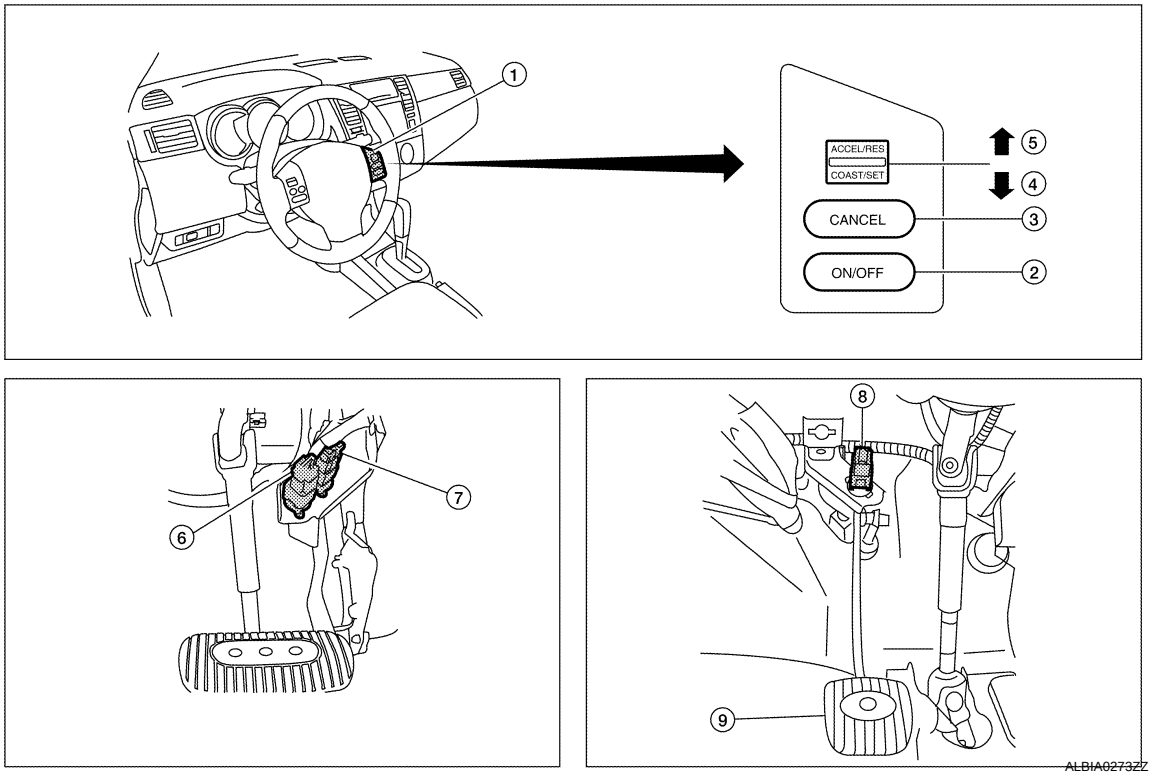
1. Exhaust manifold
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

⇦ Vehicle front



AWBIA0044ZZ

1. Cooling fan motor harness connector
2. Crankshaft position sensor
3. Stop lamp switch
4. Brake pedal
5. Accelerator pedal position sensor harness connector
6. Accelerator pedal position sensor
7. Accelerator pedal
8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
9. Fuel pressure regulator
10. Fuel pump



1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELERATE switch
6. ASCD brake switch
7. Stop lamp switch
8. ASCD clutch switch
9. Clutch pedal

Component Description

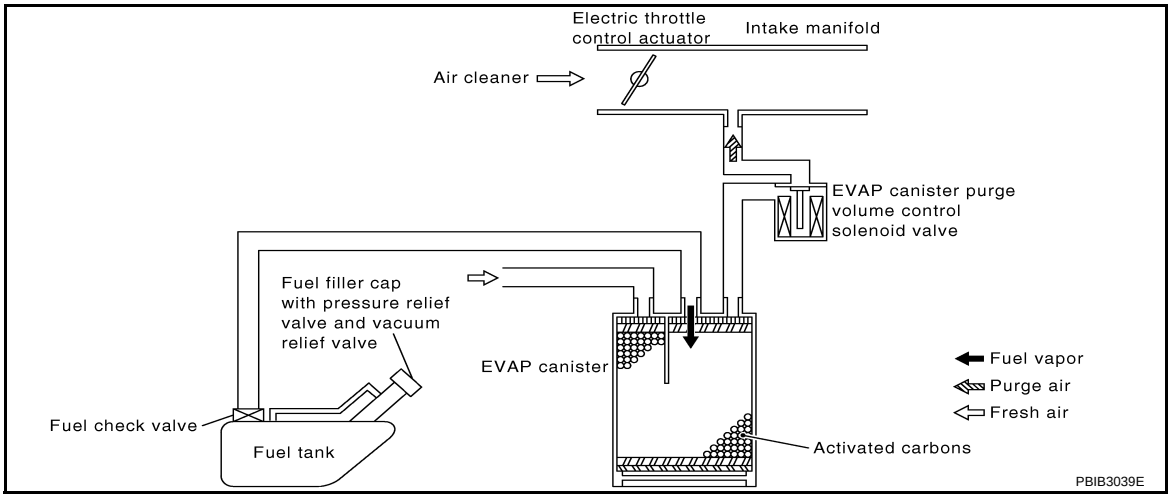
INFOID:0000000001161162

Component	Reference
Camshaft position sensor (PHASE)	EC-201, "Description"
Crankshaft position sensor (POS)	EC-197, "Description"
Cooling fan motor	EC-307, "Description"
Engine coolant temperature sensor	EC-142, "Description"
Refrigerant pressure sensor	EC-326, "Description"

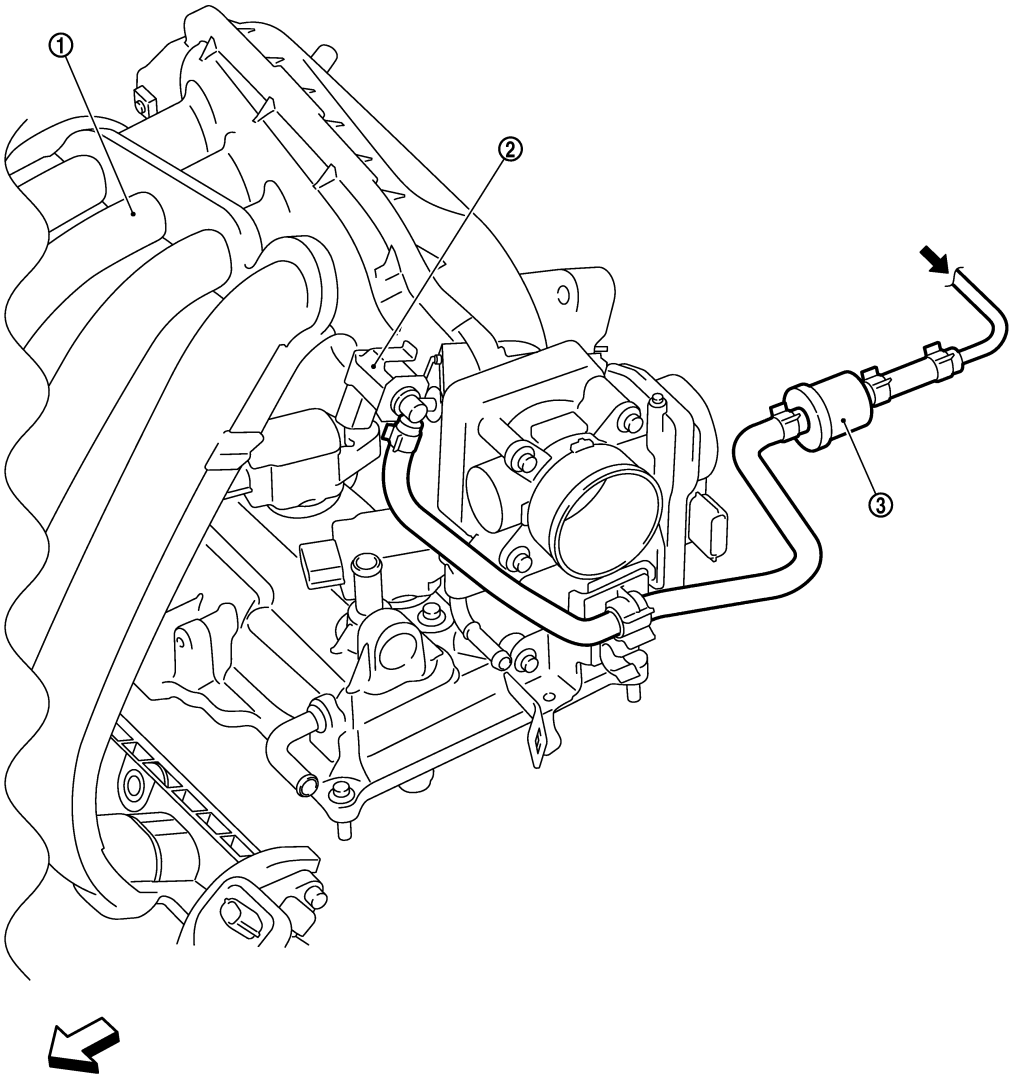
EVAPORATIVE EMISSION SYSTEM

System Diagram

INFOID:0000000001161163



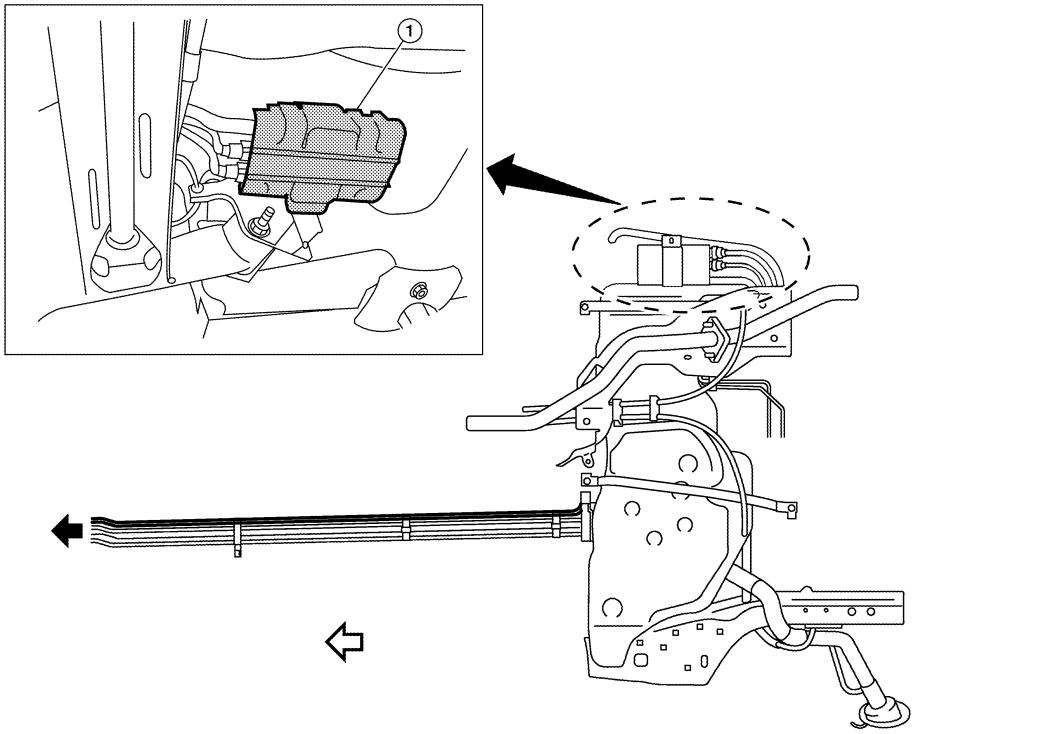
EVAPORATIVE EMISSION LINE DRAWING



PBIB2946E

1. Intake manifold collector
2. EVAP canister purge volume control solenoid valve
3. EVAP purge resonator

⇦: Vehicle front
⬅: From next figure



1. EVAP canister

⇦: Vehicle front ⬅: To previous figure

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

System Description

INFOID:0000000001161164

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		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Combination meter	Vehicle speed*2		

*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.

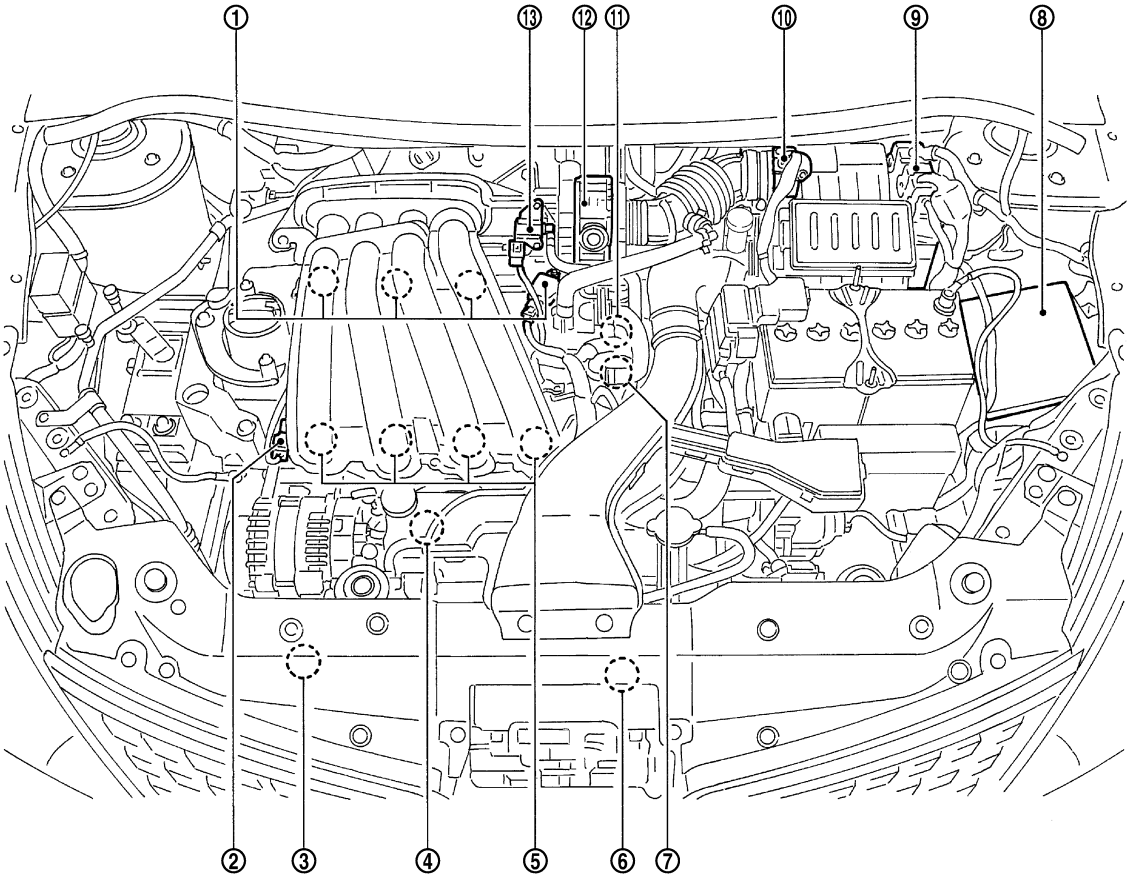
SYSTEM DESCRIPTION

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.

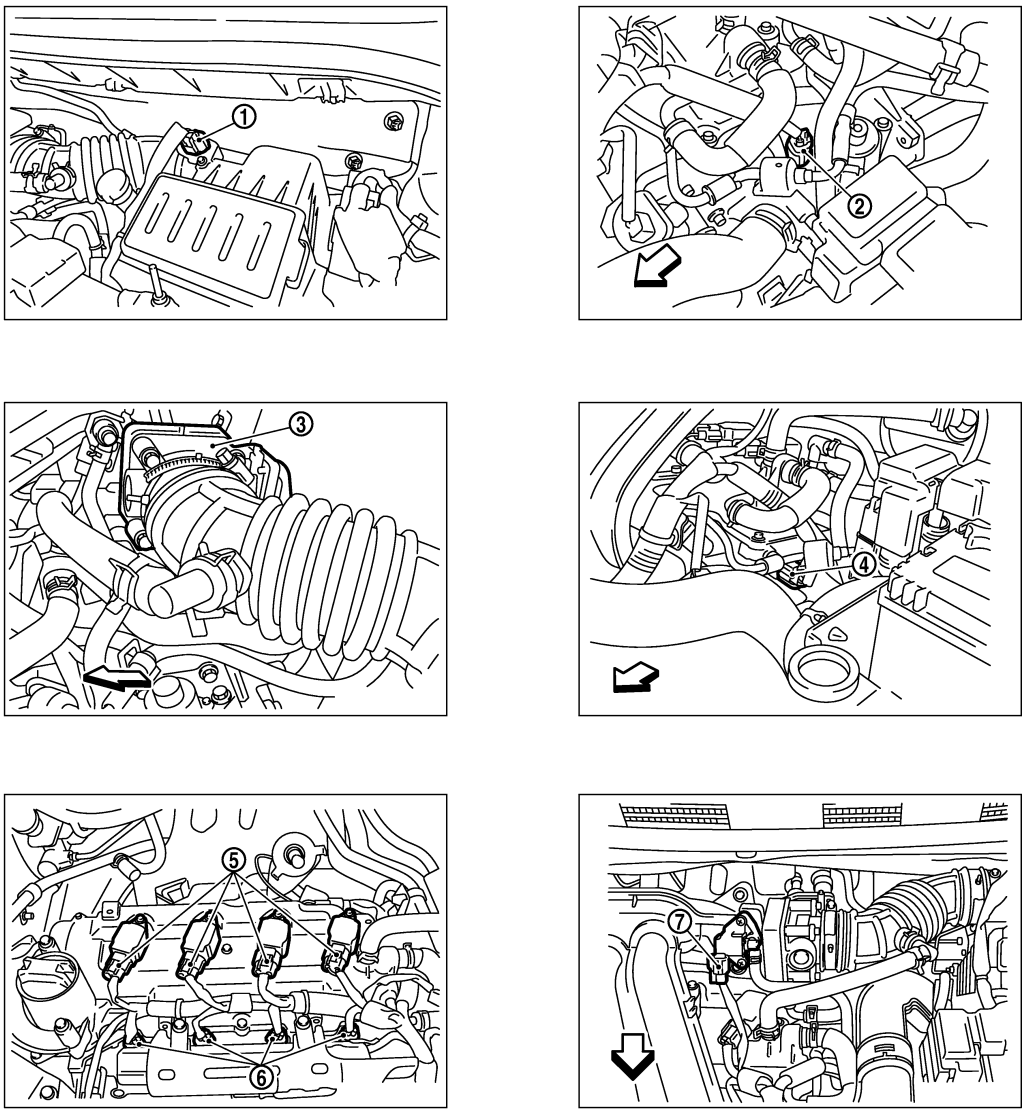
Component Parts Location

INFOID:0000000001677957



PBIB2939E

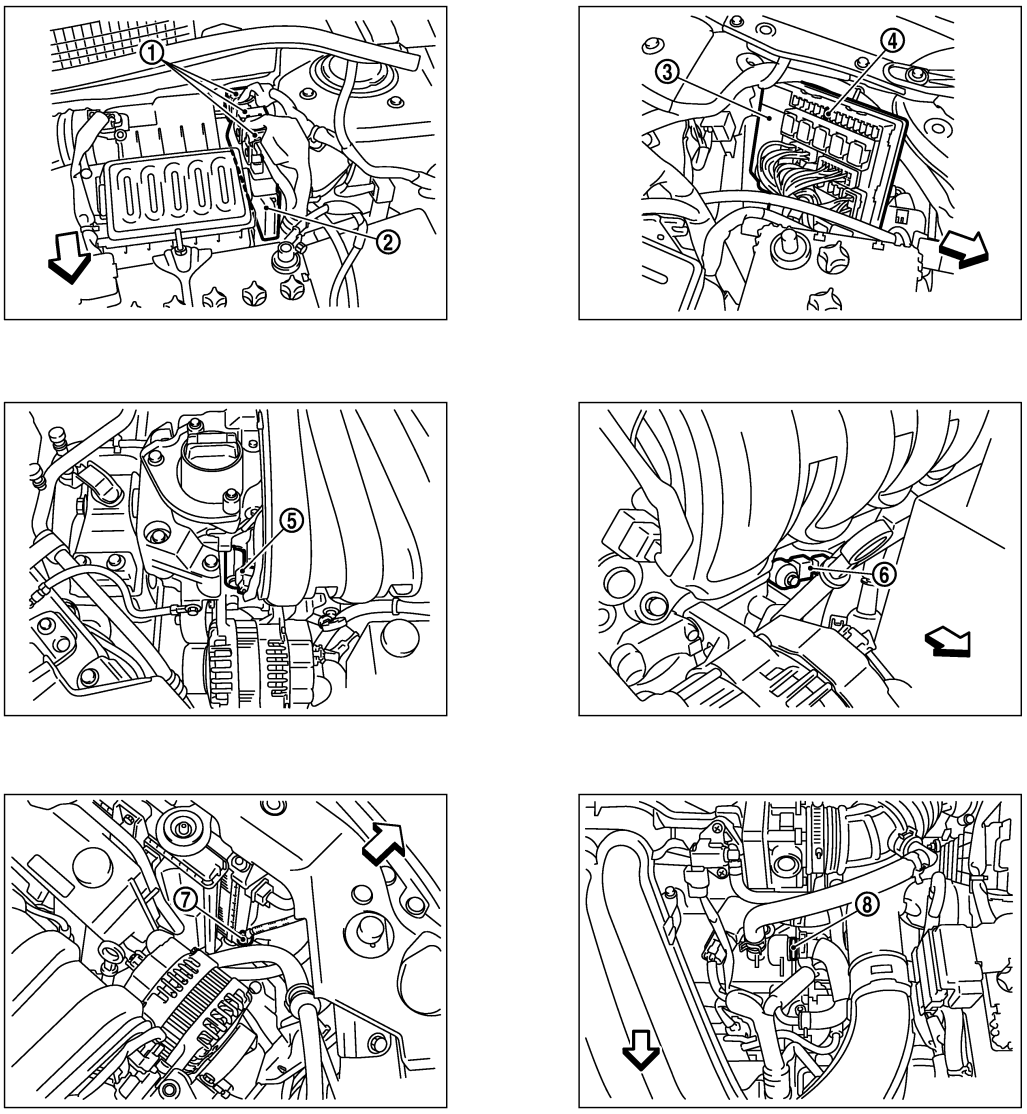
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Camshaft position sensor (PHASE)
5. Ignition coil (with power transistor)
6. Fuel injector
7. EVAP canister purge volume control solenoid valve

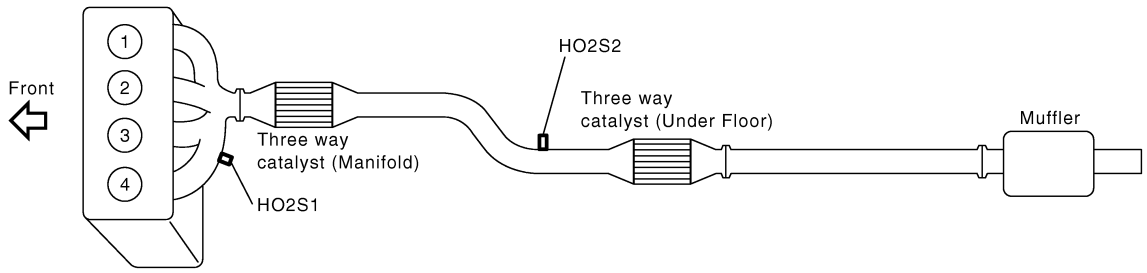
⇦ Vehicle front



PBIB2941E

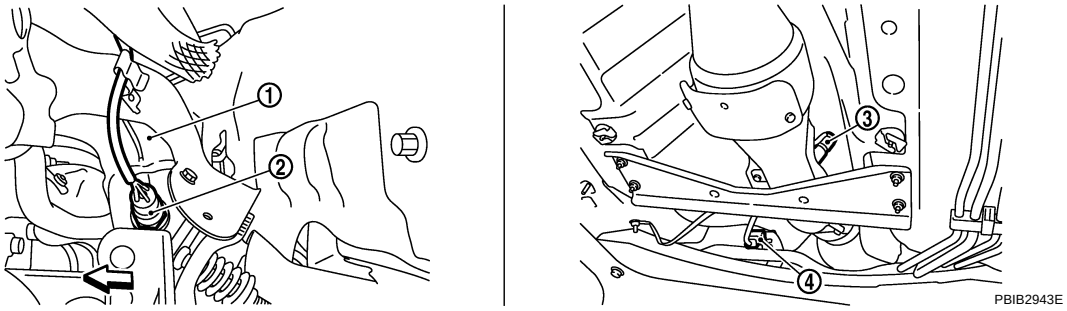
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

⇦ Vehicle front



No. of sensor
Location of a sensor in relation the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on

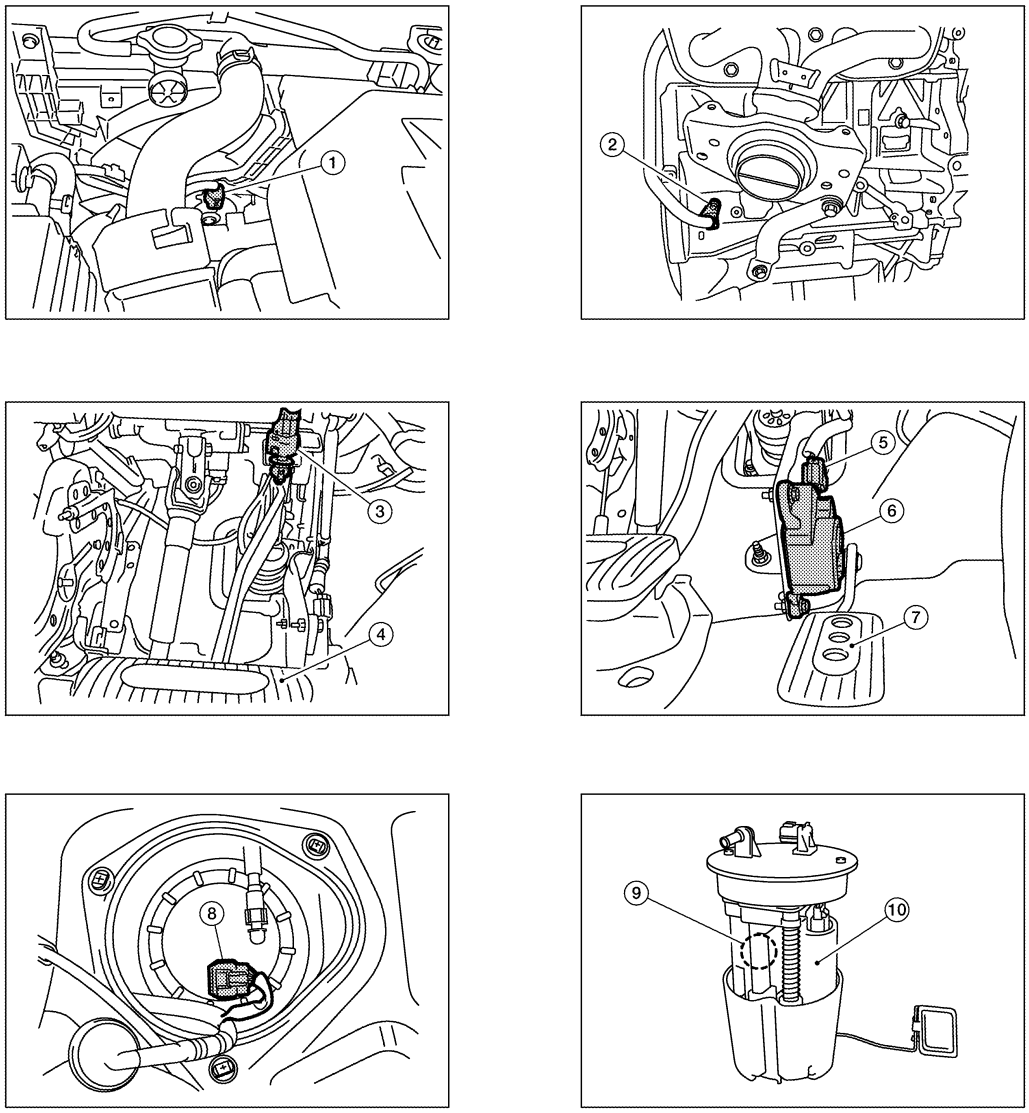
PBIB2942E



PBIB2943E

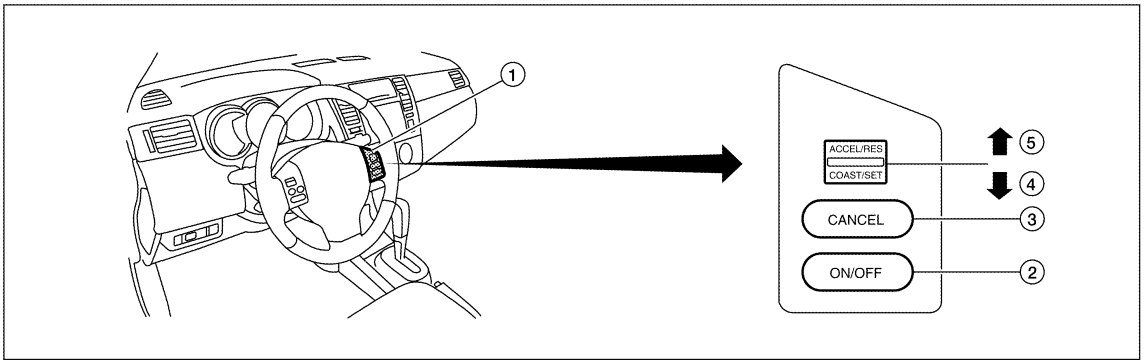
1. Exhaust manifold
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

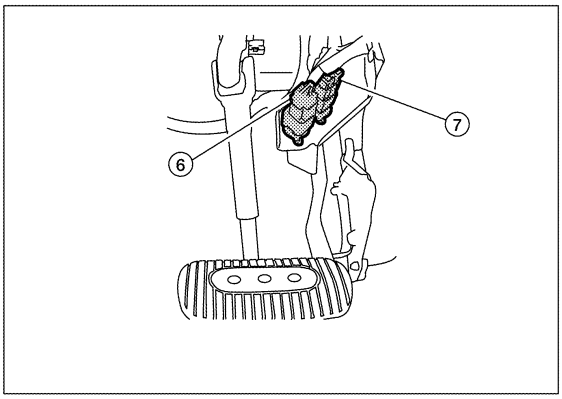
⇦ Vehicle front

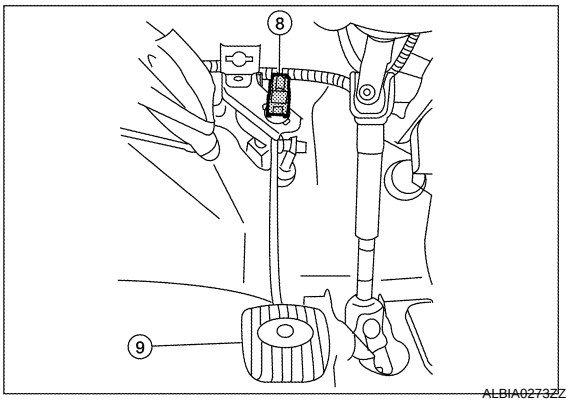


AWBIA0044ZZ

1. Cooling fan motor harness connector
2. Crankshaft position sensor
3. Stop lamp switch
4. Brake pedal
5. Accelerator pedal position sensor harness connector
6. Accelerator pedal position sensor
7. Accelerator pedal
8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
9. Fuel pressure regulator
10. Fuel pump







ALBIA0273ZZ

1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELERATE switch
6. ASCD brake switch
7. Stop lamp switch
8. ASCD clutch switch
9. Clutch pedal

Component Description

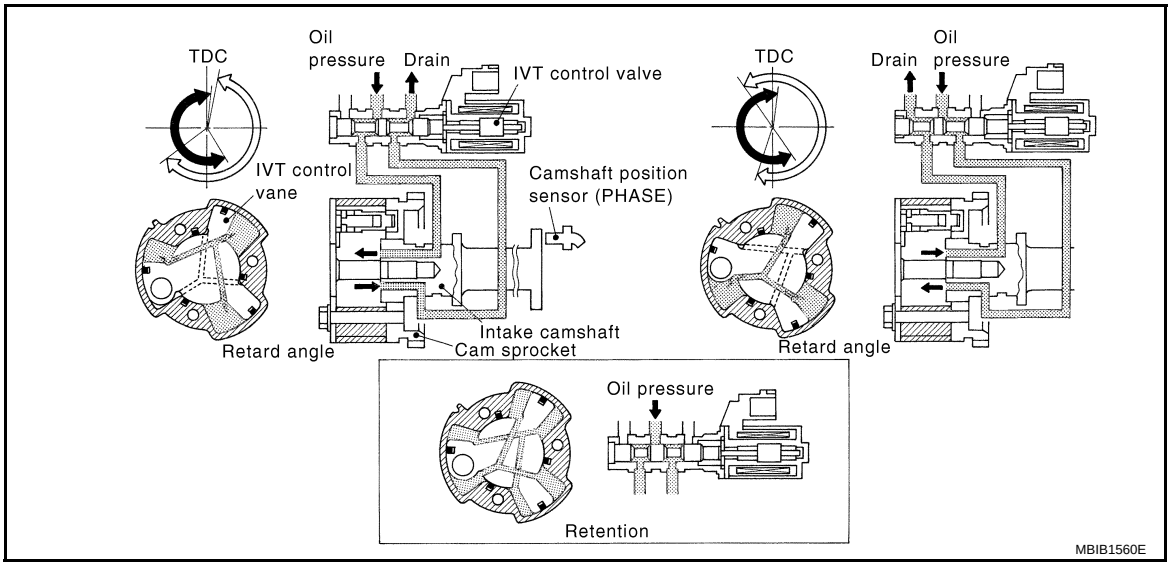
INFOID:0000000001161166

Component	Reference
Accelerator pedal position sensor	EC-286, "Description"
Camshaft position sensor (PHASE)	EC-201, "Description"
Crankshaft position sensor (POS)	EC-197, "Description"
Engine coolant temperature sensor	EC-142, "Description"
EVAP canister purge volume control solenoid valve	EC-210, "Description"
Heated oxygen sensor 1	EC-148, "Description"
Mass air flow sensor	EC-134, "Description"
Throttle position sensor	EC-145, "Description"
Vehicle speed sensor	EC-213, "Description"

INTAKE VALVE TIMING CONTROL

System Diagram

INFOID:0000000001161167



System Description

INFOID:0000000001161168

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		
Combination meter	Vehicle speed*		

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

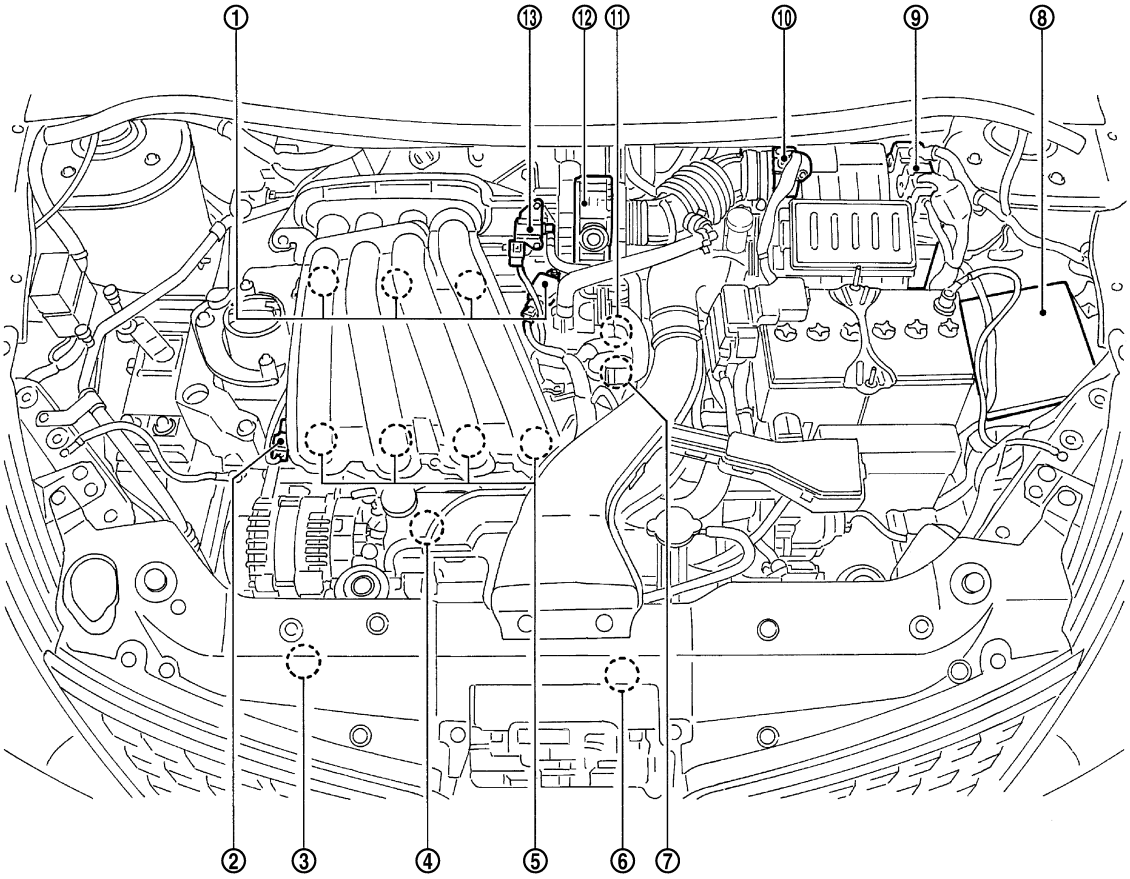
SYSTEM DESCRIPTION

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

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

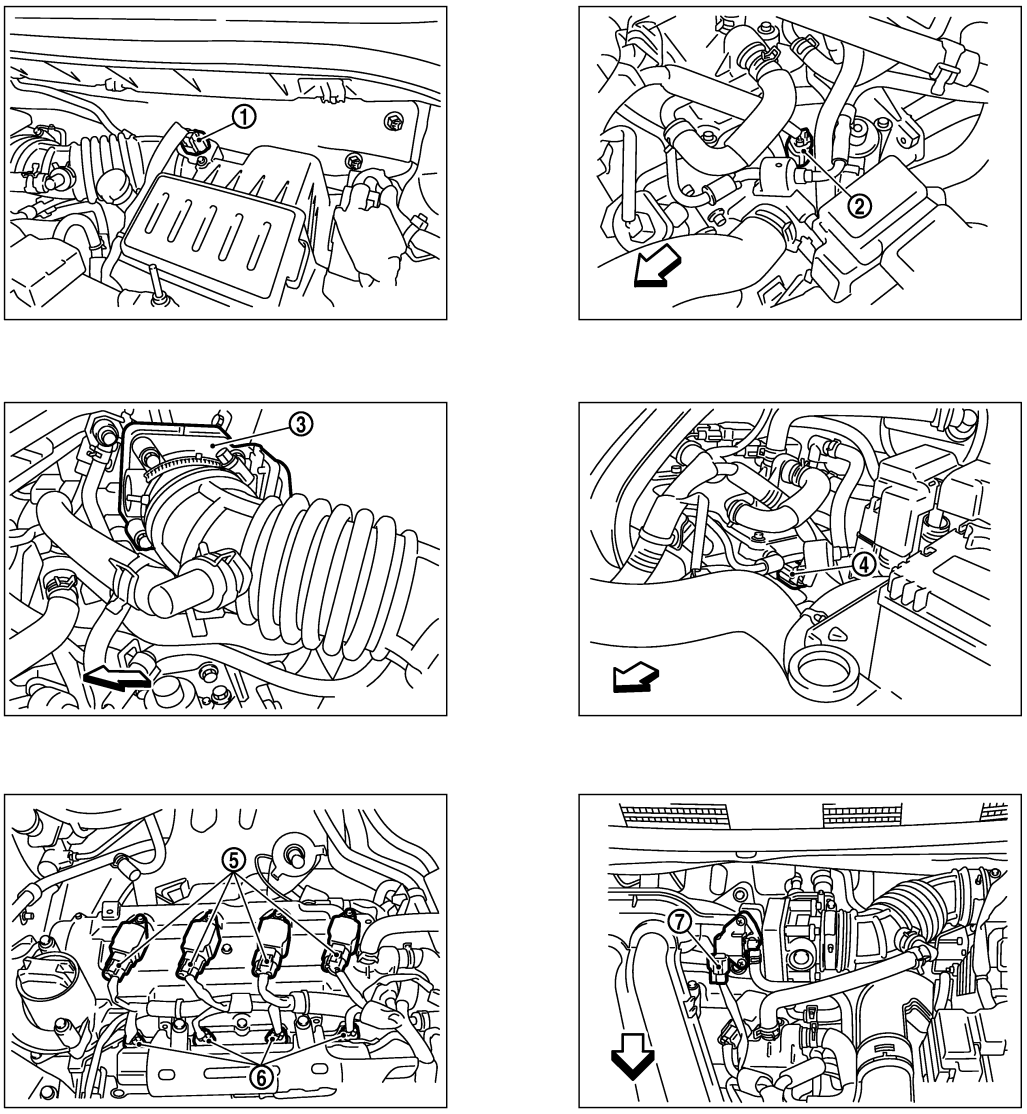
Component Parts Location

INFOID:0000000001677958



PBIB2939E

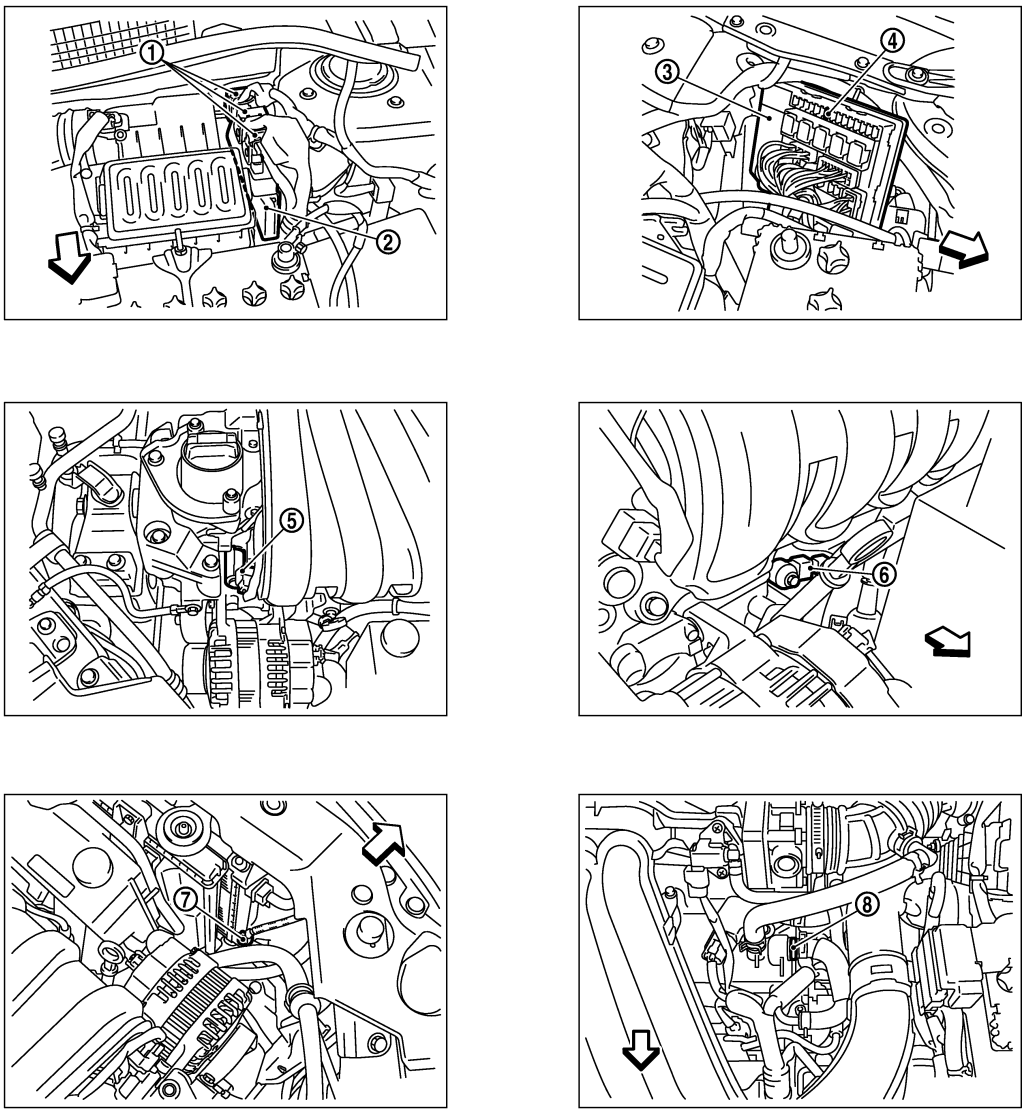
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Camshaft position sensor (PHASE)
5. Ignition coil (with power transistor)
6. Fuel injector
7. EVAP canister purge volume control solenoid valve

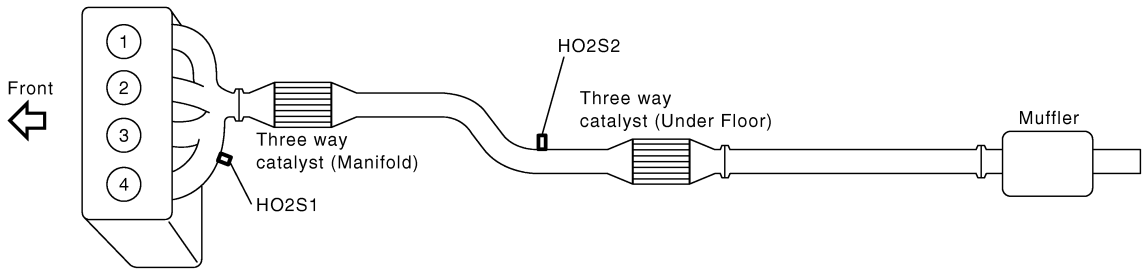
⇦ Vehicle front



PBIB2941E

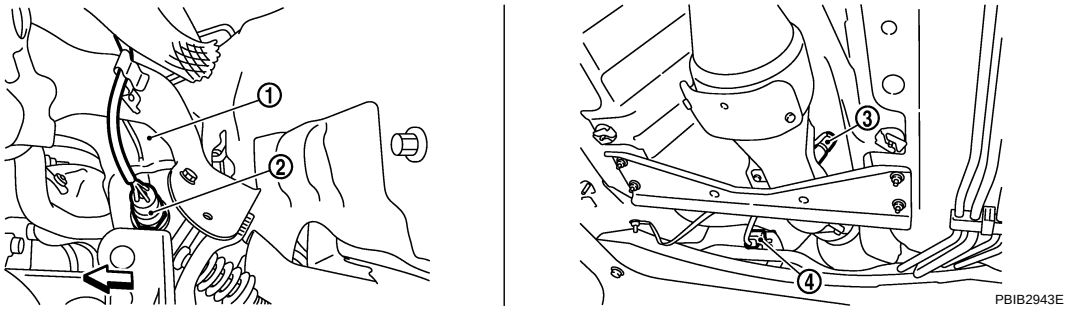
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

⇦ Vehicle front



No. of sensor
Location of a sensor in relation the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on

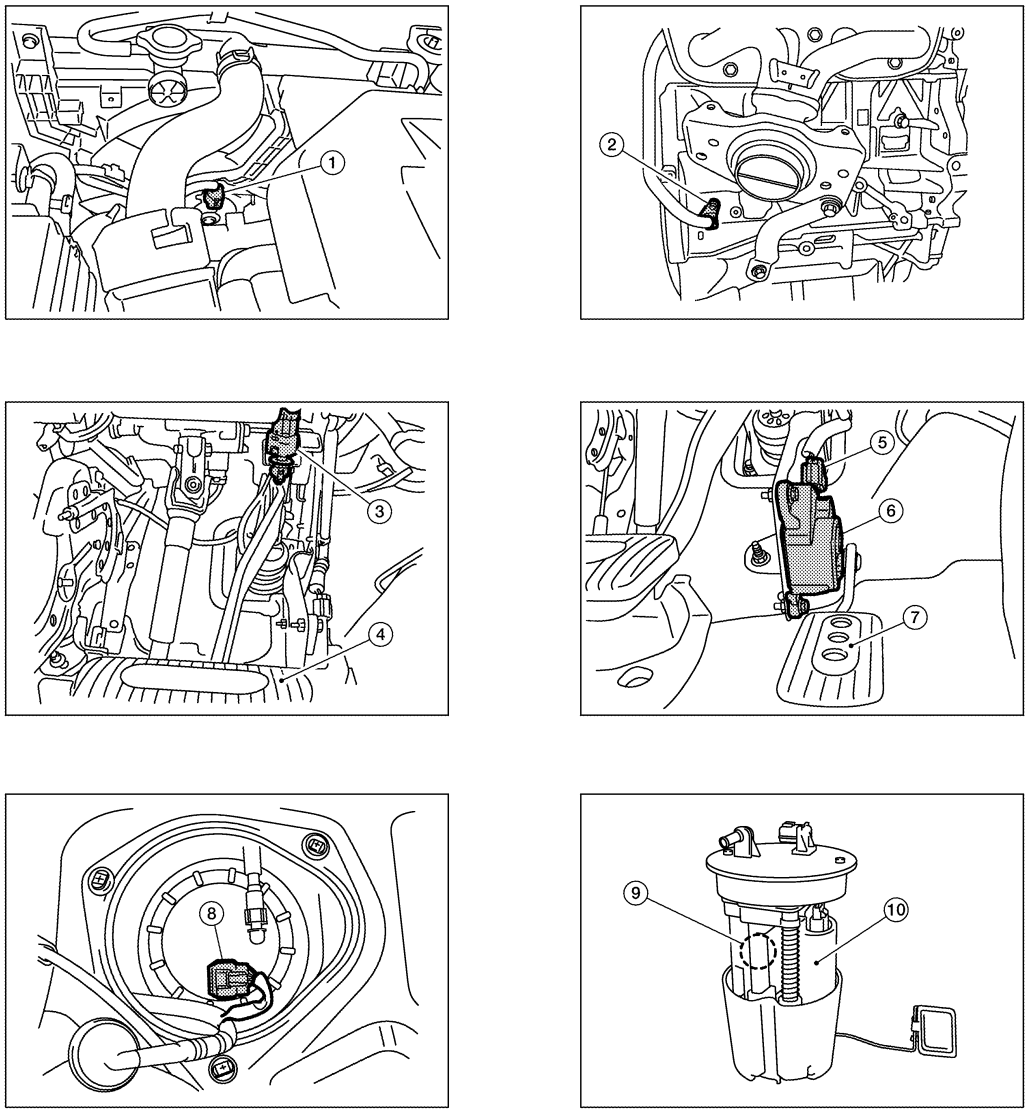
PBIB2942E



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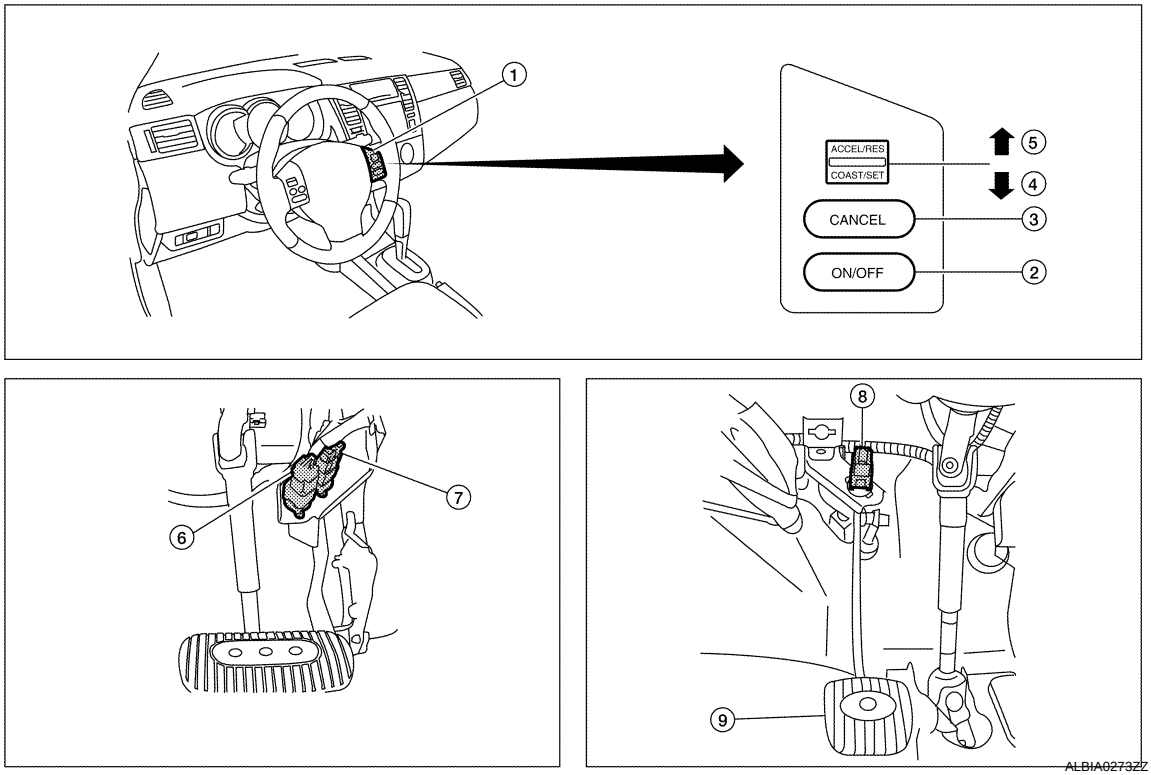
1. Exhaust manifold
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

⇦ Vehicle front



AWBIA0044ZZ

1. Cooling fan motor harness connector
2. Crankshaft position sensor
3. Stop lamp switch
4. Brake pedal
5. Accelerator pedal position sensor harness connector
6. Accelerator pedal position sensor
7. Accelerator pedal
8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
9. Fuel pressure regulator
10. Fuel pump



1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELERATE switch
6. ASCD brake switch
7. Stop lamp switch
8. ASCD clutch switch
9. Clutch pedal

Component Description

INFOID:0000000001161170

Component	Reference
Camshaft position sensor (PHASE)	EC-201, "Description"
Crankshaft position sensor (POS)	EC-197, "Description"
Engine coolant temperature sensor	EC-142, "Description"
Intake valve timing control solenoid valve	EC-219, "Description"
Vehicle speed sensor	EC-213, "Description"

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000001161171

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	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 EC-358, "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 EC-361, "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 EC-18, "Work Flow". Then perform DTC CONFIRMATION PROCEDURE or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

Freeze Frame Data and 1st Trip Freeze Frame Data

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen, not on the GST.
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/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	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

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

How to Read DTC and 1st Trip DTC

With CONSULT-III

With GST

CONSULT-III or GST (Generic Scan Tool) Examples: P0340, P1148, 1706, 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, 1148, 1706, 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

NOTE:

If the DTC is not for A/T related items (see EC-361, "DTC Index") skip step 2.

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

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 TM-35. (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 A/T related items (see EC-361, "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 TM-35. (The DTC in 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 15031-5.

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

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

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

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

NOTE:

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

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

NOTE:

If 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	1	Heated oxygen sensor 1	P0133
		Heated oxygen sensor 1	P1143
		Heated oxygen sensor 1	P1144
		Heated oxygen sensor 2	P0139
		Heated oxygen sensor 2	P1146
HO2S HTR	1	Heated oxygen sensor 1 heater	P0135
		Heated oxygen sensor 2 heater	P0141

*: 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.

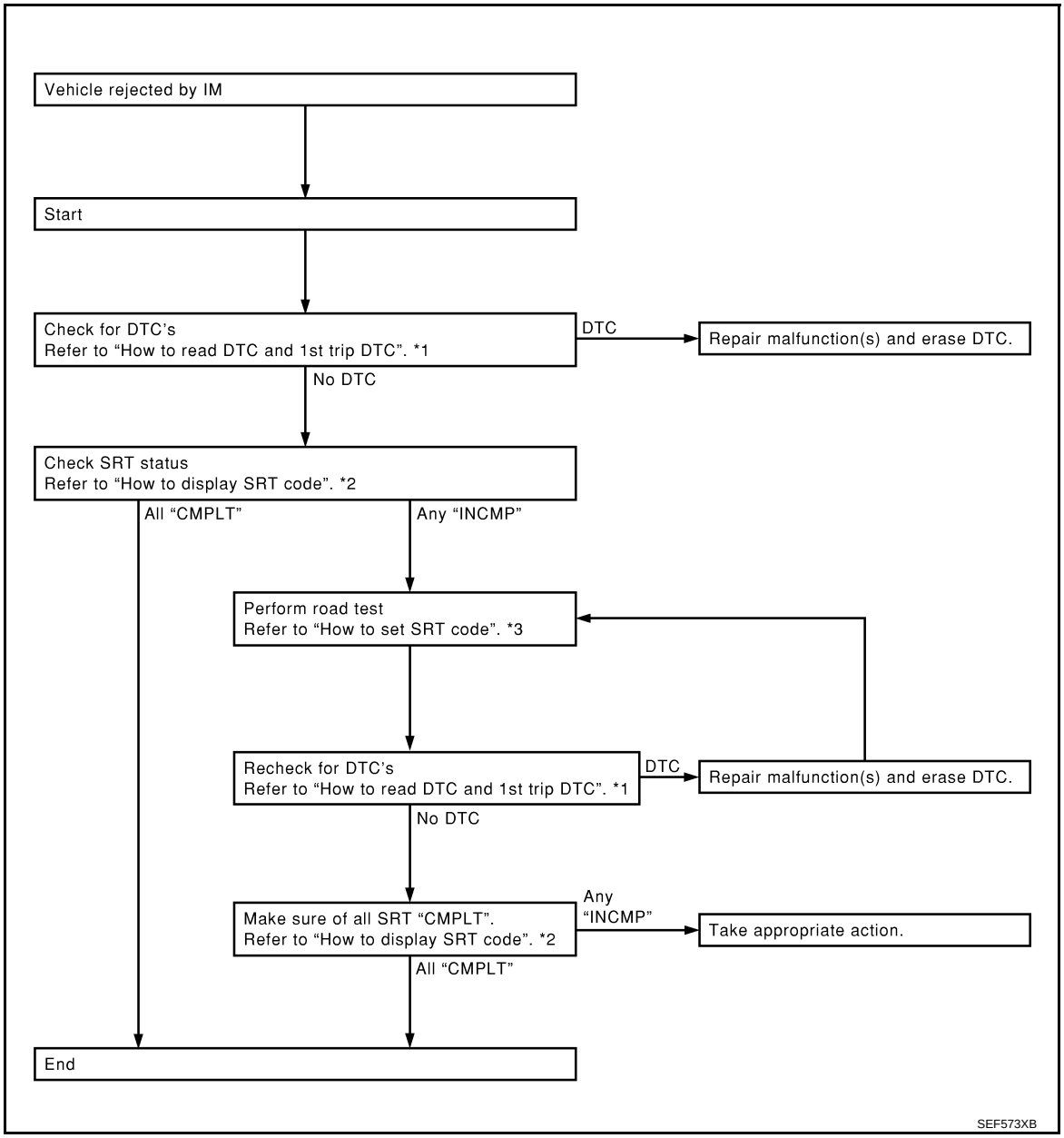
When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above

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.

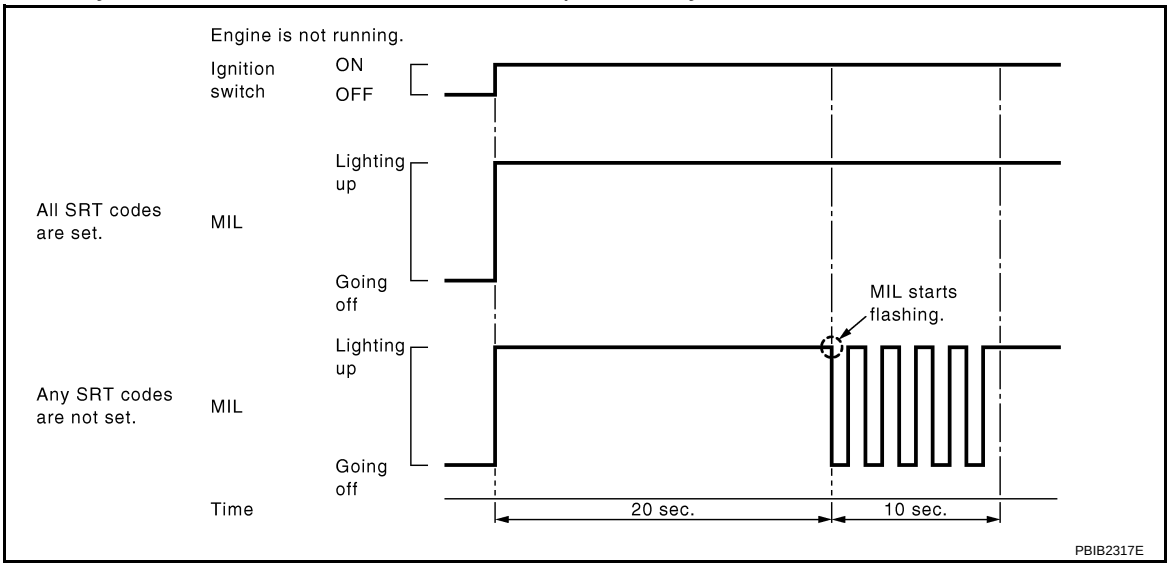
WITH GST

Selecting Service $01 with GST (Generic Scan Tool)

NO TOOLS

A SRT code itself can not be displayed while only SRT status can be.

1. Turn ignition switch ON and wait 20 seconds.
2. SRT status is indicated as shown below.
   - When all SRT codes are set, MI lights up continuously.
   - When any SRT codes are not set, MI will flash periodically for 10 seconds.

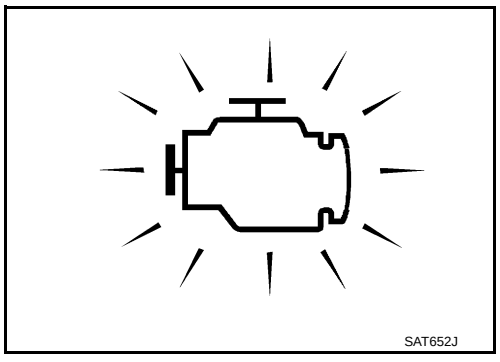


MALFUNCTION INDICATOR (MI)

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 EC-324, "Component Function Check".
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 four 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 	HEATED OXYGEN SENSOR 1 MONITOR	This function allows the fuel mixture condition (lean or rich), monitored by heated oxygen sensor 1, to be read.

MI Flashing Without DTC

If the ECM is in Diagnostic Test Mode II, MI may flash when engine is running. In this case, check ECM diagnostic test mode. How to switch the diagnostic test function modes, and details of the above functions are described later.

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

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

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 EC-324, "Component Function Check".

Diagnostic Test Mode I — Malfunction Warning

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

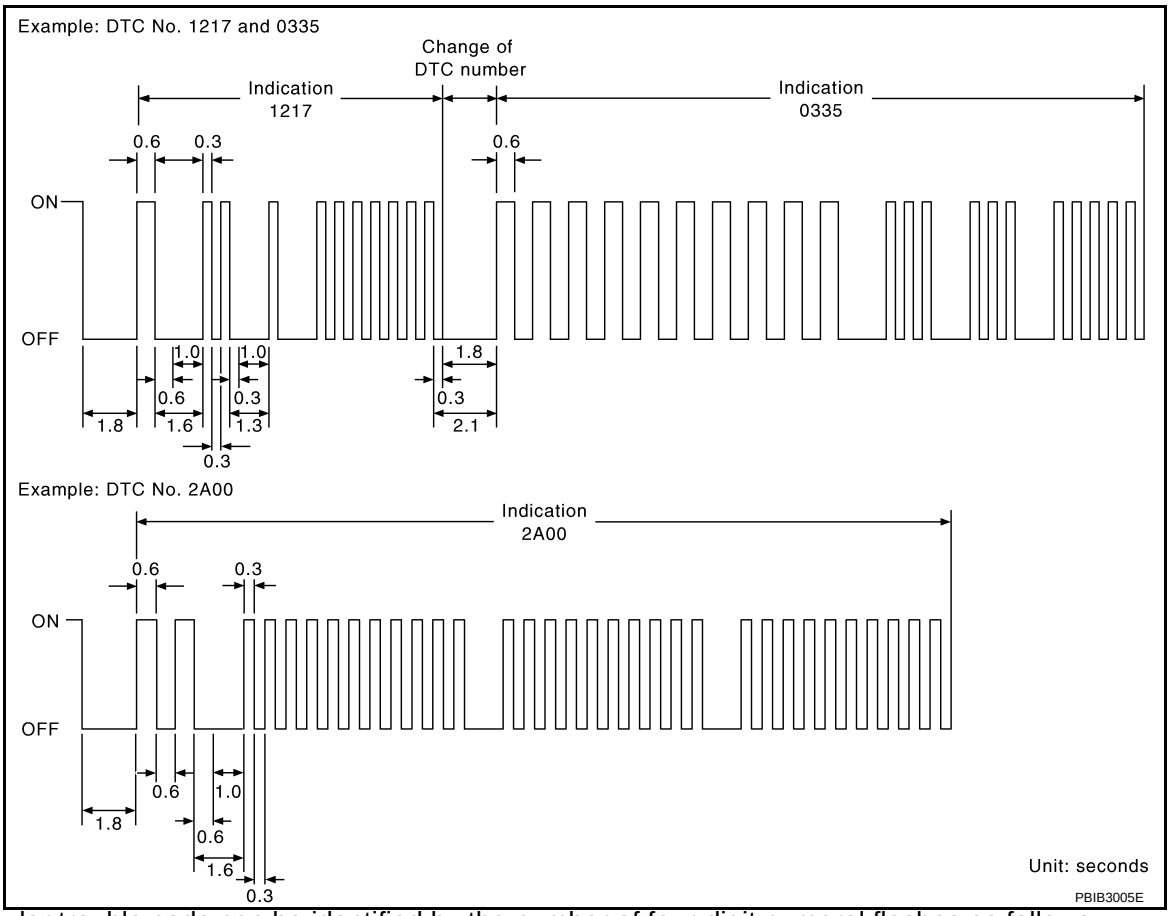
This DTC number is clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

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 illumi-

nates 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 EC-361, "DTC Index")

Diagnostic Test Mode II — Heated oxygen sensor 1 monitor
In this mode, the MI displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor 1.

MI	Fuel mixture condition in the exhaust gas	Air fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop system

*: Maintains conditions just before switching to open loop.
To check the heated oxygen sensor 1 function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.
Nest run engine at about 2,000 rpm for about 2 minutes under no load conditions. Then make sure that the MI comes ON more than 5 times within 1 seconds with engine running at 2,000 rpm under no load.

How to Switch Diagnostic Test Mode

NOTE:

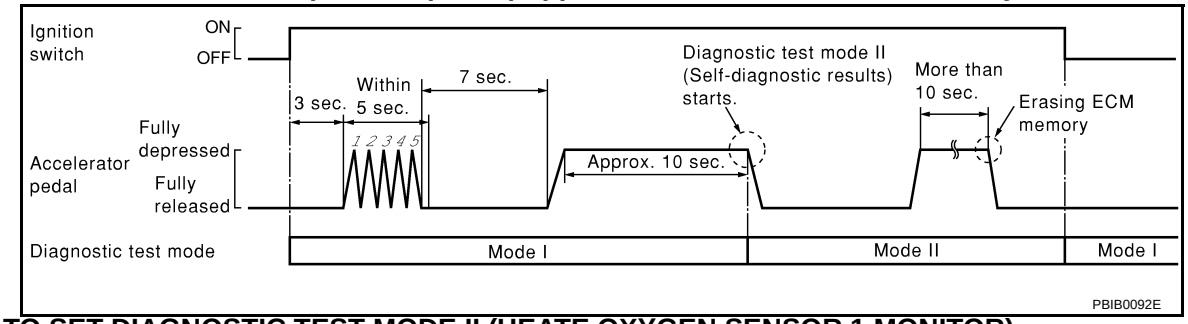
- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.**

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 (HEATE OXYGEN SENSOR 1 MONITOR)

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 entered to Diagnostic Test Mode II (Heated oxygen sensor 1 monitor).

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 (pattern B) with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (pattern C) without

the same malfunction recurring. The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-III will count the number of times the vehicle is driven.

- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

Summary Chart

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

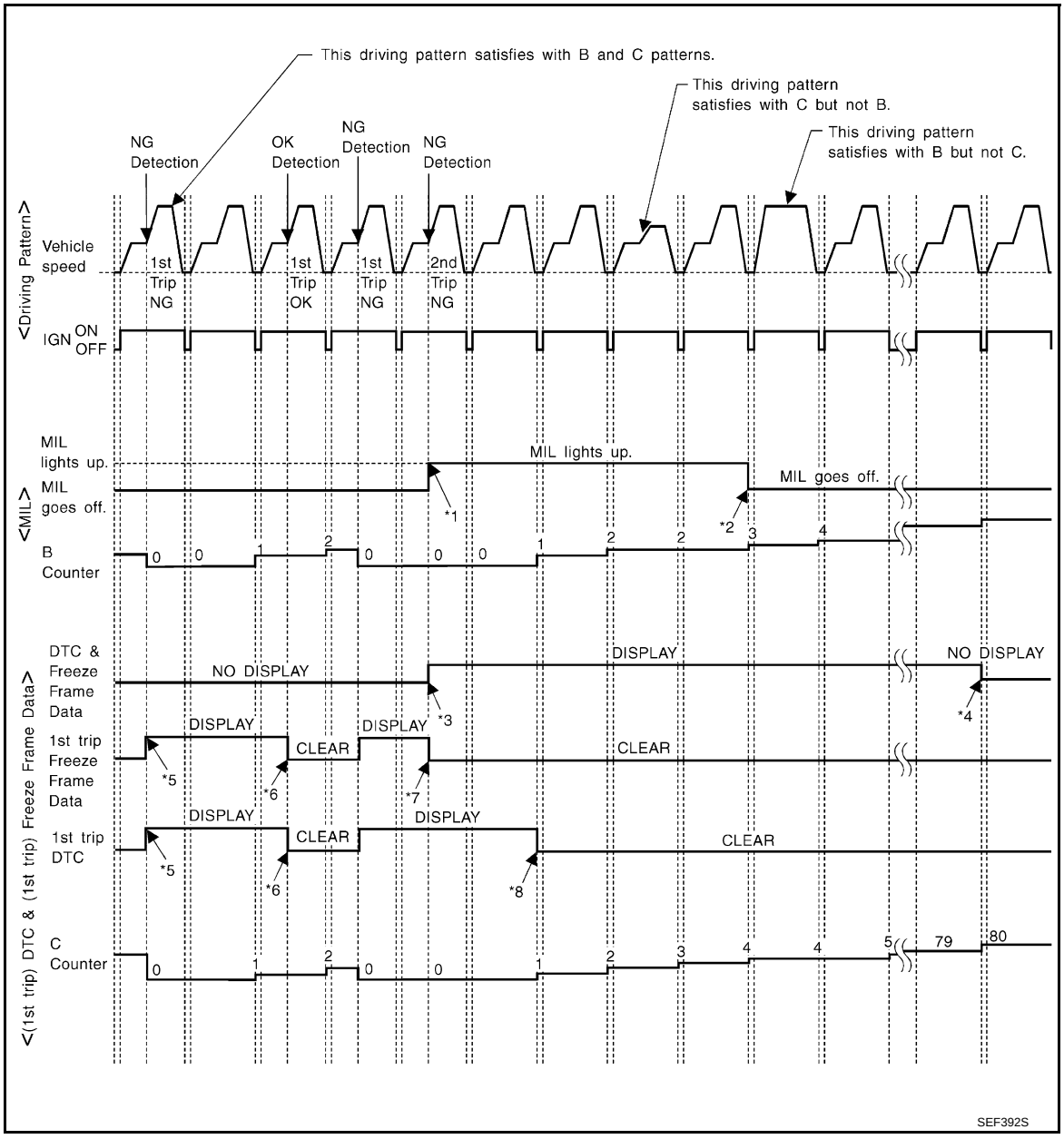
For details about patterns B and C under “Fuel Injection System” and “Misfire”, see “EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”.

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

*1: Clear timing is at the moment OK is detected.

*2: Clear timing is when the same malfunction is detected in the 2nd trip.

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



*1: When the same malfunction is detected in two consecutive trips, 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 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

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

*6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

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

*8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

Explanation for Driving Patterns for “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System”
<Driving Pattern B>
Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

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

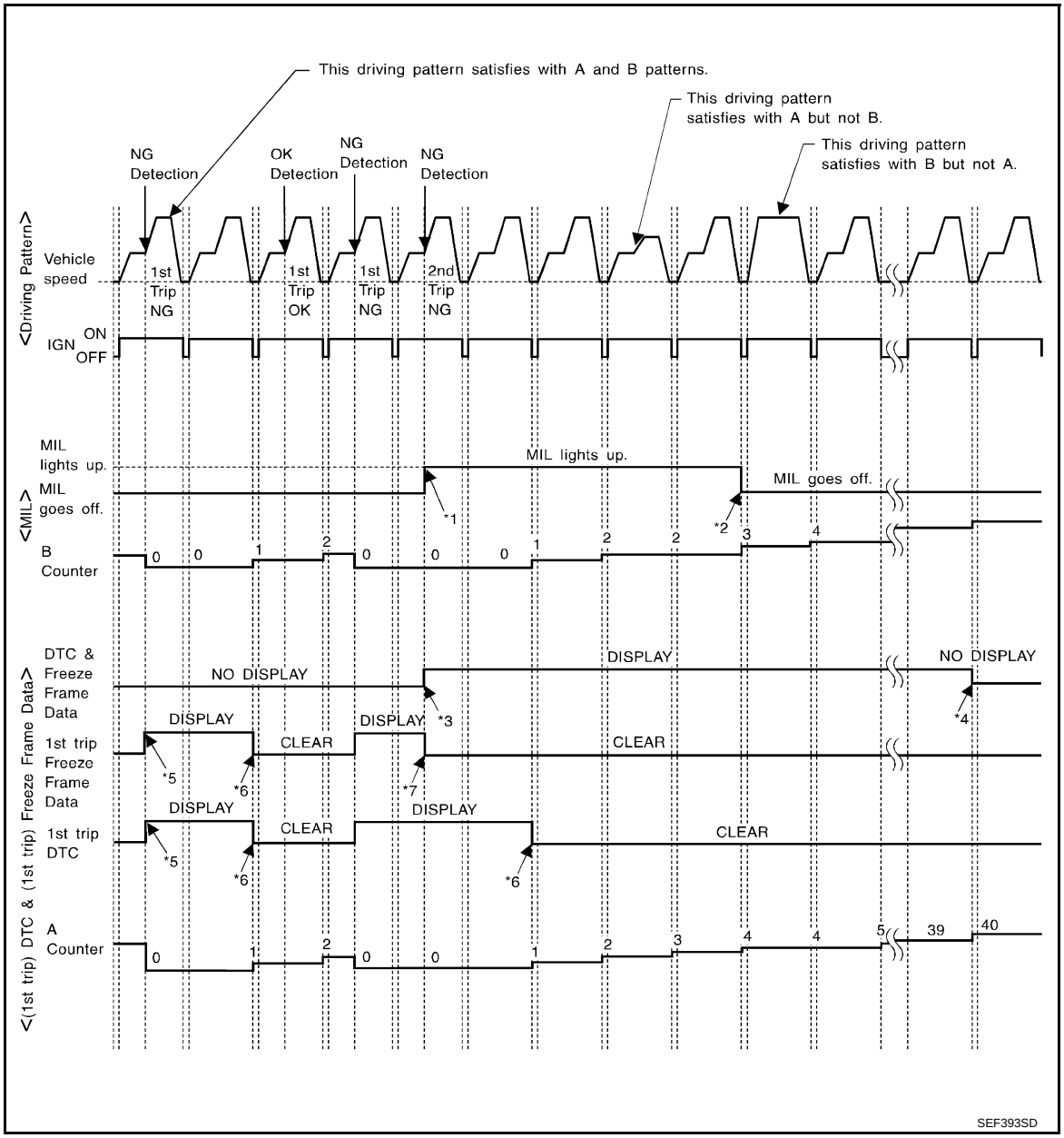
<Driving Pattern C>
Driving pattern C means the vehicle operation as follows:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature (T) condition:

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

Example:
If the stored freeze frame data is as follows:
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)
To be satisfied with driving pattern C, the vehicle should run under the following conditions:
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

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

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



*1: When the same malfunction is detected in two consecutive trips, 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.)

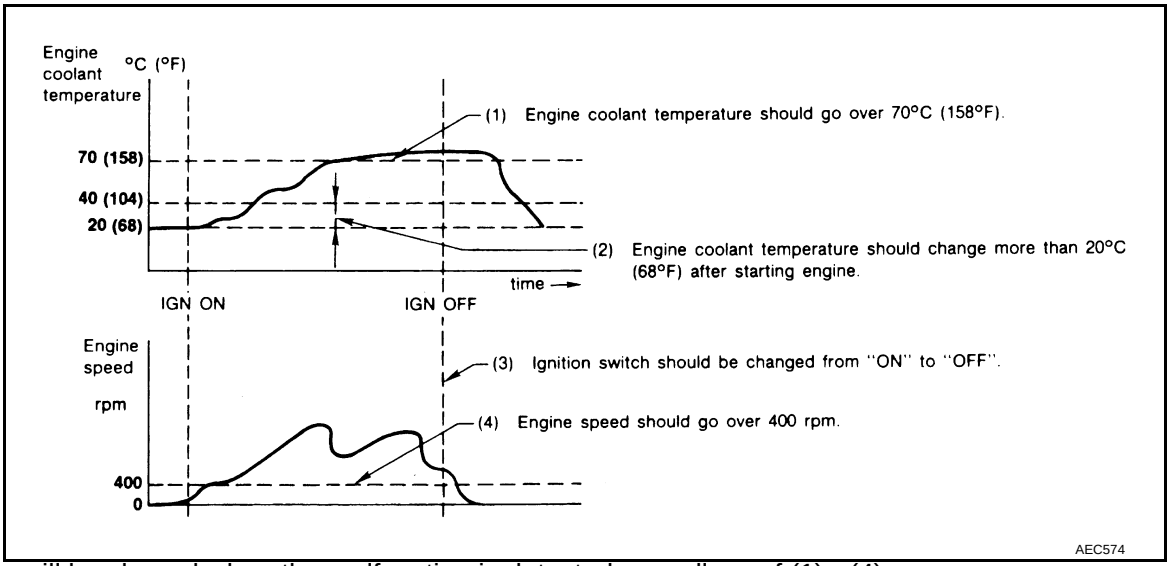
*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

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

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

<Driving Pattern A>



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

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:

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

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

CONSULT-III Function

INFOID:0000000001161172

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		×	×	×	×		
		Heated oxygen 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		×		×			
		EPS control unit				×			
		Battery voltage				×			
		Load signal				×			
		ASCD steering switch		×		×			
		ASCD brake switch		×		×			
		ASCD clutch 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		×		×	×		
		Heated oxygen sensor 1 heater		×		×		×	
		Heated oxygen sensor 2 heater		×		×		×	
		Intake valve timing control solenoid valve		×		×	×		
		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 EC-94, "Diagnosis Description".

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	• THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	• THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing mixture ratio self-learning value
TARGET IDLE RPM ADJ*	• IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	• IDLE CONDITION	When adjusting target ignition timing

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

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-361, "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 EC-361, "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.
INT MANI PRES [kPa]	• Always a certain value is displayed. • This item is not efficient for C11 models.

*: 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.
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.
HO2S1 (B1)	V	• The signal of the heated oxygen sensor 1 is displayed.	
HO2S2 (B1)	V	• The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S1 MNTR(B1)	RICH/LEAN	• Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control: RICH: means the mixture became ″rich″, and control is being affected toward a leaner mixture. LEAN: means the mixture became ″lean″, and control is being affected toward a rich mixture.	• After turning ON the ignition switch, ″RICH″ is displayed until air-fuel mixture ratio feedback control begins. • When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
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			
TP SEN 1-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.
TP SEN 2-B1			
INT/A TEMP SE	°C or °F	• The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
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.

Monitored item	Unit	Description	Remarks
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.	
PW/ST SIGNAL	ON/OFF	• [ON/OFF] condition of the power steering system (determined by the signal sent from EPS control unit) is indicated.	
LOAD SIGNAL	ON/OFF	• Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW	ON/OFF	• Indicates [ON/OFF] condition from ignition switch signal.	
CLUTCH P/P SW	ON/OFF	• Indicates [ON/OFF] condition from the clutch 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.	
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.	
THRTL RELAY	ON/OFF	• Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	

Monitored item	Unit	Description	Remarks
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	
HO2S1 HTR (B1)	ON/OFF	• Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM according to the input signals.	
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	• Indicates the vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
IDL A/V LEARN	YET/CMPLT	• Display the condition of Idle Air Volume Learning YET: Idle air volume learning has not been performed yet. CMPLT: Idle air volume learning has already been performed successfully.	
TRVL AFTER MIL	km or mile	• Distance traveled while MI is activated.	
O2 SEN HTR DTY	%	• Heated oxygen 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.	
SET VHCL SPD	km/h or mph	• The preset vehicle speed is displayed.	
MAIN SW	ON/OFF	• Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW	ON/OFF	• Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW	ON/OFF	• Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.	
SET SW	ON/OFF	• Indicates [ON/OFF] condition from SET/COAST switch signal.	
BRAKE SW1	ON/OFF	• Indicates [ON/OFF] condition from ASCD brake switch or ASCD clutch switch signal.	
BRAKE SW2	ON/OFF	• Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT	NON/CUT	• Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
LO SPEED CUT	NON/CUT	• Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low, and ASCD operation is cut off.	
AT OD MONITOR	ON/OFF	• Indicates the [ON/OFF] condition of A/T O/D according to the input signal from the TCM.	

Monitored item	Unit	Description	Remarks
AT OD CANCEL	ON/OFF	• Indicates the [ON/OFF] condition of A/T O/D cancel to the input signal from the TCM.	
CRUISE LAMP	ON/OFF	• Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP	ON/OFF	• Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	

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 • Heated oxygen 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.	• Perform Idle Air Volume Learning.
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch OFF • Shift lever: Neutral • 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
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

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

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode
For details, refer to EC-94, "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

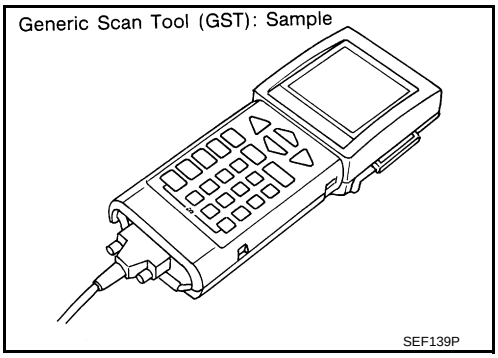
Test mode	Test item	Condition	Reference page
HO2S1	HO2S1 (B1) P0133	Refer to corresponding trouble diagnosis for DTC.	EC-152
	HO2S1 (B1) P0134		EC-158
	HO2S1 (B1) P1143		EC-233
	HO2S1 (B1) P1144		EC-238
HO2S2	HO2S2 (B1) P0139		EC-170
	HO2S2 (B1) P1146		EC-243
	HO2S2 (B1) P1147		EC-250

Diagnosis Tool Function

INFOID:0000000001161173

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.



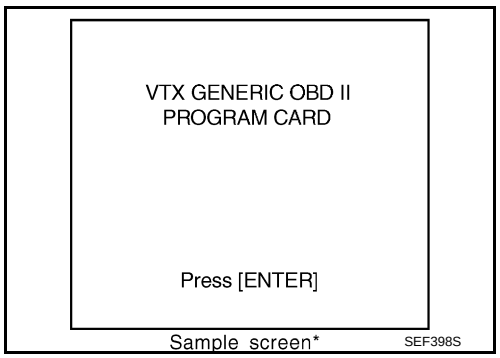
FUNCTION

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 EC-361, "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.

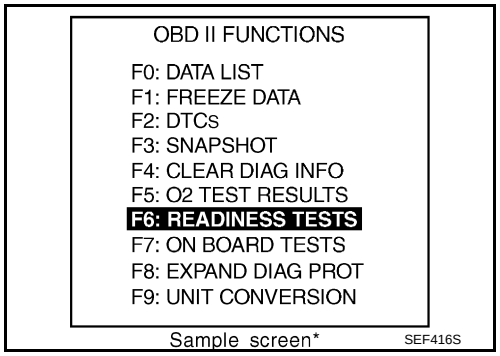
INSPECTION PROCEDURE

1. Turn ignition switch OFF.
2. Connect “GST” to data link connector, which is located under 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:0000000001670886

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:0000000001670887

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 (0.983 - 1.043 bar, 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
- 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 EC-22, "BASIC INSPECTION : Special Repair Requirement".
2. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode with CONSULT-III.
3. Make sure that monitor items are within the SP value.

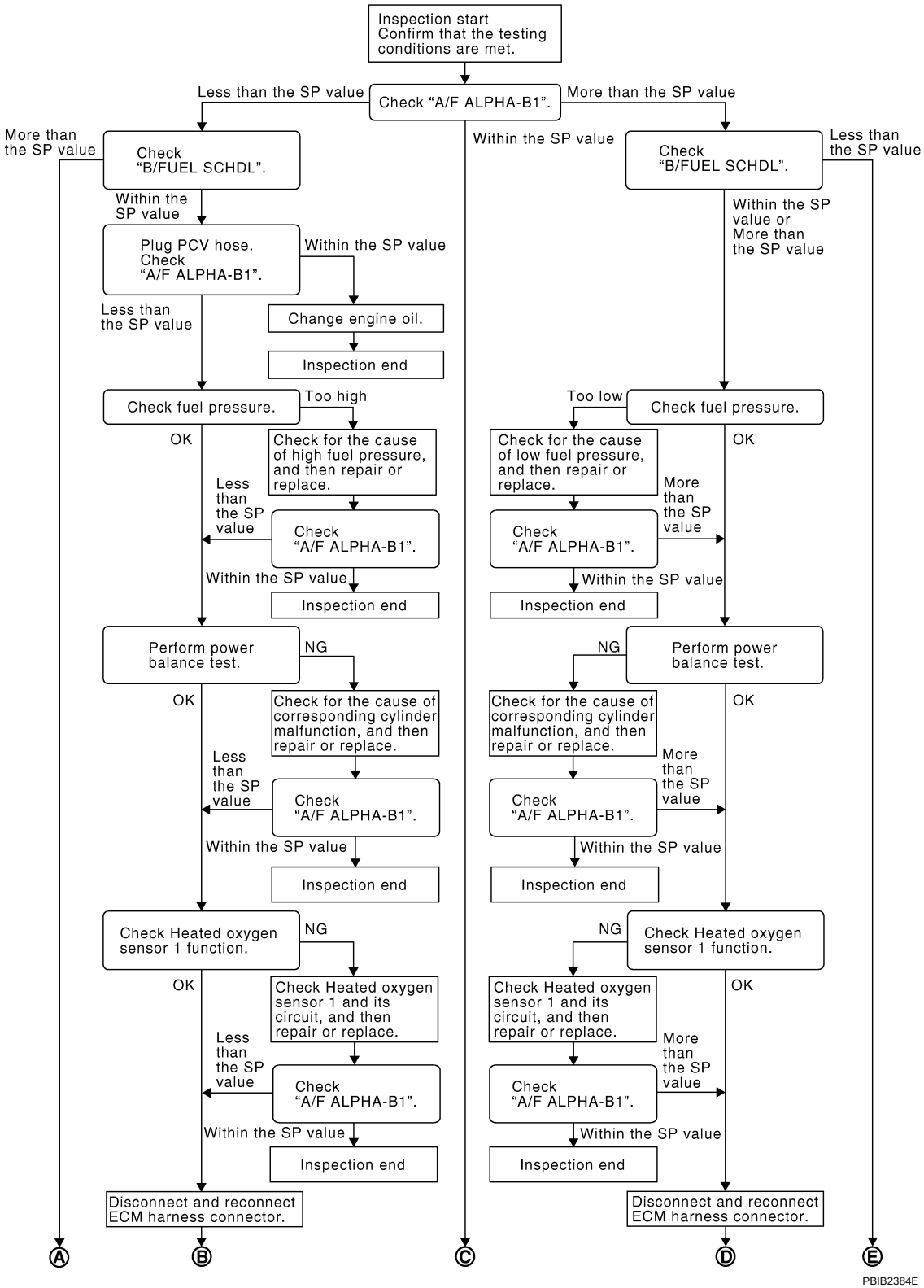
Is the inspection result normal?

YES >> END
NO >> Go to EC-117, "Diagnosis Procedure".

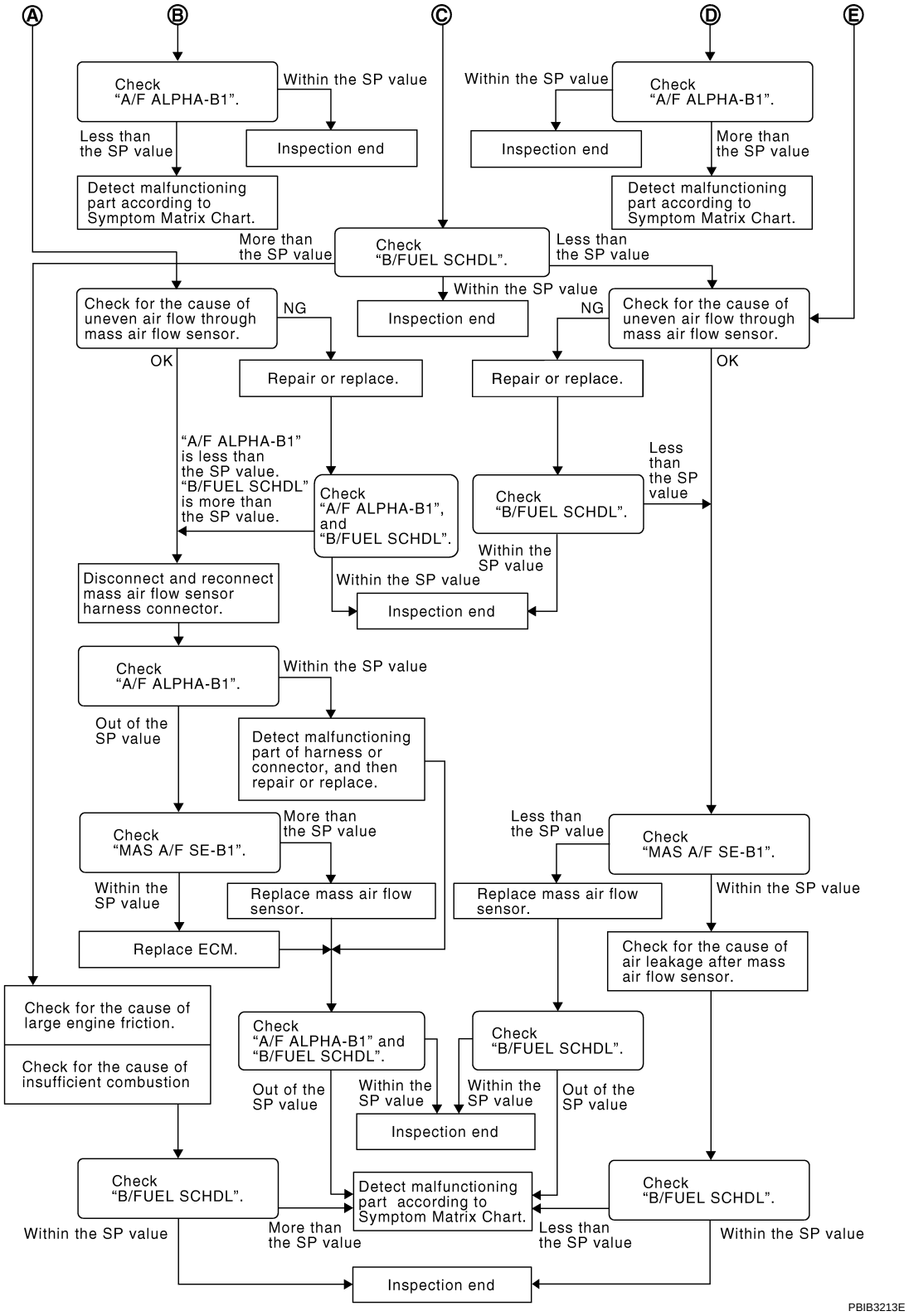
Diagnosis Procedure

INFOID:0000000001670888

OVERALL SEQUENCE



PBIB2384E



DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1"

With CONSULT-III

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-116, "Component Function Check".
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the 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 EC-377, "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 EC-319, "Component Function Check".)
2. Fuel injector and its circuit (Refer to EC-313, "Component Function Check".)
3. Intake air leakage
4. Low compression pressure (Refer to EM-24, "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 HEATED OXYGEN SENSOR 1 FUNCTION

1. Run engine at about 2,000 rpm for about 2minutes under no load.
2. Select “HO2S MNTR (B1)”, in “DATA MONITOR” mode.
3. Running engine at 2,000 rpm under no load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.

1 time : RICH → LEAN → RICH
2 times : RICH → LEAN → RICH → LEAN → RICH

Is the inspection result more than 5 times during 10 seconds?

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

13. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT

Check heated oxygen sensor 1 and its circuit, refer to.

>> 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 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 EC-366, "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 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 EC-134, "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 EC-25, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 29.

25. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal 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 EC-366, "Symptom Table".

30. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-366, "Symptom Table".

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000001670889

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 E15. Refer to Ground Inspection in GI-58, "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 harness connector terminals as follows.

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
E16	93	F10	10	Battery voltage
			11	
		E16	108	

Is the inspection result normal?

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

4.DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No. 55)
- Harness for open or short between ECM and fuse

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

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

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

ECM		Ground	Continuity
Connector	Terminal		
F10	10	Ground	Existed
	11		
E16	108		

3. Also check harness for short to power.

Is the inspection result normal?

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

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F8, E8
- 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		
E43	3	Ground	Battery voltage

Is the inspection result normal?

YES >> Go to EC-319, "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 harness connector terminals as follows.

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
E16	105	E16	108	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 11.

9. CHECK ECM POWER SUPPLY CIRCUIT-IV

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

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F10	32	E16	108	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 11.

10. CHECK ECM POWER SUPPLY CIRCUIT-V

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

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E16	105	E43	4	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 power in harness or connectors.

11. CHECK ECM POWER SUPPLY CIRCUIT-VI

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

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F10	32	E43	7	Existed

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

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

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

13. CHECK 20A FUSE

1. Disconnect 20A fuse (No. 53) 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 E15, E24. Refer to Ground Inspection in GI-58, "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		
F10	10	Ground	Existed
	11		
E16	108		

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 F8, E8
- 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-55, "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:0000000001670890

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:0000000001670891

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 1st trip DTC.

Is 1st trip DTC detected?

YES >> EC-128, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670892

Go to LAN-22, "Trouble Diagnosis Flow Chart".

U1010 CONTROL UNIT (CAN)

Description

INFOID:0000000001670893

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:0000000001670894

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 EC-129, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670895

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 EC-129, "DTC Logic".
5. Check DTC.

With GST
1. Turn ignition switch ON.
2. Select “Service $04” with GST.
3. Perform DTC CONFIRMATION PROCEDURE.
   See EC-129, "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 EC-25, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

P0011 IVT CONTROL

DTC Logic

INFOID:0000000001670896

DTC DETECTION LOGIC

NOTE:
If DTC P0011 is displayed with DTC P1111, first perform the trouble diagnosis for EC-219, "DTC 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.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10V and 16V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

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

ENG SPEED	1,200 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 4.2 msec
Shift lever	P or N position (A/T) Neutral position (M/T)

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

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

Is 1st trip DTC detected?

YES >> Go to EC-131, "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	2,000 - 3,175 rpm (A constant rotation is maintained.)
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?

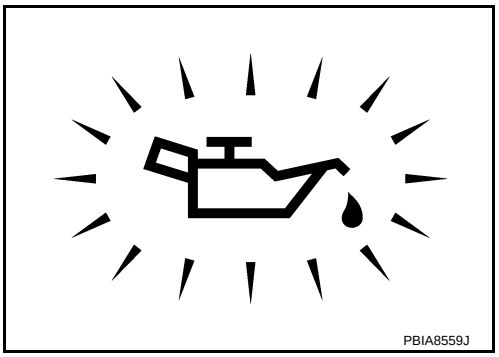
YES >> Go to EC-131, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670897

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-6, "Inspection".
NO >> GO TO 2.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-132, "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 EC-200, "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 EC-203, "Component Inspection".

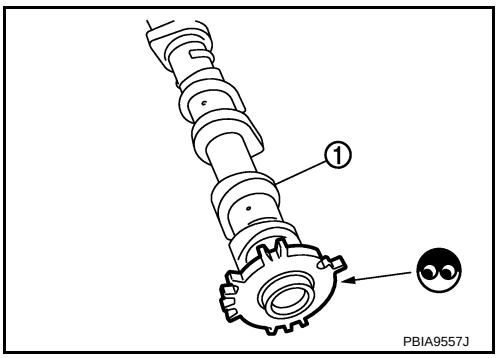
Is the inspection result normal?

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-50, "Removal and Installation".
NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to LU-6, "Inspection".

Is the inspection result normal?

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

8. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001670898

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)

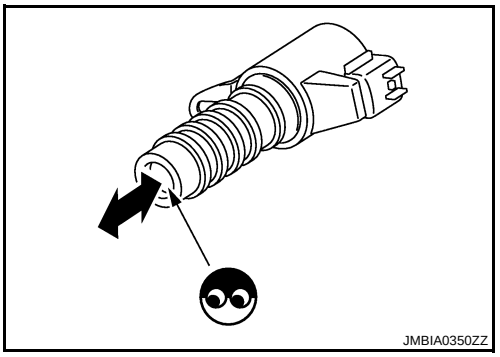
Is the inspection result normal?

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?

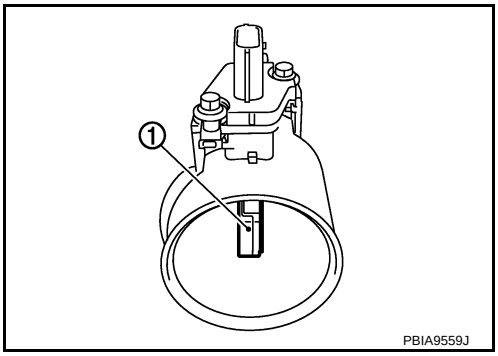
YES >> INSPECTION END
NO >> Replace intake valve timing control solenoid valve.

P0102, P0103 MAF SENSOR

Description

INFOID:0000000001670899

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:0000000001670900

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
P0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

Which DTC is detected?

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

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

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

Is DTC detected?

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

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-I

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

Is DTC detected?

YES >> Go to EC-135, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-II

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

Is DTC detected?

YES >> Go to EC-135, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670901

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 E15. Refer to Ground Inspection in GI-58, "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		
F31	2	Ground	Battery voltage

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 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	
F31	3	F11	52	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

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

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	4	F11	45	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 MASS AIR FLOW SENSOR

Refer to EC-136, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace mass air flow sensor.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001670902

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.)	1.0 - 1.3V
	Idle to about 4,000 rpm	1.0 - 1.3V 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
Connector	Terminal	Connector	Terminal		
F11	45 (MAF sensor)	F11	52	Ignition switch ON (Engine stopped.)	Approx. 0.4V
				Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3V
				Idle to about 4,000 rpm	1.0 - 1.3V 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.)	1.0 - 1.3V
	Idle to about 4,000 rpm	1.0 - 1.3V 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		
F11	45 (MAF sensor)	F11	52	Ignition switch ON (Engine stopped.)	Approx. 0.4V
				Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3V
				Idle to about 4,000 rpm	1.0 - 1.3V 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.)	1.0 - 1.3V
	Idle to about 4,000 rpm	1.0 - 1.3V 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		
F11	45 (MAF sensor)	F11	52	Ignition switch ON (Engine stopped.)	Approx. 0.4V
				Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3V
				Idle to about 4,000 rpm	1.0 - 1.3V 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?

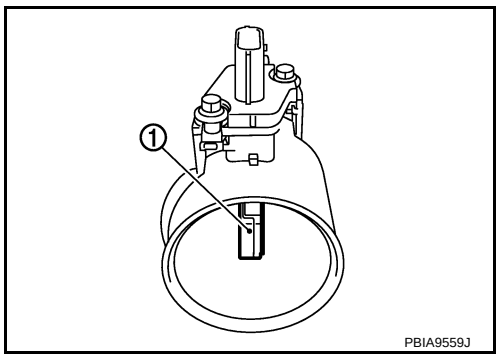
YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor.

P0112, P0113 IAT SENSOR

Description

INFOID:0000000001670903

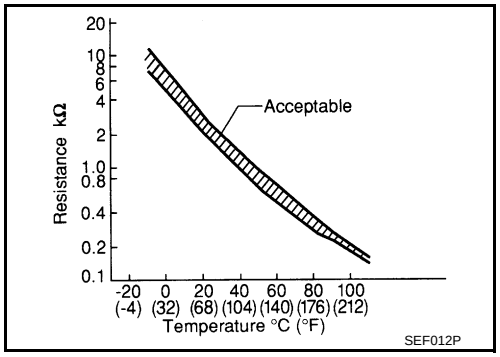
The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response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



<Reference data>

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

*: These data are reference values and are measured between ECM terminal 46 (Intake air temperature sensor) and 55.



DTC Logic

INFOID:0000000001670904

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. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-140, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670905

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
F31	5	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.

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	
F31	6	F11	55	Existed

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

Is the inspection result normal?

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

4.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-140, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001670906

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
5 and 6	Temperature °C (°F)	25 (77)	1.800 - 2.200 kΩ

Is the inspection result normal?

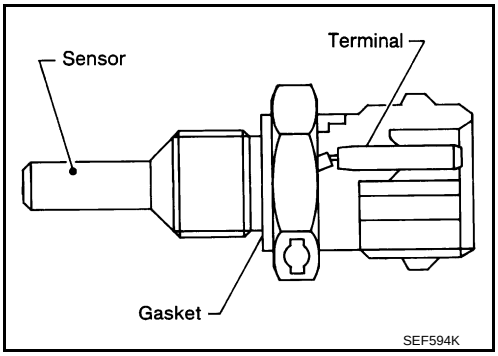
YES >> INSPECTION END
NO >> Replace mass air flow sensor (with intake air temperature sensor).

P0117, P0118 ECT SENSOR

Description

INFOID:0000000001670907

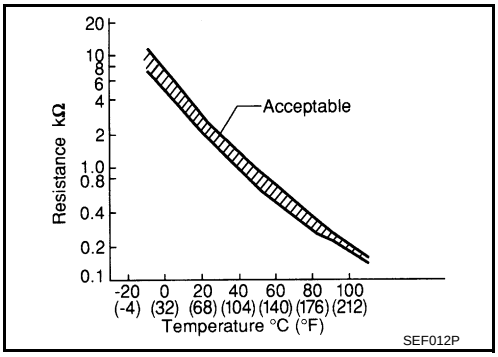
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 38 (Engine coolant temperature sensor) and 44.



DTC Logic

INFOID:0000000001670908

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

Is DTC detected?

YES >> Go to EC-143, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670909

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
F6	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	
F6	2	F11	44	Existed

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

Is the inspection result normal?

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

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-143, "Component Inspection".

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

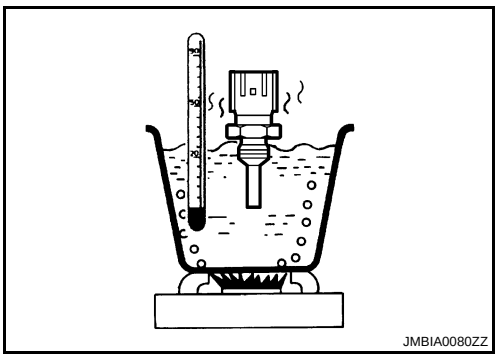
Component Inspection

INFOID:0000000001670910

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)	2.1 - 2.9 kΩ
		50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

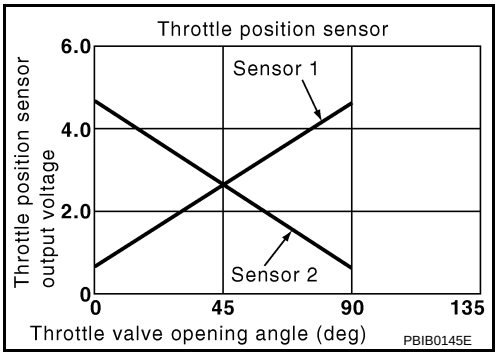
YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor.

P0122, P0123 TP SENSOR

Description

INFOID:0000000001670911

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:0000000001670912

DTC DETECTION LOGIC

NOTE:
If DTC P0122 or P0123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-265, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	• Harness or connectors (TP sensor 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 2)
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 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to EC-145, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670913

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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

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		
F7	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 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	
F7	4	F11	36	Existed

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

Is the inspection result normal?

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

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

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	3	F11	34	Existed

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

Is the inspection result normal?

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

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-147, "Component Inspection".

Is the inspection result normal?

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

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-147, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001670914

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to D (A/T), 1st (M/T) position.
6. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
F11	33 (TP sensor 1 signal)	F11	36	Accelerator pedal	Fully released	More than 0.36V
					Fully depressed	Less than 4.75V
	34 (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 EC-26, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001670915

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

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

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

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

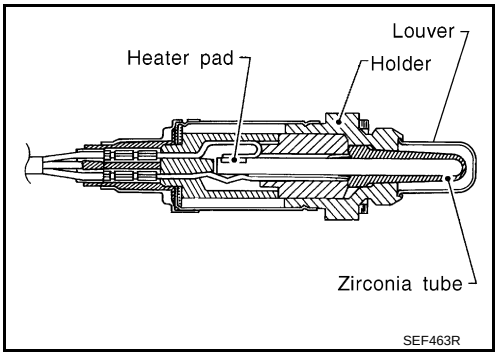
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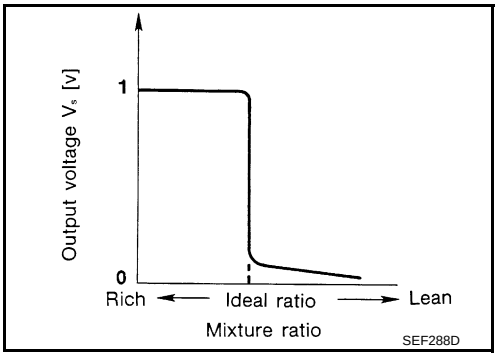
P0132 HO2S1

Description

INFOID:0000000001670916

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



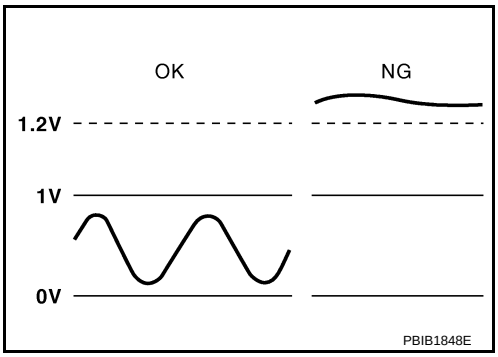


DTC Logic

INFOID:0000000001670917

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 is not inordinately high.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	heated oxygen sensor 1 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen 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.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for 2 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC is detected?

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

Diagnosis Procedure

INFOID:0000000001670918

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1. Refer to EM-159, "Removal and Installation".

>> GO TO 3.

3.CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	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 HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	4	F11	49	existed

2. Check harness continuity between HO2S1 harness connector or ECM harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F12	4	F11	49	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 HO2S1 CONNECTOR FOR WATER

Check heated oxygen sensor 1 connector for water.

Is the inspection result normal?

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

6.CHECK HEATED OXYGEN SENSOR 1

Refer to EC-150, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace heated oxygen sensor 1.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001670919

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

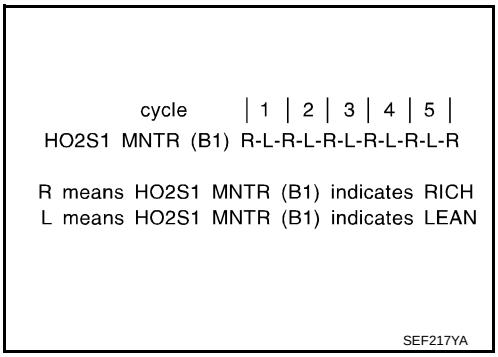
YES >> GO TO 2.
NO >> GO TO 3.

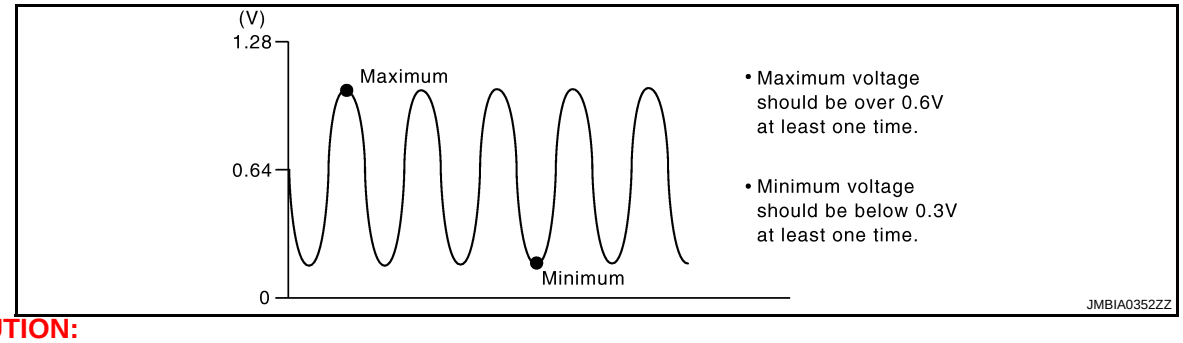
2.CHECK HEATED OXYGEN SENSOR 1

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.
6. Check the following.

- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.





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.**

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector terminals as foloows under the following condition.

ECM		ground		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

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.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

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.**

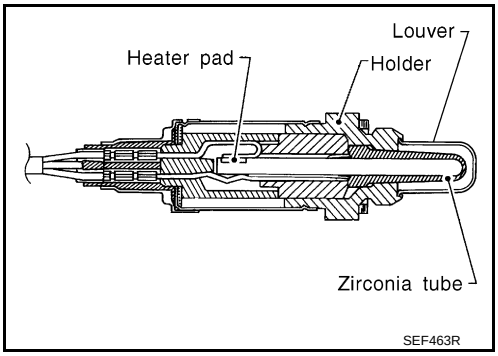
>> INSPECTION END

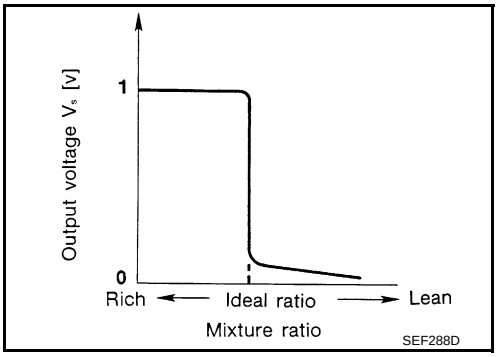
P0133 HO2S1

Description

INFOID:0000000001670920

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



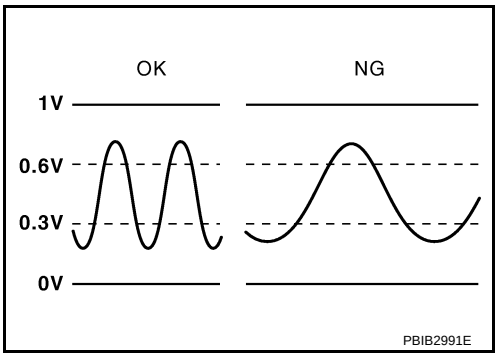


DTC Logic

INFOID:0000000001670921

DTC DETECTION LOGIC

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



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0133	Heated oxygen sensor 1 circuit slow response	• The response of the voltage signal from the sensor takes more than the specified time.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1 • Fuel pressure • Fuel injector • Intake air leaks • Exhaust gas leaks • PCV valve • 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:

Always perform at a temperature above -10°C (14°F).

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 3.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P0133” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.
   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 40 to 50 seconds.)
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	1,300 - 3,500 rpm
VHCL SPEED SE	More than 80 km/h (50 MPH)
B/FUEL SCHDL	3 - 15 msec
Shift lever	Suitable position

   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Touch “SELF-DIAG RESULTS”.

Which displayed on COUSULT-III screen?

OK >> INSPECTION END.
NG >> Go to EC-154, "Diagnosis Procedure".

3. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set volmeter probes between ECM harness connector terminals as follows.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

Is the inspection result normal?

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

Diagnosis Procedure

INFOID:0000000001670922

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

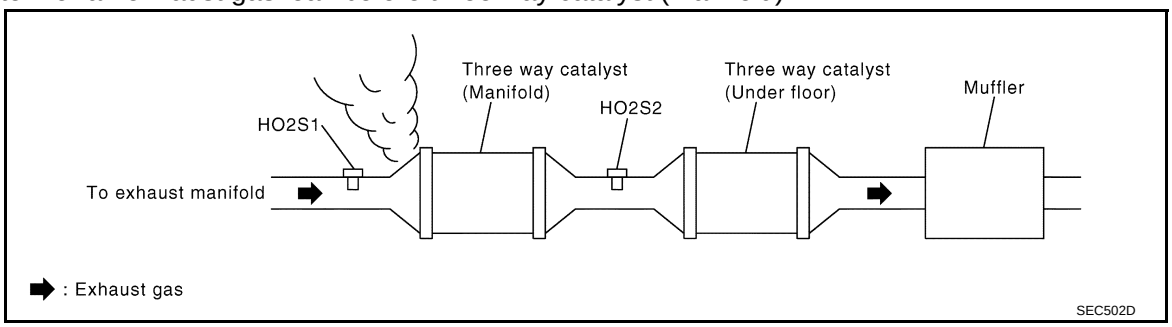
2.RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten the heated oxygen sensor 1. Refer to EM-159, "Removal and Installation".

>> GO TO 3.

3.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (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 EC-29, "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 EC-179, "DTC Logic" or EC-183, "DTC Logic".
NO >> GO TO 6.

6.CHECK HEATED OXYGEN SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	56	Existed

5. 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 HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	4	F11	49	Existed

2. Check the continuity between HO2S1 harness connector or ECM harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F12	4	F11	49	Ground	Not existed

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 MASS AIR FLOW SENSOR

Check mass air flow sensor.
Refer to EC-136, "Component Inspection".

Is the inspection result normal?

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

9. CHECK PCV VALVE

Refer to EC-325, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace PCV valve.

10. CHECK HEATED OXYGEN SENSOR 1

Perform EC-155, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace heated oxygen sensor 1.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001670923

1. INSPECTION START

Do you have CONSULT-III?

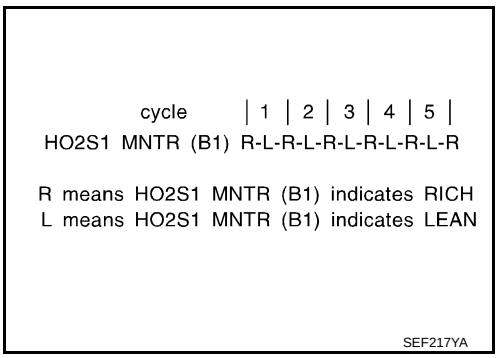
Do you have CONSULT-III?

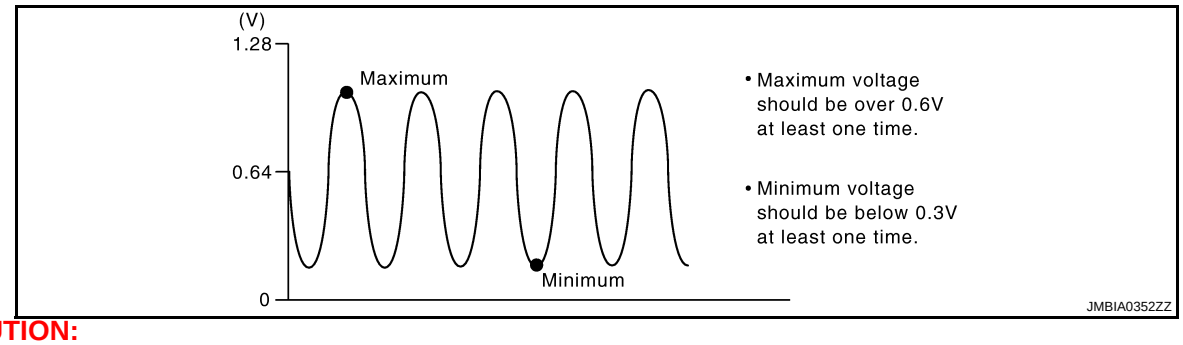
YES >> GO TO 2.
NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 1

With CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.
6. Check the following.

- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.





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.**

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signals)	F11	56	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

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.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

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.**

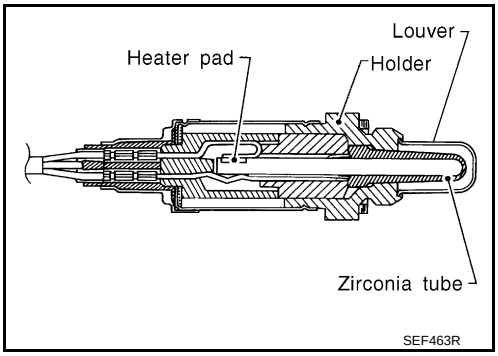
>> INSPECTION END

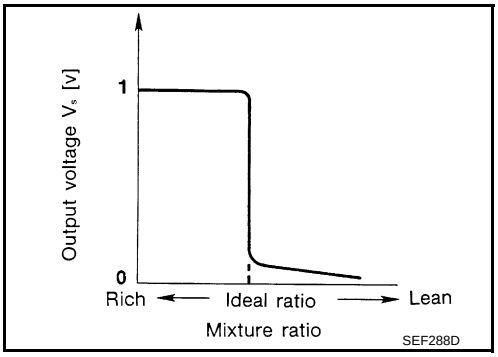
P0134 HO2S1

Description

INFOID:0000000001670924

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



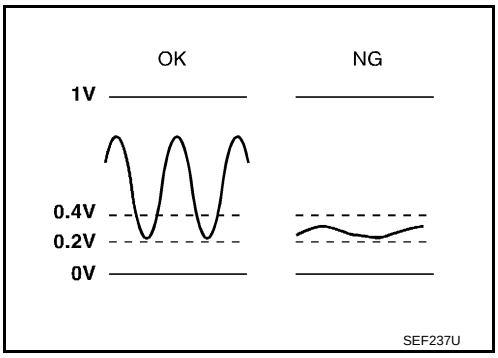


DTC Logic

INFOID:0000000001670925

DTC DETECTION LOGIC

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 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
P0134 0134	Heated oxygen sensor 1 circuit no activity detected	The voltage from the sensor is constantly approx. 0.3V.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen 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 3.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P0134” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.
   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 40 to 50 seconds.)
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	1,300 - 3,500 rpm
VHCL SPEED SE	More than 80 km/h (50 MPH)
B/FUEL SCHDL	3 - 15 msec
Shift lever	Suitable position

If “TESTING” is not displayed after 5 minutes, retry from step 2.

7. Touch “SELF-DIAG RESULTS”.

Which displayed on COUSULT-III screen?

OK >> INSPECTION END.
NG >> Go to EC-159, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM harness connector terminals as follows.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Engine speed held at 2,000 rpm constant under no load.	• The voltage dose not remain in the range of 0.2 to 0.4.

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-159, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001670926

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.

2. Disconnect ECM harness connector.
3. Check harness continuity between ECM harness connector and HO2S1 harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	56	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 HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	4	F11	49	Existed

2. Check harness continuity between ECM harness connector or HO2S1 harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F12	4	F11	49	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 HEATED OXYGEN SENSOR 1

Refer to EC-160, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace heated oxygen sensor 1.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001670927

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

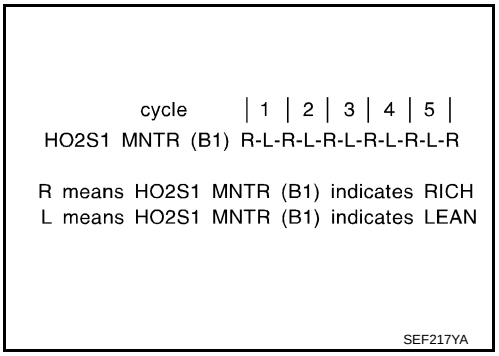
YES >> GO TO 2.
NO >> GO TO 3.

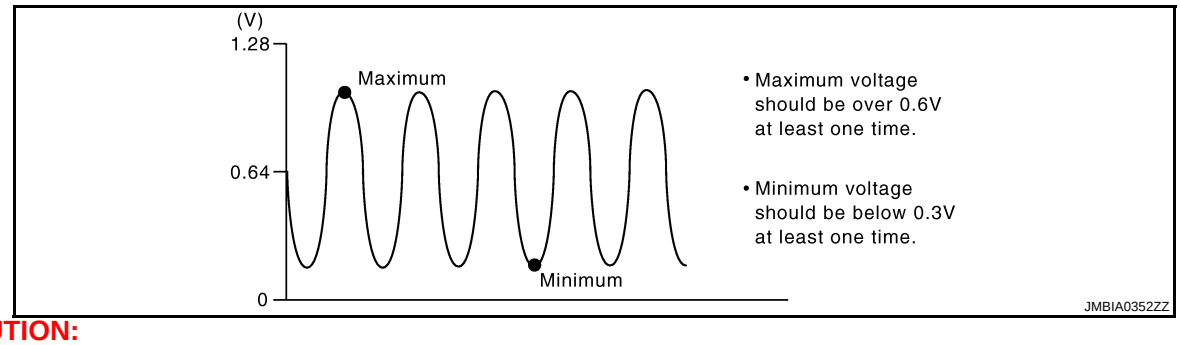
2.CHECK HEATED OXYGEN SENSOR 1

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.

6. Check the following.
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.





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.**

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	E11	56	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

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.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.
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

P0135 HO2S1 HEATER

Description

INFOID:0000000001670928

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF duty control of the heated oxygen sensor 1 heater corresponding to the engine speed and engine coolant temperature. The duty percent varies with engine coolant temperature when engine is started.

DTC Logic

INFOID:0000000001670929

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0135	Heated oxygen sensor 1 heater control circuit low	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	• Harness or connectors (The heated oxygen sensor 1 heater circuit is open or shorted.) • Heated oxygen 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. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-163, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670930

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between HO2S1 sensor 1 harness connector and ground.

HO2S1		Ground	Voltage
Connector	Terminal		
F12	2	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No. 54)
- Harness for open or short between heated oxygen sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK HO2S1 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	3	F10	3	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 1 HEATER

Refer to EC-164, "Component Inspection".

Is the inspection result normal?

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

6.REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

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

Perform GI-55, "Intermittent Incident".

>> Repair or replace.

Component Inspection

INFOID:0000000001670931

1.CHECK HEATED OXYGEN SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect HO2S1 harness connector.
3. Check resistance between HO2S1 terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
2 and 3	3.4 - 4.4 Ω
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 1

Replace heated oxygen 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.**

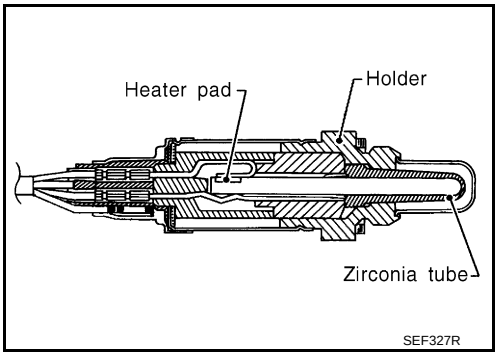
>> INSPECTION END

P0138 HO2S2

Description

INFOID:0000000001670932

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 heated oxygen 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.

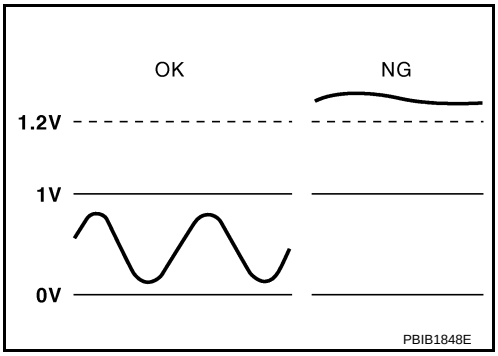


DTC Logic

INFOID:0000000001670933

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time.
To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high 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	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

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 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 2 minutes.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-167, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670934

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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	
F13	1	F11	59	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	
F13	4	F11	50	Existed

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

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F13	4	F11	50	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 EC-168, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001670935

1.INSPECTION START

Do you have CONSULT-III?

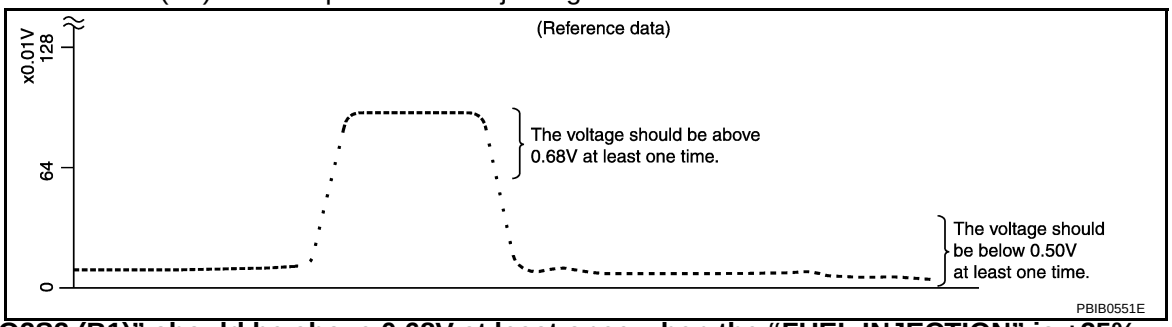
Do you have CONSULT-III?

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 0.50V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

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

3.CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

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

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	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 0.50V at least once during this procedure.

Is the inspection result normal?

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

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	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 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	Coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Always drive vehicle at a safe speed.

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.**

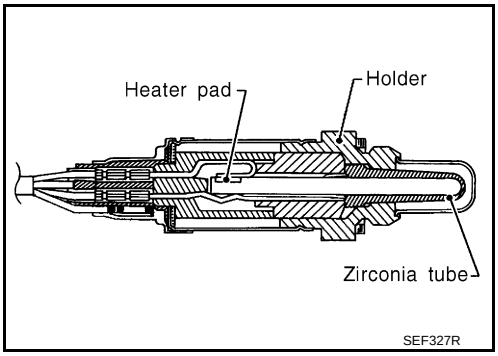
>> INSPECTION END

P0139 HO2S2

Description

INFOID:0000000001670936

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 heated oxygen 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.

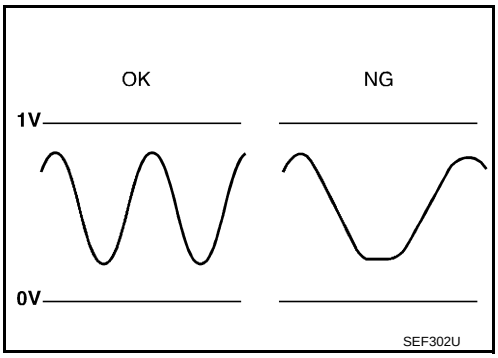


DTC Logic

INFOID:0000000001670937

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139	Heated oxygen sensor 2 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.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 11.

2.PRECONDITIONING

"COMPLETED" will appear on CONSULT-III screen when all tests "COND1", "COND2" and "COND3" are completed.
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION
For 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 PERFORM PROCEDURE FOR COND1 - II.

>> GO TO 3.

3. PERFORM PROCEDURE FOR COND1-I

Start engine and warm it up to normal operating temperature.

>> GO TO 4.

4. PERFORM PROCEDURE FOR COND1-II

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 5.

5. PERFORM PROCEDURE FOR COND1-III

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) P0139” 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 9.
NO >> GO TO 6.

6. PERFORM PROCEDURE FOR COND1-IV

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 4.
COND1: COMPLETED COND2: INCOMPLETED>>GO TO 7.
COND1: COMPLETED COND2: COMPLETED>>GO TO 8.

7. 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 8.
COND2: COMPLETED COND3: COMPLETED>>GO TO 9.

8. PERFORM PROCEDURE FOR COND3-I

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 9.

9. PERFORM PROCEDURE FOR COND3-II

Touch “SELF DIAGRESULTS”.

Which displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-173, "Diagnosis Procedure".
CAN NOT BE DIAGNOSED>>GO TO 10.

10. PERFORM PROCEDURE FOR COND3-III

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.

11. PREFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-172, "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 EC-173, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001670938

1. PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	Revving up to 4,000 rpm under no load at least 10 times	A change of voltage should be more than 0.12 V for 1 second during this procedure.

Is the inspection result normal?

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

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	Keeping engine speed at idle for 10 minutes	A change of voltage should be more than 0.12 V for 1 second during this procedure.

Is the inspection result normal?

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

3. PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	Coasting from 80 km/h (50 MPH) in D position (A/T), 4rd gear position (M/T)	A change of voltage should be more than 0.12 V for 1 second during this procedure.

iAlways drive vehicle at a safe speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-173, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001670939

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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 EC-29, "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 EC-179, "DTC Logic" or EC-183, "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	
F13	1	F11	59	Existed

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

Is the inspection result normal?

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

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	4	F11	50	Existed

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

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F13	4	F11	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-174, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001670940

1. INSPECTION START

Do you have CONSULT-III?

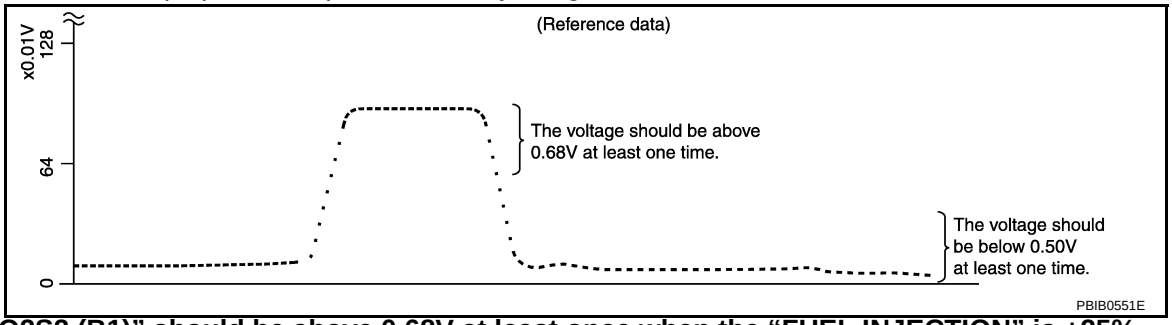
Do you have CONSULT-III?

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 0.50V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.

3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	E11	59	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 0.50V at least once during this procedure.

Is the inspection result normal?

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

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	E11	59	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 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	E11	59	Coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Always drive vhicle at a safe speed.

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

P0141 HO2S2 HEATER

Description

INFOID:0000000001670941

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
Above 3,600	OFF
Below 3,600 rpm after the following conditions are met. • Engine: After warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

DTC Logic

INFOID:0000000001670942

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0141	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) • Heated oxygen sensor 2 heater

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. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st tip DTC detected?

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

Diagnosis Procedure

INFOID:0000000001670943

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
F13	2	Ground	Battery voltage

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No. 54)
- 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	
F13	3	F10	5	Existed

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

Is the inspection result normal?

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

5. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-178, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001670944

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 [at 25°C (77°F)]
2 and 3	3.3 - 4.4 Ω
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

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000001670945

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 heated oxygen 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
Heated oxygen 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 • Heated oxygen 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 EC-29, "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 EC-180, "Diagnosis Procedure".
NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

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

Is 1st trip DTC detected?

YES >> Go to EC-180, "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?

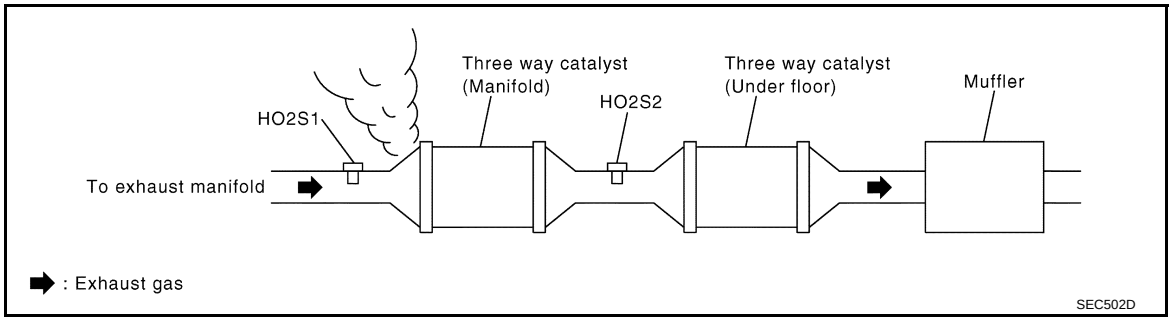
YES >> Go to EC-180, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670946

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 HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT

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

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	4	F11	49	Existed

5. Check the continuity between heated oxygen sensor 1 harness connector or ECM harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F12	4	F11	49	Ground	Not existed

6. Also check harness for short to power.

Is the inspection result normal?

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

4. CHECK FUEL PRESSURE

Check fuel pressure. Refer to EC-377, "Inspection".

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.
   For specification, refer to EC-380, "Mass Air Flow Sensor".

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.
   For specification, refer to EC-380, "Mass Air Flow Sensor".

Is the measurement value within the specification?

YES >> GO TO 7.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-134, "DTC Logic".

7. CHECK FUNCTION OF FUEL INJECTOR

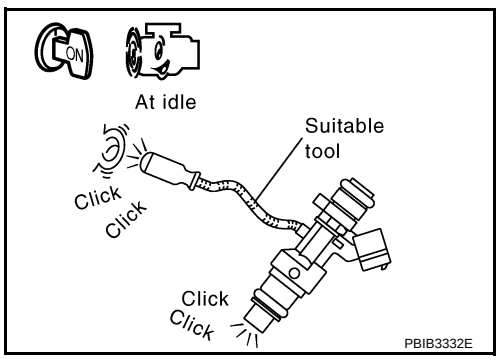
With CONSULT-III

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.



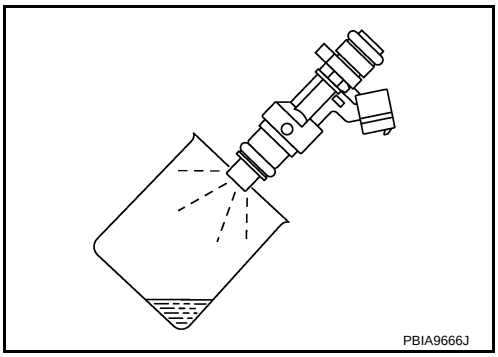
Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-313, "Component Function Check".

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-35, "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-55, "Intermittent Incident".

>> INSPECTION END

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000001670947

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 heated oxygen 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
Heated oxygen 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.)	• Heated oxygen 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 EC-29, "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 EC-184, "Diagnosis Procedure".
NO >> Remove spark plugs and check for fouling, etc.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Start engine and let it idle for at least 10 minutes.

Is 1st trip DTC detected?

YES >> Go to EC-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?

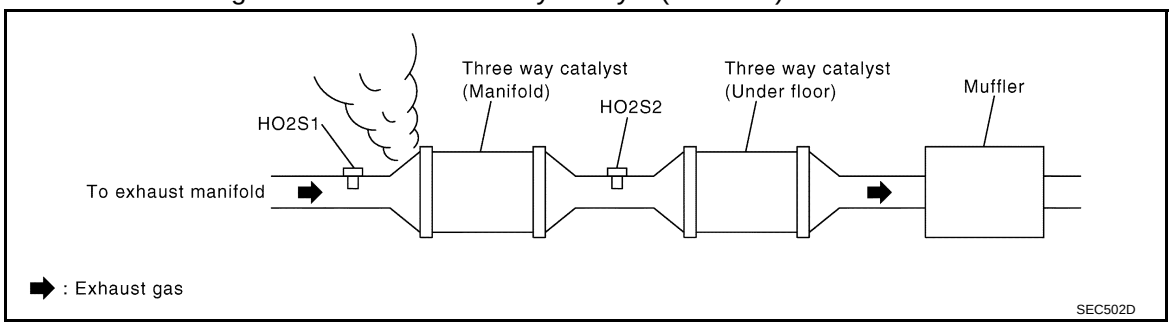
YES >> Go to EC-184, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670948

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 HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT

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

HO2S1 sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	4	F11	49	Existed

5. Check the continuity between heated oxygen sensor 1 harness connector or ECM harness connector and ground.

HO2S1 sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F12	4	F11	49	Ground	Not existed

6. Also check harness for short to power.

Is the inspection result normal?

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

4. CHECK FUEL PRESSURE

Check fuel pressure. Refer to EC-377, "Inspection".

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.
   For specification, refer to EC-380, "Mass Air Flow Sensor".

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in “Service $01” with GST.
   For specification, refer to EC-380, "Mass Air Flow Sensor".

Is the measurement value within the specification?

YES >> GO TO 7.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-134, "DTC Logic".

7. CHECK FUNCTION OF FUEL INJECTOR

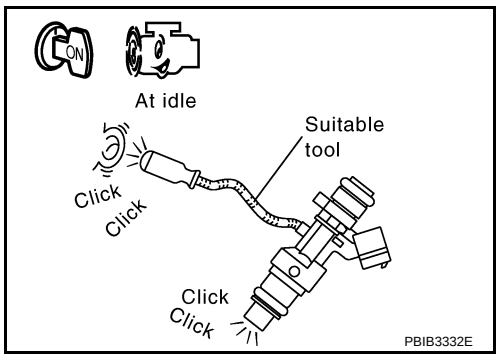
With CONSULT-III

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 EC-313, "Component Function Check".

8. CHECK FUELINJECTOR

1. Remove fuel injector assembly. Refer to EM-35, "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-55, "Intermittent Incident".

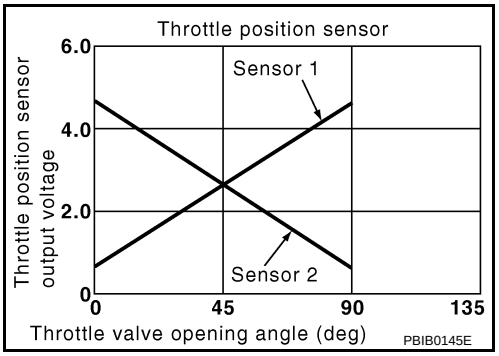
>> INSPECTION END

P0222, P0223 TP SENSOR

Description

INFOID:0000000001670949

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:0000000001670950

DTC DETECTION LOGIC

NOTE:
If DTC P0222 or P0223 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-265, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	• Harness or connectors (TP sensor 1 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1)
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 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to EC-187, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670951

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
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		
F7	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 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	
F7	4	F11	36	Existed

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

Is the inspection result normal?

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

4. CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	2	F11	33	Existed

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

Is the inspection result normal?

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

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-189, "Component Inspection".

Is the inspection result normal?

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

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-189, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001670952

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-27, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to D (A/T), 1st (M/T) position.
6. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
F11	33 (TP sensor 1 signal)	F11	36	Accelerator pedal	Fully released	More than 0.36V
					Fully depressed	Less than 4.75V
	34 (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 EC-189, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001670953

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

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

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

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

>> END

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

INFOID:0000000001670954

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 • Heated oxygen 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. Restart engine and let it idle for about 15 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-191, "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 EC-191, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670955

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.

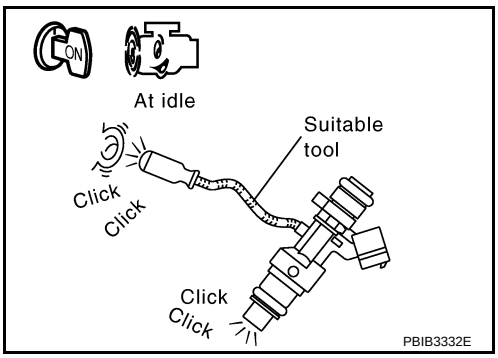
Is the inspection result normal?

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.

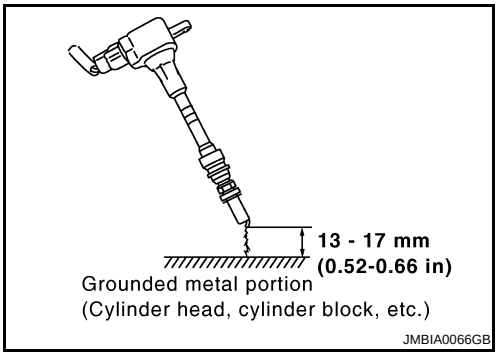
Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-314, "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 EC-319, "Component Function Check".

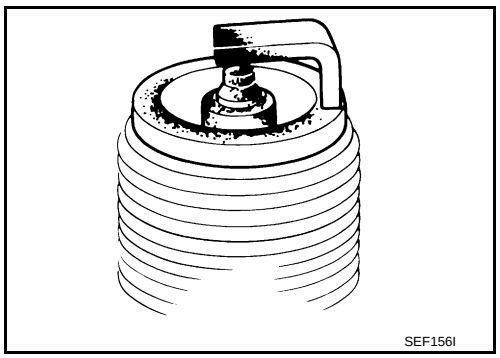
7. CHECK SPARK PLUG

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-47, "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-47, "Removal and Installation".

9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-24, "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

Check fuel pressure. Refer to EC-377, "Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”.

NO >> Repair or replace.

12. CHECK IGNITION TIMING

For procedure, refer to EC-26, "IGNITION TIMING : Special Repair Requirement".
For specification, refer to EC-380, "Idle Speed" and EC-380, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Follow the EC-26, "IGNITION TIMING : Special Repair Requirement".

13. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-164, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace heated oxygen sensor 1.

14. CHECK MASS AIR FLOW SENSOR

With CONSULT-III
Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-III.
For specification, refer to EC-380, "Mass Air Flow Sensor".

With GST
Check mass air flow sensor signal in Service $01 with GST.
For specification, refer to EC-380, "Mass Air Flow Sensor".

Is the measurement value within the specification?

YES >> GO TO 15.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-134, "DTC Logic".

15. CHECK SYMPTOM TABLE

Check items on the rough idle symptom in EC-366, "Symptom Table".

Is the inspection result normal?

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

16. 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 EC-94, "Diagnosis Description".

>> GO TO 17.

17. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

P0327, P0328 KS

Description

INFOID:0000000001670956

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:0000000001670957

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
P0328	Knock 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.

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 run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-195, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670958

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect knock sensor harness connector and disconnect ECM harness connector.
2. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F14	2	F11	40	Existed

3. 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 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	
F14	1	F11	37	Existed

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

Is the inspection result normal?

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

4.CHECK KNOCK SENSOR

Refer to EC-196, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace knock sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001670959

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 [at 20°C (68°F)]
1 and 2	Approx. 532 - 588 kΩ

CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

Is the inspection result normal?

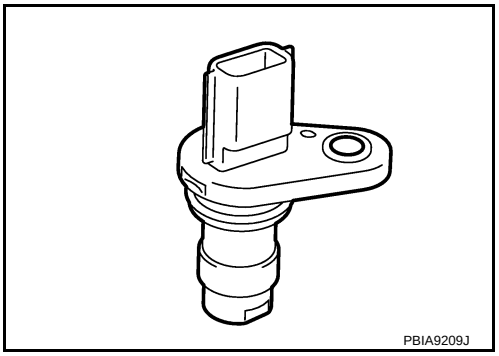
YES >> INSPECTION END
NO >> Replace knock sensor.

P0335 CKP SENSOR (POS)

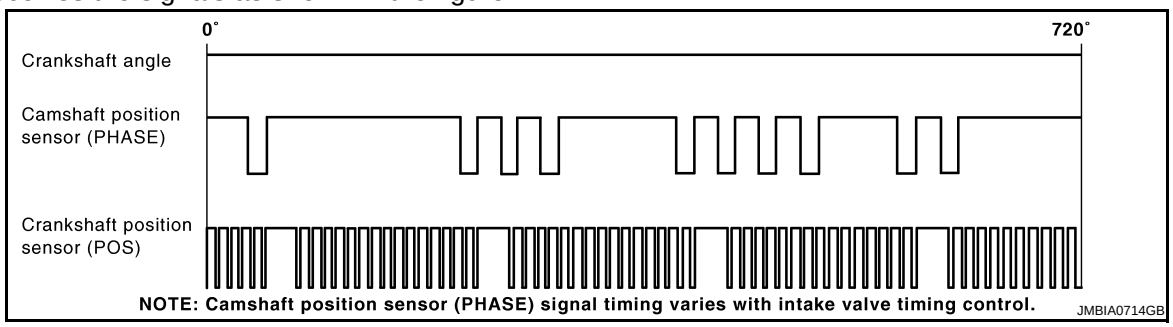
Description

INFOID:0000000001670960

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.


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ECM receives the signals as shown in the figure.



DTC Logic

INFOID:0000000001670961

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (POS) circuit	• The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	• Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Refrigerant pressure sensor circuit is shorted.) (Accelerator pedal position sensor 2 circuit is shorted.) • Crankshaft position sensor (POS) • Refrigerant pressure sensor • Accelerator pedal position sensor (APPS 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 EC-198, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670962

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
F15	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 OFF.
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	
F15	1	F11	75	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
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
E16	102	APP sensor 2	E12 (LHD models) M204 (RHD models)	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 REFRIGERANT PRESSURE SENSOR

Refer to EC-326, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace refrigerant pressure sensor.

6. CHECK APP SENSOR

Refer to EC-293, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 7.

7. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-26, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

8. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F15	2	F11	62	Existed

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F15	3	F11	61	Existed

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

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-200, "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-55, "Intermittent Incident".

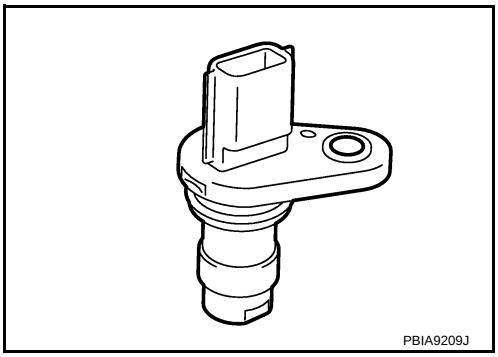
>> INSPECTION END

Component Inspection

INFOID:0000000001670963

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.


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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 [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞ Ω
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

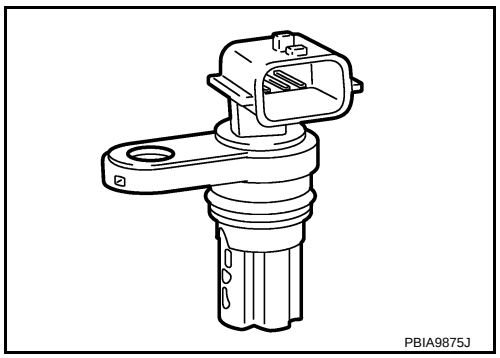
YES >> INSPECTION END
NO >> Replace crankshaft position sensor (POS).

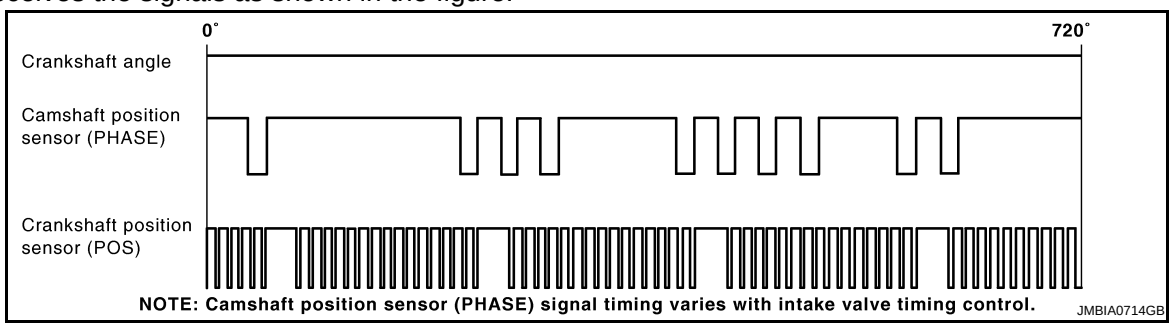
P0340 CMP SENSOR (PHASE)

Description

INFOID:0000000001670964

The camshaft position sensor (PHASE) senses the retraction of camshaft (INT) to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
ECM receives the signals as shown in the figure.





DTC Logic

INFOID:0000000001670965

DTC DETECTION LOGIC

NOTE:
If DTC P0340 is displayed with DTC P1129, first perform the trouble diagnosis for DTC P1129. Refer to EC-265, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340	Camshaft position sensor (PHASE) circuit	• The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. • The cylinder No. signal is not sent to ECM during engine running. • The cylinder No. signal is not in the normal pattern during engine running.	• Harness or connectors (The sensor circuit is open or shorted) • Camshaft position sensor (PHASE) • Camshaft (INT) • Starter motor • Starting system circuit • Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-202, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-202, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670966

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 E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

3.CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CMP sensor (PHASE) harness connector and ground.

CMP sensor (PHASE)		Ground	Voltage
Connector	Terminal		
F21	1	Ground	Approx. 5V

Is the inspection result normal?

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

4.CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F21	2	F11	63	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 CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F21	3	F11	65	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CAMSHAFT POSITION SENSOR (PHASE)

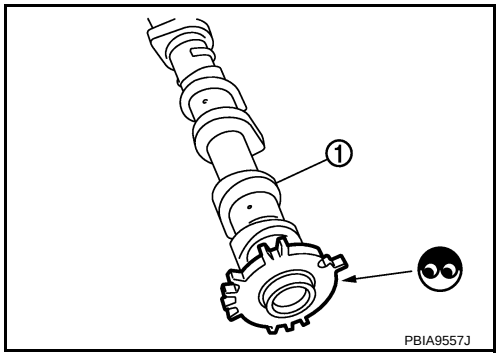
Refer to EC-203, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace camshaft position sensor (PHASE).

7. CHECK CAMSHAFT (INT)

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



Is the inspection result normal?

YES >> GO TO 8.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

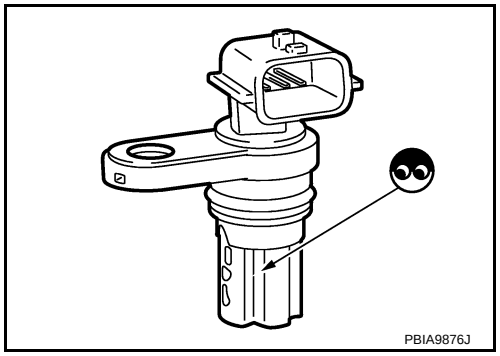
>> INSPECTION END

Component Inspection

INFOID:0000000001670967

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 [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞ Ω
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace camshaft position sensor (PHASE).

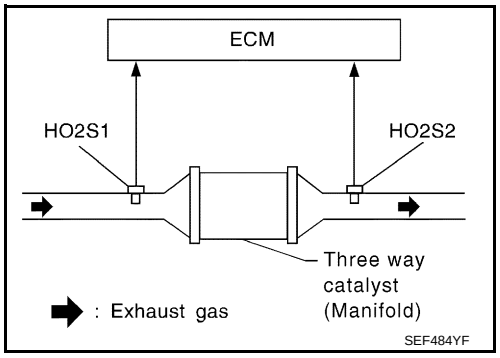
P0420 THREE WAY CATALYST FUNCTION

DTC Logic

INFOID:0000000001670968

DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of heated oxygen 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 heated oxygen 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. 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. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-III.
9. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
10. Check the indication of “CATALYST”.

Which is displayed on CONSULT-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

1. Stop engine and cool it down to less than 70°C (158°F).
2. 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 EC-207, "Diagnosis Procedure".
NO >> INSPECTION END

7. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-206, "Component Function Check".

NOTE:
Use component function check to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-207, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001670969

1. PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

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

(+)		(–)		Condition	Specification
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Keeping engine speed at 2,000 rpm constant under no load	The voltage switch periodically more than 5 times within 10 seconds.

Is the inspection result normal?

YES >> GO TO 2
NO >> Go to EC-152, "DTC Logic".

2. PERFORM COMPONENT FUNCTION CHECK-II

Without CONSULT-III

1. Set voltmeter probes between ECM harness connector terminals as follows.
2. Make sure that the voltage switching frequency (high&low) HO2S2 voltage is very less than that of HO2S1 voltage under the following condition.

(+)		(–)		Condition	Specification
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Keeping engine speed at 2,000 rpm constant under no load	Switching freqency ratio (A/B) : Less than 0.75 A : Heated oxygen sensor 2 voltage switching frequency B : Heated oxygen sensor 1 voltage switching frequency
	50 (HO2S2 signal)		59		

Is the inspection result normal?

YES >> INSPECTION END
NO >> If the ratio is greater than above (0.75), it means three way catalyst does not operate properly. Go to EC-207, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001670970

1.CHECK EXHAUST SYSTEM

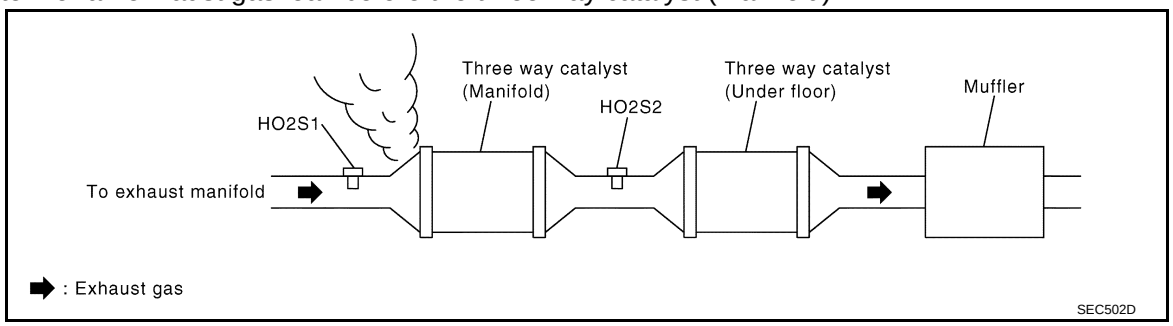
Visually check exhaust tubes and muffler for dent.

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 AND IDLE SPEED

Check the following items. Refer to EC-26, "IGNITION TIMING : Special Repair Requirement"
For specification, refer to EC-380, "Idle Speed", EC-380, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Follow the EC-26, "IGNITION TIMING : Special Repair Requirement".

5.CHECK FUEL INJECTOR

1. Stop engine and then turn ignition switch OFF.
2. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F10	25	E16	108	Battery voltage
	29			
	30			
	31			

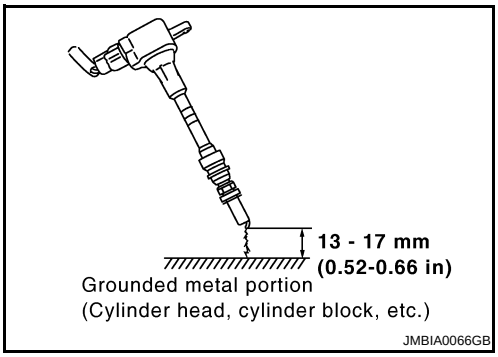
Is the inspection result normal?

YES >> GO TO 6.
NO >> Perform EC-313, "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 EC-319, "Diagnosis Procedure".

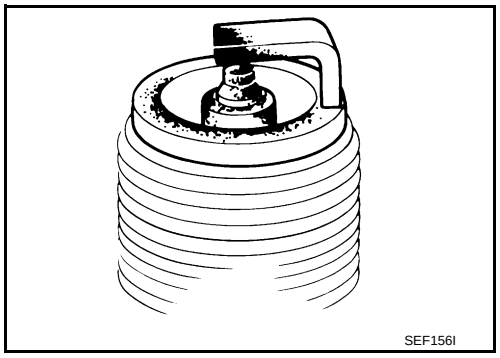
8. CHECK SPARK PLUG

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-47, "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-47, "Removal and Installation".

10. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Remove fuel injector assembly.
   Refer to EM-35, "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-55, "Intermittent Incident".

Is the trouble fixed?

YES >> INSPECTION END

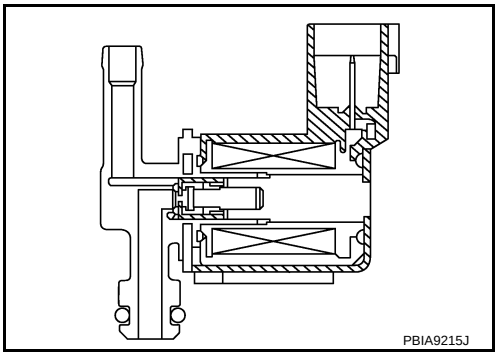
NO >> Replace three way catalyst assembly.

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:0000000001670971

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:0000000001670972

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

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 11V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 13 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-210, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670973

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		
F22	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK 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	
F22	2	F10	9	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 3.
YES-2 >> Without CONSULT-III: GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the value opening?

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

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-211, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace EVAP canister purge volume control solenoid valve.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001670974

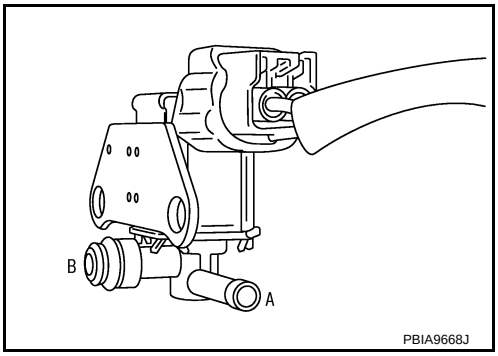
1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

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:0000000001670975

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:0000000001670976

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 EC-128, "DTC Logic".**
- **If DTC P0500 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-129, "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) • Wheel sensor • Combination meter • ABS actuator and electric unit (control unit)

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 VEHICLE SPEED SENSOR FUNCTION

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

With CONSULT-III

1. Start engine.
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-III. The vehicle speed on CONSULT-III should exceed 10 km/h (6 mph) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Go to EC-214, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select “DATA MONITOR” mode with CONSULT-III.
2. Warm engine up to normal operating temperature.
3. Maintain the following conditions for at least 50 consecutive seconds.
   CAUTION:

Always drive vehicle at a safe speed.

ENG SPEED	1,600 - 6,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	7.2 - 31.8 msec
Shift lever	Except Neutral position
PW/ST SIGNAL	OFF

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-214, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-214, "Component Function Check".
Use component function check to check the overall function of the vehicle speed sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-214, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001670977

1.PERFORM COMPONENT FUNCTION CHECK

With GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed sensor signal in Service $01 with GST.
   The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-214, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001670978

1.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-25, "CONSULT-III Function (ABS)" (with ABS) or BRC-105, "CONSULT-III Function (ABS)" (with ESP/TCS/ABS).

Is the inspection result normal?

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

2.CHECK COMBINATION METER

Refer to MWI-22, "CONSULT-III Function (METER/M&A)".

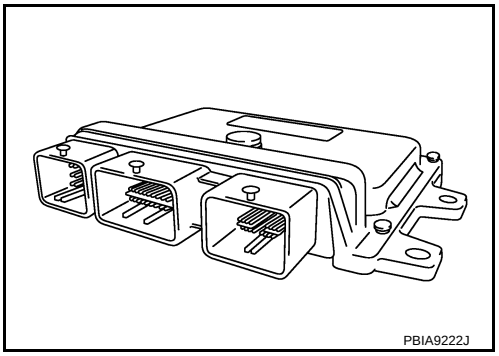
>> INSPECTION END

P0605 ECM

Description

INFOID:0000000001670979

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


PBIA9222J

DTC Logic

INFOID:0000000001670980

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 EC-216, "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. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-216, "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 10 seconds, and then turn ON.
3. Repeat step 2 for 32 times.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-216, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670981

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 EC-215, "DTC Logic".

With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. **Perform DTC CONFIRMATION PROCEDURE.**
   See EC-215, "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 EC-25, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

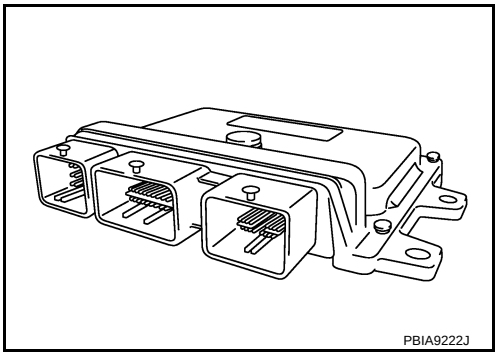
>> INSPECTION END

P1065 ECM

Description

INFOID:0000000001161270

ECM has the memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the Idle Air Volume Learning value memory, etc. even when the ignition switch is turned OFF.


PBIA9222J

DTC Logic

INFOID:0000000001161271

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1065	Engine control module	ECM back-up RAM system does not function properly.	• 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 and wait at least 1 second.
2. Start engine and let it idle for 1 second.
3. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
4. Repeat steps 2 and 3 for four times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-217, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161272

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 EC-217, "DTC Logic".

With GST
1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. **Perform DTC CONFIRMATION PROCEDURE.**
   See EC-217, "DTC Logic".

Is the 1st trip DTC P1065 displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to EC-25, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

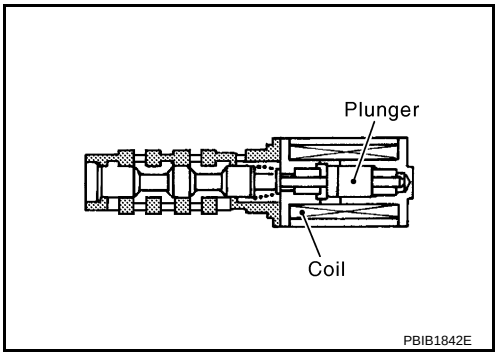
>> INSPECTION END

P1111 IVT CONTROL SOLENOID VALVE

Description

INFOID:0000000001670983

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:0000000001670984

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 EC-219, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670985

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		
F23	1	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 E8, F8
- 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	
F23	2	F11	73	Existed

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

Is the inspection result normal?

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

4.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-220, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001670986

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.

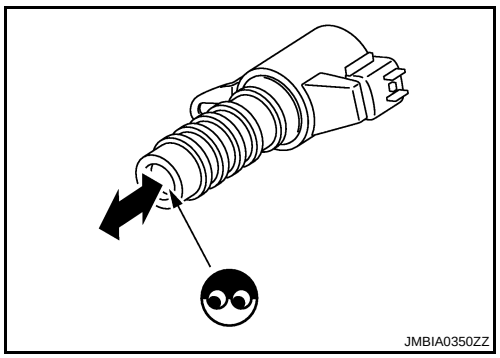
2. Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

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.

P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

INFOID:0000000001670987

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:0000000001670988

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121	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.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND B

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D (A/T), 1st (M/T) position and wait at least 3 seconds.
3. Set shift lever to P or N (A/T), Neutral (M/T) position.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Set shift lever to D (A/T), 1st (M/T) position and wait at least 3 seconds.
7. Set shift lever to P or N (A/T), Neutral (M/T) position.
8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
9. Check DTC.

Is DTC detected?

YES >> Go to EC-222, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D (A/T), 1st (M/T) position and wait at least 3 seconds.
3. Set shift lever to P or N (A/T), Neutral (M/T) position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.

Is DTC detected?

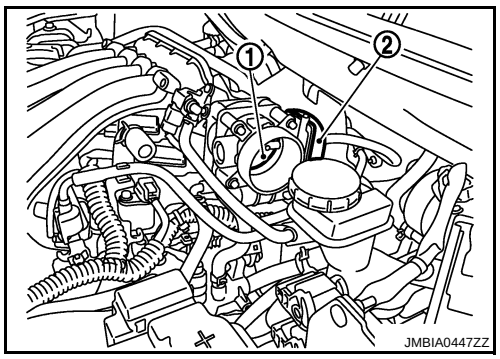
YES >> Go to EC-222, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670989

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-223, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001670990

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

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

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

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

>> END

P1122 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:0000000001670991

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:0000000001670992

DTC DETECTION LOGIC

NOTE:
If DTC P1122 is displayed with DTC P1121 or P1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-228, "DTC Logic" or EC-222, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122	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 11V when engine is running.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-224, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001670993

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F10	2	F16	108	Ignition switch OFF	Approx. 0V
				Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 3.

3.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

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

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F10	15	E16	108	Battery voltage

Is the inspection result normal?

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

4.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

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

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E46	46	F10	15	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 E8, F8
- Harness for open or short between ECM and IPDM E/R

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

6.CHECK FUSE

1. Disconnect 15A fuse (No. 52) from IPDM E/R.
2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace 15A fuse.

7.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-III

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

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E43	8	F10	2	Existed

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

Is the inspection result normal?

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

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

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

9. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

10. 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	
F7	5	F10	1	Not existed
			4	Existed
	6		1	Existed
			4	Not existed

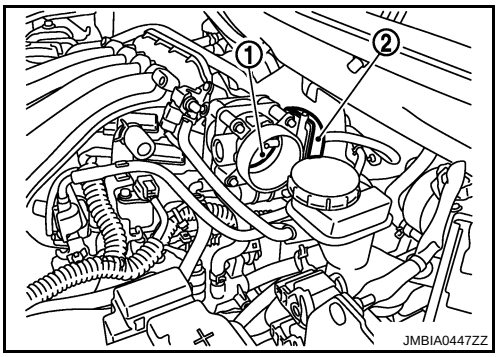
5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. 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

Is the inspection result normal?

YES >> GO TO 12.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

12. CHECK THROTTLE CONTROL MOTOR

Refer to EC-227, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 14.

13. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair or replace harness or connectors.

14. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunction electric throttle control actuator.
2. Go to EC-227, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000001670994

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
5 and 6	Approx. 1 - 15 Ω [at 25 °C (77°F)]

Is the inspection result normal?

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

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-227, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001670995

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

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

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

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

>> END

P1124, P1126 THROTTLE CONTROL MOTOR RELAY

Description

INFOID:0000000001670996

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:0000000001670997

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124	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
P1126	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?

P1126 >> GO TO 2.
P1124 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1126

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

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

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1124

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

Is DTC detected?

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

Diagnosis Procedure

INFOID:0000000001670998

1.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

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

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F10	15	E16	108	Battery voltage

Is the inspection result normal?

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

2.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

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

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E46	46	F10	15	Existed

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

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

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

4.CHECK FUSE

1. Disconnect 15A fuse (No. 52) from IPDM E/R.
2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace 15A fuse.

5.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F10	2	E16	108	Ignition switch OFF	Approx. 0V
				Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 6.

6.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	
E43	8	F10	2	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 E8, F8
- Harness for open or short between ECM and IPDM E/R

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

8. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

P1128 THROTTLE CONTROL MOTOR

Description

INFOID:0000000001670999

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:0000000001671000

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1128	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	• Harness or connectors (Throttle control motor circuit is shorted.) • Electric throttle control actuator (Throttle control motor)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

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

Diagnosis Procedure

INFOID:0000000001671001

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect electric throttle control actuator harness connector.
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	
F7	5	F10	1	Not existed
			4	Existed
	6		1	Existed
			4	Not existed

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

Is the inspection result normal?

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

3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-232, "Component Inspection".

Is the inspection result normal?

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

4.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

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

5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-232, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000001671002

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
5 and 6	Approx. 1 - 15 Ω [at 25 °C (77°F)]

Is the inspection result normal?

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

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-232, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001671003

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

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

>> GO TO 2

2.PERFORM IDLE AIR VOLUME LEARNING

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

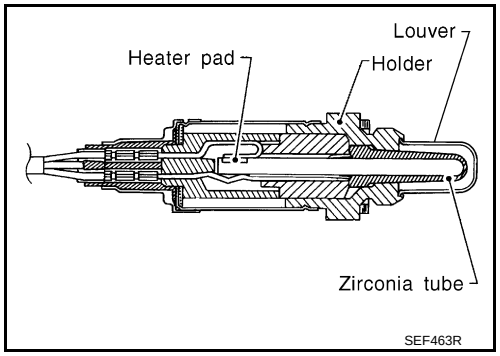
>> END

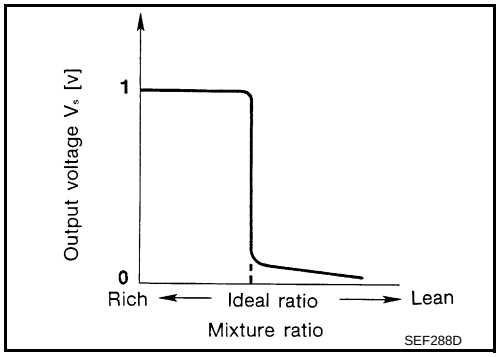
P1143 HO2S1

Description

INFOID:0000000001671004

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



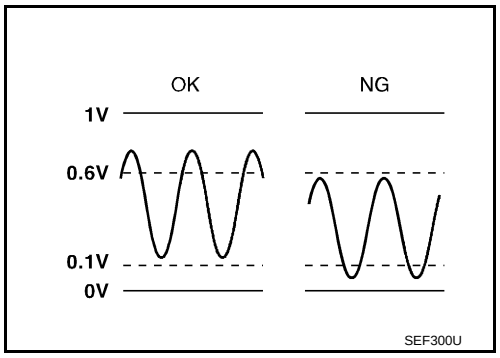


DTC Logic

INFOID:0000000001671005

DTC DETECTION LOGIC

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1143	Heated oxygen sensor 1 lean shift monitoring	The maximum and minimum voltage from the sensor are not reached to the specified voltages.	• Heated oxygen sensor 1 • Heated oxygen 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:

Always perform at a temperature above -10°C (14°F)

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 3.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P1143” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.
   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	1,375 - 2,600 rpm
VHCL SPEED SE	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	3.7 - 10.0 msec
Shift lever	Suitable position

   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Touch “SELF-DIAG RESULT”

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-234, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

With GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM harness connector terminals as follows under the following condition.

ECM		Ground		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Engine speed held at 2,000 rpm constant under no load	• The maximum voltage is over 0.6 at least 1 time. • The minimum voltage is over 0.1 at least 1 time.

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-234, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001671006

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1. Refer to EM-159, "Removal and Installation".

>> GO TO 3.

3. CLEAR THE SELF-LEARNING DATA

1. Clear mixture ratio self-learning value, refer to EC-29, "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 detected or difficult to start engine?

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-179, "DTC Logic".
No >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-164, "Component Inspection".

Is inspection result normal?

YES >> GO TO 5.
NO >> Replace heated oxygen sensor 1.

5. CHECK INTERMITTENT INCIDENT

Perform GI-55, "Intermittent Incident".

Is the inspection result normal?

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

6. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

>> INSPECTION END

Component Inspection

INFOID:0000000001671007

1. INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

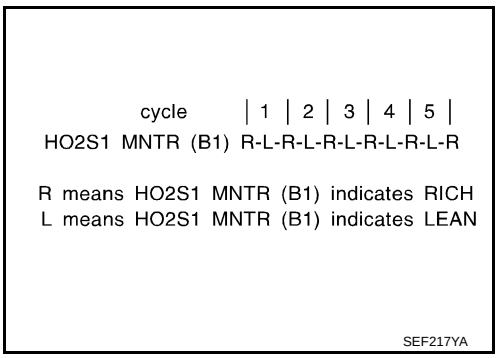
YES >> GO TO 2.
NO >> GO TO 3.

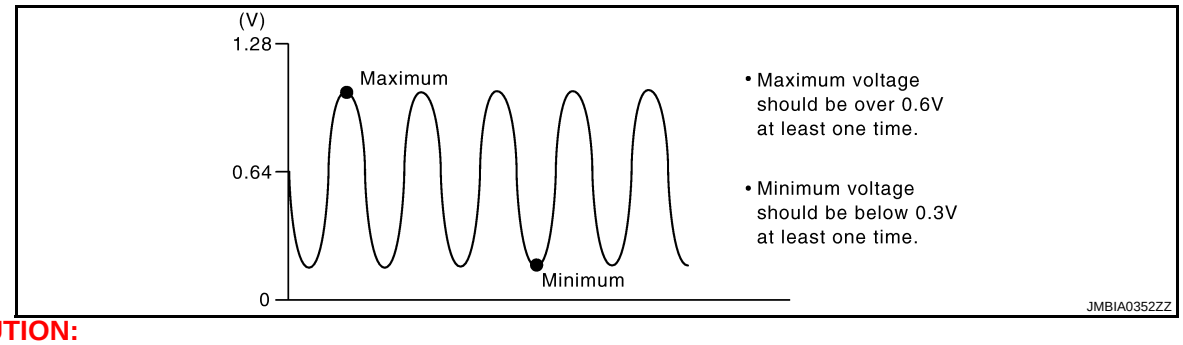
2. CHECK HEATED OXYGEN SENSOR 1

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.

6. Check the following.
- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.





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.**

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

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.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

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.**

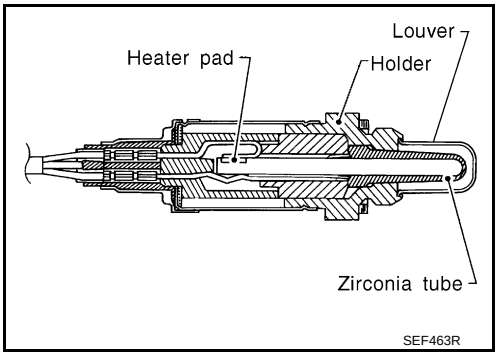
>> INSPECTION END

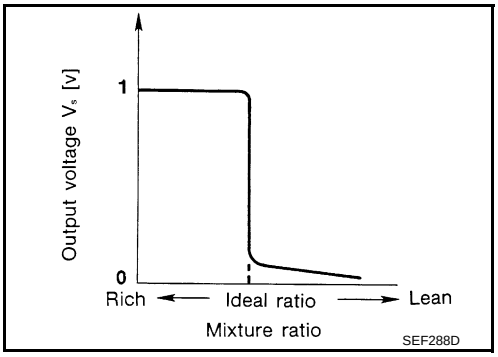
P1144 HO2S1

Description

INFOID:0000000001671008

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



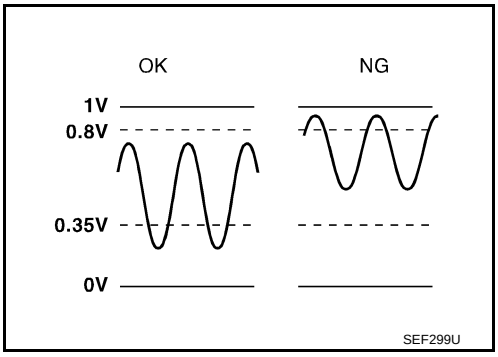


DTC Logic

INFOID:0000000001671009

DTC DETECTION LOGIC

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high and “lean” output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1144	Heated oxygen sensor 1 rich shift monitoring	The maximum and minimum voltages from the sensor are beyond the specified voltages.	• Heated oxygen sensor 1 • Heated oxygen sensor 1 heater • Fuel pressure • Fuel injector

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Always perform at a temperature above -10°C (14°F).

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 3.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P1144” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.
   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	1,375 - 2,600 rpm
VHCL SPEED SE	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	3.7 - 10.0 msec
Shift lever	Suitable position

   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Touch “SELF-DIAG RESULT”

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-239, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

With GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Engine speed held at 2,000 rpm constant under no load	• The maximum voltage is over 0.8 at least 1 time. • The minimum voltage is over 0.35 at least 1 time.

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-239, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001671010

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1. Refer to EM-159, "Removal and Installation".

>> GO TO 3.

3.CLEAR THE SELF-LEARNING DATA

1. Clear the mixture ratio self-learning value, refer to EC-29, "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 or difficult to start engine?

Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-179, "DTC Logic".
No >> GO TO 4

4.CHECK HO2S1 CONNECTOR FOR WATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. 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 1 HEATER

Refer to EC-164, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace heated oxygen sensor 1.

6.CHECK HEATED OXYGEN SENSOR 1

Refer to EC-150, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace heated oxygen sensor 1.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001671011

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

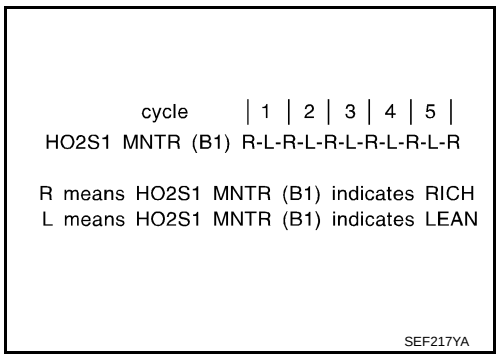
YES >> GO TO 2.
NO >> GO TO 3.

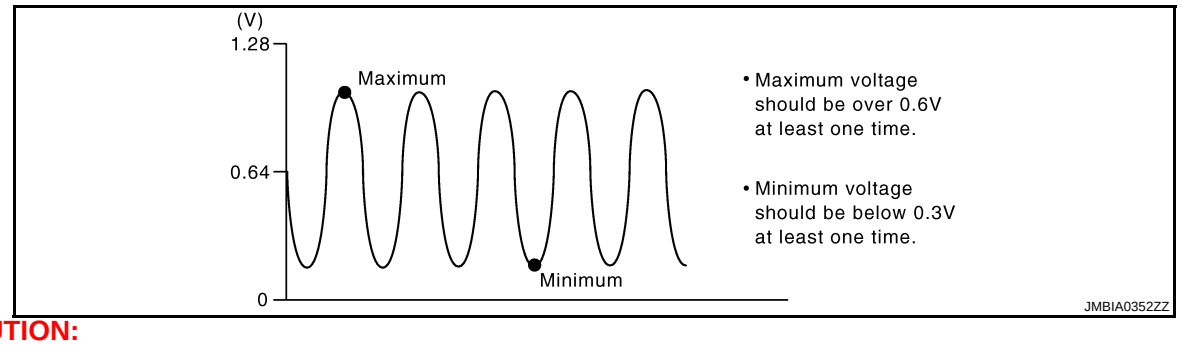
2.CHECK HEATED OXYGEN SENSOR 1

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.

6. Check the following.
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.





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.**

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Engine speed held at 2,000 rpm constant under no load	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

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.**

Is the inspection result normal?

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

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

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.**

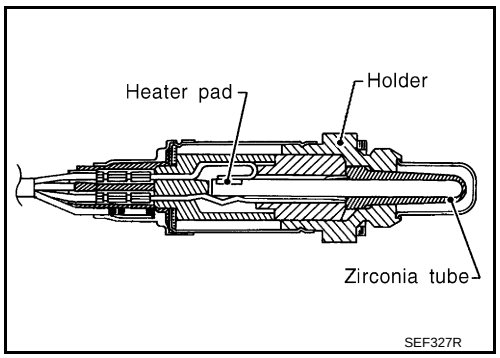
>> INSPECTION END

P1146 HO2S2

Description

INFOID:0000000001671012

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 heated oxygen 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.

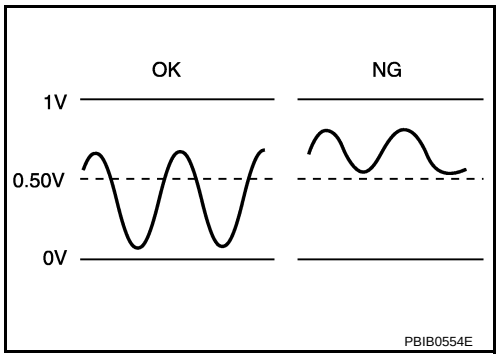


DTC Logic

INFOID:0000000001671013

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of the sensor is sufficiently low during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146	Heated oxygen sensor 2 minimum voltage monitoring	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 • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 11.

2.PRECONDITIONING

"COMPLETED" will appear on CONSULT-III screen when all tests "COND1", "COND2" and "COND3" are completed.
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **For 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 3.

3. PERFORM PROCEDURE FOR COND1-I

Start engine and warm it up to normal operating temperature.

>> GO TO 4.

4. PERFORM PROCEDURE FOR COND1-II

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 5.

5. 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 9.
NO >> GO TO 6.

6. 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 4.
COND1: COMPLETED COND2: INCOMPLETED>>GO TO 7.
COND1: COMPLETED COND2: COMPLETED>>GO TO 8.

7. 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 8.
COND2: COMPLETED COND3: COMPLETED>>GO TO 9.

8. 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 9.

9. PERFORM PROCEDURE FOR COND3-I

Touch “SELF DIAGRESULTS”.

Which displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-246, "Diagnosis Procedure".

CAN NOT BE DIAGNOSED>>GO TO 10.

10. 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.

11. PREFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-245, "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 EC-246, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001671014

1. PERFORM COMPONENT FUNCTION CHECK-I

With GST

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

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	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.

Is the inspection result normal?

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

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure.

Is the inspection result normal?

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

3. PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	Coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure.

Always drive vehicle at a safe speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-246, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001671015

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.CLEAR THE SELF-LEARNING DATA

1. Clear mixture ratio self-learning value, refer to EC-29, "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 EC-183, "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	
F13	1	F11	59	Existed

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

Is the inspection result normal?

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

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	4	F11	50	Existed

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

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F13	4	F11	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

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

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-247, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001671016

1. INSPECTION START

Do you have CONSULT-III?

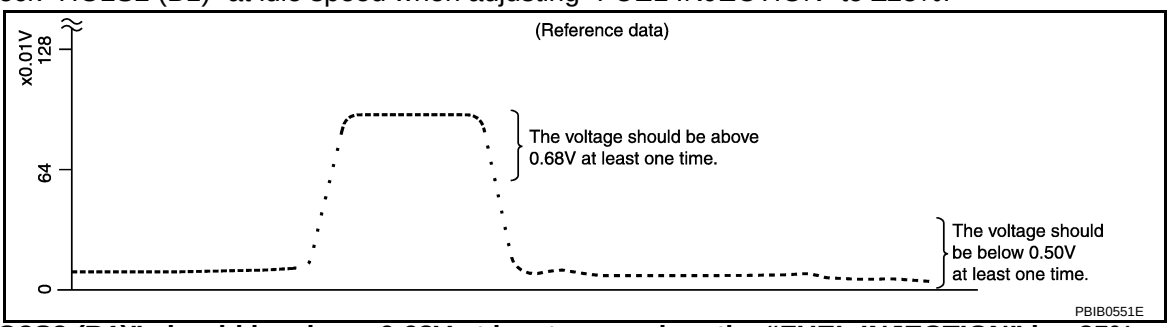
Do you have CONSULT-III?

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 0.50V 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			
F11	50 (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 0.50V 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			
F11	50 (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 0.50V 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			
F11	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Always drive vehicle at a safe speed.

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.**

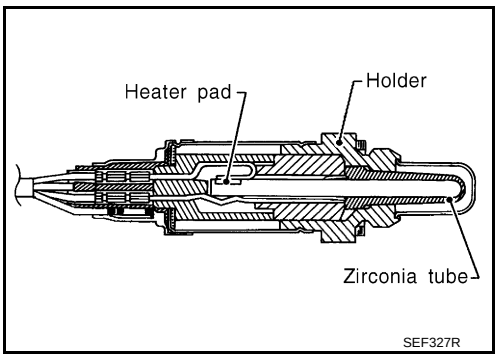
>> INSPECTION END

P1147 HO2S2

Description

INFOID:0000000001671017

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 heated oxygen 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.

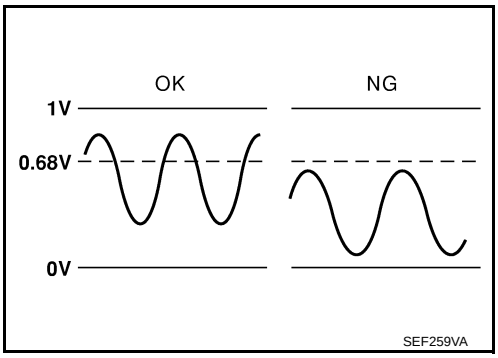


DTC Logic

INFOID:0000000001671018

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146	Heated oxygen sensor 2 circuit low voltage	The maximum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 11.

2.PRECONDITIONING

"COMPLETED" will appear on CONSULT-III screen when all tests "COND1", "COND2" and "COND3" are completed.
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **For 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 3.

3. PERFORM PROCEDURE FOR COND1-I

Start engine and warm it up to normal operating temperature.

>> GO TO 4.

4. PERFORM PROCEDURE FOR COND1-II

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 5.

5. 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) P1147” 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 9.
NO >> GO TO 6.

6. 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 4.
COND1: COMPLETED COND2: INCOMPLETED>>GO TO 7.
COND1: COMPLETED COND2: COMPLETED>>GO TO 8.

7. 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 8.
COND2: COMPLETED COND3: COMPLETED>>GO TO 9.

8. 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 9.

9. PERFORM PROCEDURE FOR COND3-I

Touch “SELF DIAGRESULTS”.

Which displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-253, "Diagnosis Procedure".

CAN NOT BE DIAGNOSED>>GO TO 10.

10.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.

11.PREFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-245, "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 EC-253, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001671019

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

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

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	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.

Is the inspection result normal?

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

2.PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure.

Is the inspection result normal?

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

3.PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	Coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure.

Always drive vehicle at a safe speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-253, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001671020

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.CLEAR THE SELF-LEARNING DATA

1. Clear mixture ratio self-learning value, refer to EC-29, "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 EC-183, "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	
F13	1	F11	59	Existed

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

Is the inspection result normal?

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

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	4	F11	50	Existed

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

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F13	4	F11	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-247, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001671021

1. INSPECTION START

Do you have CONSULT-III?

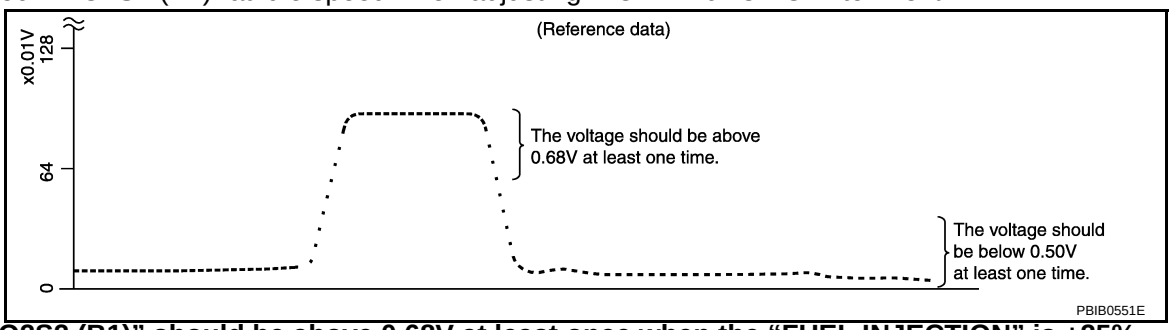
Do you have CONSULT-III?

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 0.50V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.

3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	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 0.50V at least once during this procedure.

Is the inspection result normal?

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

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	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 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	Coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Always drive vehicle at a safe speed.

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

P1212 TCS COMMUNICATION LINE

Description

INFOID:0000000001671026

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:0000000001671027

DTC DETECTION LOGIC

NOTE:
- **If DTC P1212 is displayed with DTC U1000 U1001, first perform the trouble diagnosis for DTC U1000 U1001. Refer to EC-128, "DTC Logic".**
- **If DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-129, "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 10.5V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Go to EC-256, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001671028

Go to BRC-86, "Work Flow".

P1217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000001677294

DTC DETECTION LOGIC

NOTE:

- **If DTC P1217 is displayed with DTC U1000 U1001, first perform the trouble diagnosis for DTC U1000 U1001. Refer to EC-128, "DTC Logic".**
- **If DTC P1217 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-129, "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 relay-1, -2, -3) • Cooling fan motor • Radiator hose • Radiator • Radiator cap • Reservoir tank • Water pump • Thermostat

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to CO-11, "Inspection". Also, replace the engine oil. Refer to LU-7, "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-20, "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 EC-257, "Component Function Check".

NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-258, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001677295

1.PERFORM COMPONENT FUNCTION CHECK-I

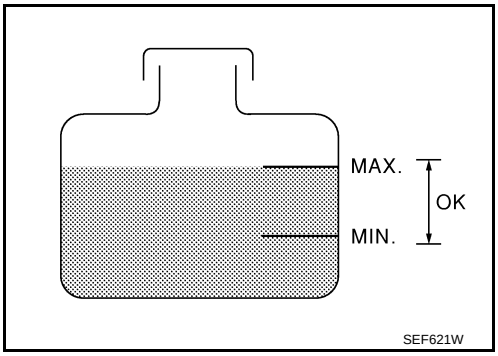
WARNING:

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 EC-258, "Diagnosis Procedure".
NO >> GO TO 2.



2.PERFORM COMPONENT FUNCTION CHECK-II

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

YES >> Go to EC-258, "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 motor operate at each speed (LOW/HI).

Without CONSULT-III
Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PCS-10, "Diagnosis Description".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-258, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001677296

1.INSPECTION START

Do you have CONSULT-III?

Yes or No

Yes >> GO TO 2.
No-1 >> With A/C models: GO TO 4.
No-2 >> Without A/C models: GO TO 5

2.CHECK COOLING FAN LOW SPEED OPERATION

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 fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check cooling fan control circuit. Refer to EC-307, "Diagnosis Procedure".

3.CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-III
1. Touch “HIGH” on the CONSULT-III screen.
2. Make sure that cooling fan operates at higher speed than low speed.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check cooling fan control circuit. Refer to EC-307, "Diagnosis Procedure".

4. CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT-III

1. Start engine and let it idle.
2. Turn air conditioner switch ON.
3. Turn blower fan switch ON.
4. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check cooling fan speed control circuit. Refer to EC-307, "Diagnosis Procedure".

5. CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT-III

1. Perfom IPDM E/R auto active test and check cooling fan motor operation. Refer to PCS-10, "Diagnosis Description".
2. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check cooling fan speed control circuit. Refer to EC-307, "Diagnosis Procedure"

6. CHECK COOLING FAN HIGH SPEED OPERATION.

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 >> GO TO 7.
NO >> Check cooling fan speed control circuit. Refer to EC-307, "Diagnosis Procedure".

7. CHECK COOLING SYSTEM FOR LEAK

Check cooling system for leak. Refer to CO-11, "Inspection".

Is leakage detected?

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

8. DETECT MALFUNCTIONING PART

Check the following for leak. Refer to CO-11, "Inspection".

- Hose
- Radiator
- Water pump
- Reservoir tank

>> Repair or replace.

9. CHECK RESERVOIR TANK CAP

Check radiator cap. Refer to CO-14, "Checking Radiator Cap".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace radiator cap.

10. CHECK THERMOSTAT

Check thermostat.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace thermostat.

11. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor.

Is the inspection result normal?

OK >> GO TO 12.
NG >> Replace engine coolant temperature sensor.

12. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, check the following.

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	MA-20, "SAE Viscosity Number"
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-11, "Inspection"
	4	• Reservoir tank cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 bar, 0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	CO-14, "Checking Radiator Cap"
ON*2	5	• Coolant leaks	• Visual	No leaks	CO-11, "Inspection"
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	CO-22, "Removal and Installation"
ON*1	7	• Cooling fan motor	• CONSULT-III	Operating	EC-307, "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-11, "Inspection"
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	CO-11, "Inspection"
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-80, "Removal and Installation"
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	EM-108, "Inspection"

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to CO-6, "Troubleshooting Chart".

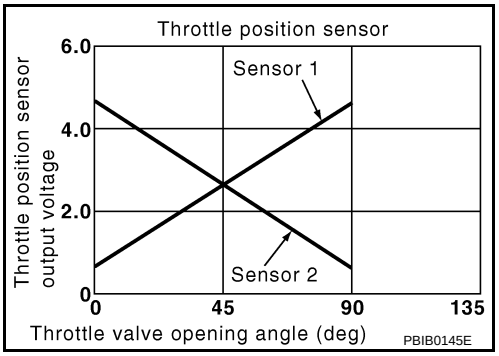
>> INSPECTION END

P1225 TP SENSOR

Description

INFOID:0000000001671032

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:0000000001671033

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 EC-261, "Diagnosis Procedure".
NO >> INSPECTION END

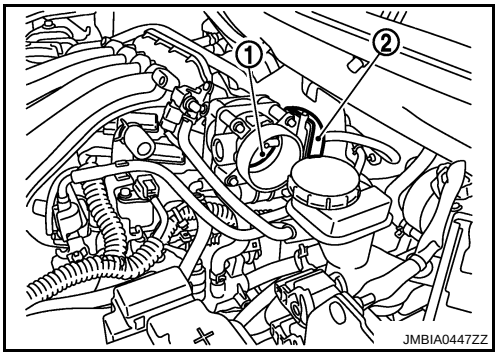
Diagnosis Procedure

INFOID:0000000001671034

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-262, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001671035

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

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

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

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

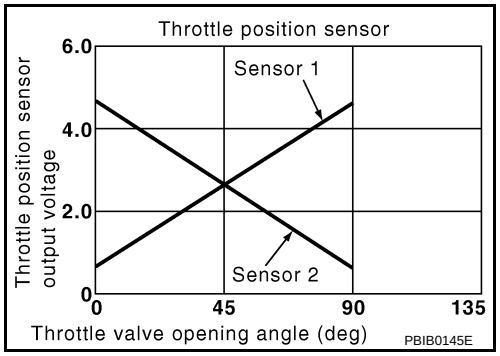
>> END

P1226 TP SENSOR

Description

INFOID:0000000001671036

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:0000000001671037

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF, wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 2 and 3 for 32 times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-263, "Diagnosis Procedure".
NO >> INSPECTION END

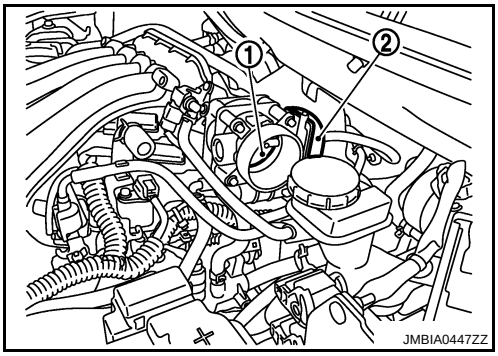
Diagnosis Procedure

INFOID:0000000001671038

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-262, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001671039

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

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

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

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

>> END

P1229 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000001671040

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	• Harness or connectors (APP sensor 1 circuit is shorted.) (TP sensor circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] • Accelerator pedal position sensor (APPS 1) • Throttle position sensor • Camshaft position sensor (PHASE)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to EC-265, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001671041

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E12 (LHD models) M204 (RHD models)	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUITS

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

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F11	72	Electric throttle control actuator	F7	1
	78	CMP sensor (PHASE)	F21	1
E16	106	APP sensor	E12 (LHD models) M204 (RHD models)	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 COMSHAFT POSITION SENSOR

Refer to EC-203, "Component Inspection".

Is the inspection result normal?

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

5.CHECK TP SENSOR

Refer to EC-296, "Component Inspection".

Is the inspection result normal?

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

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-296, "Component Inspection".

>> INSPECTION END

7.CHECK APP SENSOR

Refer to EC-288, "Component Inspection".

Is the inspection result normal?

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

8.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-26, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

9.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

P1564 ASCD STEERING SWITCH

Description

INFOID:0000000001671042

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.
Refer to EC-61, "System Diagram" for the ASCD function.

DTC Logic

INFOID:0000000001671043

DTC DETECTION LOGIC

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-215, "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 EC-267, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001671044

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-III
1. Turn ignition switch ON.

2. Select “MAIN SW”, “CANCEL SW”, “RESUME/ACC SW” and “SET SW” in “DATA MONITOR” mode with CONSULT-III.
3. Check each item indication under the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF
RESUME/ACC SW	RESUME/ACCELERATE switch	Pressed	ON
		Released	OFF
SET SW	SET/COAST switch	Pressed	ON
		Released	OFF

Without CONSULT-III
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
E16	94 (ASCD steering switch signal)	E16	95	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 M30.
4. Check the continuity between combinarion switch and ECM harness connector.

Combination switch	ECM		Continuity
Terminal	Connector	Terminal	
15	E16	95	Existed

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

Is the inspection result normal?

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

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- 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	
14	E16	94	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 M69, E7
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

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

7. CHECK ASCD STEERING SWITCH

Refer to EC-269, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001671045

1. CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector.
2. Check the continuity between combination switch harness connector terminals under following conditions.

Combination meter		Condition	Resistance
Connector	Terminals		
M30	14 and 15	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:0000000001671184

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-61, "System Description" for the ASCD function.

DTC Logic

INFOID:0000000001671185

DTC DETECTION LOGIC

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-215, "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. Start engine.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Press MAIN switch and make sure that CRUISE indicator is displayed in combination meter.
4. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

   CAUTION:

   Always drive vehicle at a safe speed.

   NOTE:

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

VHCL SPEED SE	More than 30 km/h (19 mph)
Shift lever	Suitable position

5. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Go to EC-271, "Diagnosis Procedure".
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-II

1. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than 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 EC-271, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001671186

1. CHECK OVERALL FUNCTION-I

With CONSULT-III

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BRAKE SW1” indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal and/or clutch pedal	Slightly depressed	OFF
	Brake pedal and clutch pedal	Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminal as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E16	100 (ASCD brake switch signal)	E16	108	Brake pedal and/or clutch pedal	Slightly depressed	Approx. 0V
				Brake pedal and clutch pedal	Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO-1 >> A/T models: GO TO 3.

NO-1 >> M/T models: GO TO 8.

2.CHECK OVERALL FUNCTION-II

With CONSULT-III

Select “BRAKE SW2” and check indication in “DATA MONITOR” mode.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal	Slightly depressed	ON
		Fully released	OFF

Without CONSULT-III

Check the voltage between ECM harness connector terminal as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E16	99 (Stop lamp switch signal)	E108	108	Brake pedal	Slightly depressed	Battery voltage
					Fully released	Approx. 0V

Is the inspection result normal?

YES >> GO TO 21.
NO >> GO TO 16.

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		
E36 (LHD models) M205 (RHD models)	1	Ground	Battery voltage

Is the inspection result normal?

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

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E7, M69 (LHD models)
- Harness connectors M25, M201 (RHD models)
- 10A fuse (No.2)
- Harness for open or short between ASCD brake switch and fuse

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

5.CHECK ASCD 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	
E36 (LHD models) M205 (RHD models)	2	E16	100	Existed

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

Is the inspection result normal?

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

6. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector M25, M201, M69, E7 (RHD models)
- Harness for open or short between ASCD brake switch and ECM

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

7. CHECK ASCD BRAKE SWITCH

Refer to EC-275, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 21.
NO >> Replace ASCD brake switch.

8. 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				
E35 (LHD models) M206 (RHD models)	1	Ground	Brake pedal	Slightly depressed	Approx. 0
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 9.

9. 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		
E36 (LHD models) M205 (RHD models)	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector E7, M69 (LHD models)
- Junction block connector M25, M201 (RHD models)
- 10A fuse (No.2)
- Harness for open or short between ASCD brake switch and fuse

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

11. 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	
E36 (LHD models) M205 (RHD models)	2	E35 (LHD models) M206 (RHD models)	1	Existed

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

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK ASCD BRAKE SWITCH

Refer to EC-275, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 21.
NO >> Replace ASCD brake switch.

13. 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	
E16	100	E35 (LHD models) M206 (RHD models)	2	Existed

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

Is the inspection result normal?

YES >> GO TO 15.
NO >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector M25, M201, M69, E7 (RHD models)
- Harness for open or short between ASCD brake switch and ECM

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

15. CHECK ASCD CLUTCH SWITCH

Refer to EC-276, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 21.
NO >> Replace ASCD clutch switch.

16. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E13 (LHD models)) M203 (RHD models)	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 18.
NO >> GO TO 17.

17. DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No.7)
- Junction block connector E7, M69 (LHD models)
- Junction block connector M25, M201 (RHD models)
- 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.

18. 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	
E16	99	E13 (LHD models) M203 (RHD models)	2	Existed

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

Is the inspection result normal?

YES >> GO TO 20.
NG >> GO TO 19.

19. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector M25, M201, M69, E7 (RHD models)
- 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.

20. CHECK STOP LAMP SWITCH

Refer to EC-276, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 21.
NO >> Replace stop lamp switch.

21. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000001671187

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-6, "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:0000000001671188

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, "On-vehicle 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:0000000001671189

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-6, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

P1574 ASCD VEHICLE SPEED SENSOR

Description

INFOID:0000000001671052

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-61, "System Diagram" for ASCD functions.

DTC Logic

INFOID:0000000001671053

DTC DETECTION LOGIC

NOTE:

- **If DTC P1574 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-128, "DTC Logic".**
- **If DTC P1574 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-129, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-213, "DTC Logic"**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-215, "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 • 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.
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 EC-278, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001671054

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-32, "OBD Diagnostic Trouble Code (DTC)".

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-25, "CONSULT-III Function (ABS)" (with ABS) or BRC-105, "CONSULT-III Function (ABS)" (with ABS/TCS/ESP).

Is the inspection result normal?

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

3. CHECK COMBINATION METER

Check combination meter function.
Refer to MWI-22, "CONSULT-III Function (METER/M&A)".

>> INSPECTION END

P1706 PNP SWITCH

Description

INFOID:0000000001671055

When the shift lever position is P or N (A/T), Neutral (M/T) position, park/neutral position (PNP) switch is ON. ECM detects the position because the continuity of the line (the ON signal) exists.

DTC Logic

INFOID:0000000001671056

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
P or N position (A/T) Neutral position (M/T)	ON
Except above position	OFF

Is the inspection result normal?

YES >> GO TO 4.
NO >> Go to EC-281, "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	A/T: 1,650 - 6,375 rpm M/T: 1,925 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)

B/FUEL SCHDL	A/T: 3.5 - 31.8 msec M/T: 2.5 - 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 EC-281, "Diagnosis Procedure".
NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-281, "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 EC-281, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001671057

1. PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminal as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
F11	69 (PNP switch signal)	E16	108	Shift lever	P or N (A/T) Neutral (M/T)	Approx. 0V
					Except above	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-281, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001671058

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		
F24 (M/T)	2	Ground	Battery voltage
F25 (A/T)	1		

Is the inspection result normal?

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

2. DTECTED MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- 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

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	
F24 (M/T)	3	F11	69	Existed
F25 (A/T)	2			

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.

4. CHECK PNP SWITCH

Refer to TM-621, "PARK/NEUTRAL POSITION (PNP) SWITCH : Component Inspection" (M/T) or TM-46, "Component Inspection" (A/T).

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace PNP switch.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

P1805 BRAKE SWITCH

Description

INFOID:0000000001671059

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:0000000001671060

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 EC-283, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001671061

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 the inspection result normal?

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		
E13 (LHD models) M203 (RHD models)	1	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 M69, E7 (LHD models)
- Harness connectors M201, M25 (RHD models)
- Harness for open or short between stop lamp switch and fuse

>> 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	
E16	99	E13 (LHD models) M203 (RHD models)	2	Existed

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 connectors M201, M25, M69, E7 (RHD models)
- Harness for open or short between ECM and stop lamp switch

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

6.CHECK STOP LAMP SWITCH

Refer to EC-284, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Stop Lamp Switch)

INFOID:0000000001671062

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-6, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

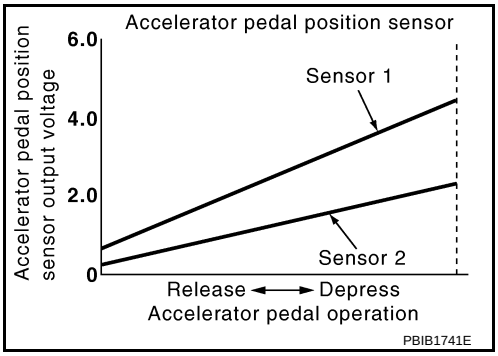
YES >> INSPECTION END
NO >> Replace stop lamp switch.

P2122, P2123 APP SENSOR

Description

INFOID:0000000001671063

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:0000000001671064

DTC DETECTION LOGIC

NOTE:
If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-265, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	• Harness or connectors (APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)
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 EC-286, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001671065

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
E12 (LHD models) M204 (RHD models)	4	Ground	Approx. 5V

Is the inspection result normal?

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

3.DETECT MALFUNCTIONGN PART

Check the following.
- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

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

4.CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12 (LHD models) M204 (RHD models)	2	E16	111	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 MALFUNCTIONGN PART

Check the following.
- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

>> 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	
E12 (LHD models) M204 (RHD models)	3	E16	110	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 MALFUNCTIONGN PART

Check the following.
- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

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

8.CHECK APP SENSOR

Refer to EC-288, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-288, "Special Repair Requirement".

>> INSPECTION END

10.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001671066

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			
E16	110 (APP sensor 1 signal)	E16	111	Accelerator pedal	Fully released	0.6 - 0.9V
					Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)		104		Fully released	0.3 - 0.6V
					Fully depressed	1.95 - 2.4V

Is the inspection result normal?

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

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-288, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001671067

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-26, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

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

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

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

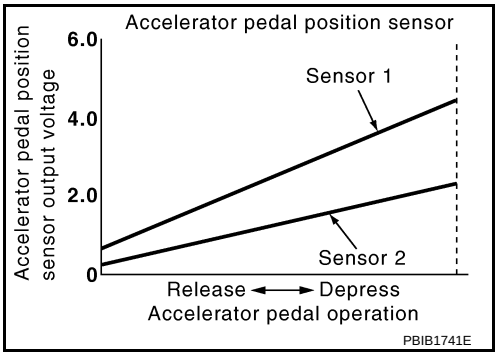
>> END

P2127, P2128 APP SENSOR

Description

INFOID:0000000001671068

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:0000000001671069

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.] (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor
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 EC-290, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001671070

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
E12 (LHD models) M204 (RHD)	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	
E12 (LHD models) M204 (RHD models)	5	E16	102	Existed

Is the inspection result normal?

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

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

>> Repair open circuit or short to ground or short 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	Item	Connector	Terminal
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
E16	102	APP sensor	E12 (LHD models) M204 (RHD models)	5

Is the inspection result normal?

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

6.DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

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

7.CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-200, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-326, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 14.
NO >> Replace malfunctioning component.

8.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	
E12 (LHD models) M204 (RHD models)	1	E16	104	Existed

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

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9.DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

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

10.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12 (LHD models) M204 (RHD models)	6	E16	103	Existed

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

Is the inspection result normal?

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

11.DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E7, M69, M25, M201.
- Harness for open or short between ECM and APP sensor.

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

12.CHECK APP SENSOR

Refer to EC-293, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.
NO >> GO TO 13.

13. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-293, "Special Repair Requirement".

>> INSPECTION END

14. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001671071

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

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

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E16	110 (APP sensor 1 signal)	E16	111	Accelerator pedal	Fully released	0.6 - 0.9V
					Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)		104		Fully released	0.3 - 0.6V
					Fully depressed	1.95 - 2.4V

Is the inspection result normal?

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

2. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-293, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001671072

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-26, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

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

>> GO TO 3.

3. PERFORM IDLE AIR VOLUME LEARNING

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

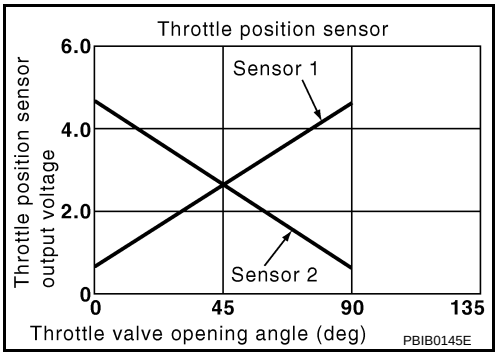
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P2135 TP SENSOR

Description

INFOID:0000000001671073

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:0000000001671074

DTC DETECTION LOGIC

NOTE:
If DTC P2135 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-265, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	• Harness or connector (TP sensor 1 and 2 circuit is open or shorted.) • 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 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 EC-294, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001671075

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
F7	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	
F7	1	F11	72	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit.

4. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	4	F11	36	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 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	
F7	2	F11	33	Existed
	3		34	

2. 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

Refer to EC-296, "Component Inspection".

Is the inspection result normal?

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

7.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. EC-296, "Special Repair Requirement"

>> INSPECTION END

8.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001671076

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-296, "Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to D (A/T), 1st (M/T) position.
6. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
F11	33 (TP sensor 1 signal)	F11	36	Accelerator pedal	Fully released	More than 0.36V
					Fully depressed	Less than 4.75V
	34 (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 EC-296, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001671077

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

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

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

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

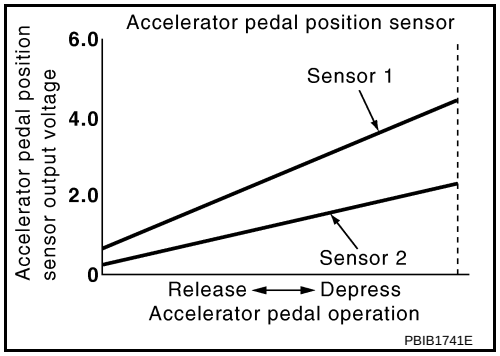
>> END

P2138 APP SENSOR

Description

INFOID:0000000001671078

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:0000000001671079

DTC DETECTION LOGIC

NOTE:
If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-265, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal position sensor circuit range/ performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	• Harness or connector (APP sensor 1 and 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2) • Crankshaft position sensor (POS) • 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 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to EC-297, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001671080

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
E12 (LHD models) M204 (RHD models)	4	Ground	Approx. 5V

Is the inspection result normal?

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

3.DETECT MALFUNCTINING PART

- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

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

4.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		
E12 (LHD models) M204 (RHD models)	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 5.

5.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12 (LHD models) M204 (RHD models)	5	E16	102	Existed

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO6.

6.DETECT MALFUNCTINING PART

- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

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

7.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	Item	Connector	Terminal
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
E16	102	APP sensor	E12 (LHD models) M204 (RHD models)	5

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair short to ground or short to power in harness or connectors.

8.CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-200, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-326, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace malfunctioning component.

9.CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
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	
E12 (LHD models) M204 (RHD models)	2	E16	111	Existed
	1		104	

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 shot to power in harness or connectors.

10.DETECT MALFUNCTINING PART

- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

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

11.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12 (LHD models) M204 (RHD models)	3	E16	110	Existed
	6		103	

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

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 12.

12.DETECT MALFUNCTINING PART

- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

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

13.CHECK APP SENSOR

Refer to EC-300, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> GO TO 14.

14.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-300, "Special Repair Requirement".

>> INSPECTION END

15.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001671081

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			
E16	110 (APP sensor 1 signal)	E16	111	Accelerator pedal	Fully released	0.6 - 0.9V
					Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)		104		Fully released	0.3 - 0.6V
					Fully depressed	1.95 - 2.4V

Is the inspection result normal?

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

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-300, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001671082

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-26, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

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

>> GO TO 3.

3. PERFORM IDLE AIR VOLUME LEARNING

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

>> END

ASCD BRAKE SWITCH

Description

INFOID:0000000001671083

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-61, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000001671084

1.CHECK FOR ASCD BRAKE SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BRAKE SW1” indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal and/or clutch pedal	Slightly depressed	OFF
	Brake pedal and clutch pedal	Fully released	ON

Without CONSULT-III

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

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	100 (ASCD brake switch signal)	Ground	Brake pedal and/or clutch pedal	Slightly depressed	Approx. 0V
			Brake pedal and clutch pedal	Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-302, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001671085

1.CHECK OVERALL FUNCTION-I

Check which type of transmission the vehicle is equipped with.

Is the inspection result normal?

A/T >> 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		
E36 (LHD models) M205 (RHD models)	1	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 M69, E7 (LHD models)
- Harness connectors M25, M201 (RHD models)
- 10A fuse (No. 2)
- Harness for open or short between ASCD brake switch and fuse

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

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	
E36 (LHD models) M205 (RHD models)	2	E16	100	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 EC-305, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD brake switch.

6. CHECK ASCD CLUCH SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD cluch switch harness connector.
3. Turn ignition switch ON.
4. Check the continuity between ASCD cluch switch harness connector and ground.

ASCD cluch switch		Ground	Condition		Voltage (V)
Connector	Terminal				
E35 (LHD models) M206 (RHD models)	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		
E36 (LHD models) M205 (RHD models)	1	Ground	Battery voltage

Is the inspection result normal?

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

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness connector M69,E7 (LHD models)
- Harness connector M25,M201 (RHD models)
- 10A fuse (No. 2)
- Harness for open or short between ASCD brake switch and fuse

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

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	
E36 (LHD models) M205 (RHD models)	2	E35 (LHD models) M206 (RHD models)	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 EC-275, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD brake switch.

11. CHECK ASCD CLUCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

ASCD cluch switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E35 (LHD models) M206 (RHD models)	2	E16	100	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 EC-276, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000001671086

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-6, "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:0000000001671087

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, "On-vehicle 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:0000000001671088

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.
CRUISE lamp illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.
SET lamp illuminates when following conditions are met.
- CRUISE lamp is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET lamp remains lit during ASCD control.
Refer to EC-61, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000001671089

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 144 km/h (89 MPH)	• ASCD: Operating	ON
		• ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-306, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001671090

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 EC-128, "DTC Logic".

2.CHECK COMBINATION METER OPERATION

Refer to MWI-22, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check combination meter circuit. Refer to MWI-4, "METER SYSTEM : System Diagram".

3.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

COOLING FAN

Description

INFOID:0000000001677297

Cooling fan operates at each speed when the current flows in the cooling fan motor as follows.
Refer to EC-70, "System Diagram" for cooling fan operation.

Component Function Check

INFOID:0000000001677298

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. Refer to EC-307, "Diagnosis Procedure".

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. Perform IPDM E/R auto active test and check cooling fan motors operation.
2. Make sure that cooling fan operates at high speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Check cooling fan high speed control circuit. Refer to EC-307, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001677299

1. CHECK POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the voltage between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Continuity
Connector	Terminal		
E44	22	Ground	Existed

Is the inspection result normal?

YES-2 >> With A/C models: GO TO 3.
YES-2 >> Without A/C models: GO TO 5.
NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- 50A fusible link (letter J) (with A/C models)
- 40A fusible link (letter J) (without A/C models)
- Harness for open or short between IPDM E/R and battery

>> Repair or replace malfunctioning part.

3.CHECK COOLING FAN MOTORS CIRCUIT FOR OPEN AND SHORT

1. Disconnect cooling fan motor harness connector.
2. Check the continuity between IPDM E/R harness connector and cooling fan motor harness connector.

IPDM E/R		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E44	24	E3	1	Existed
E45	30			

3. Check the continuity between cooling fan motor harness connector or IPDM E/R harness connector and ground.

Cooling fan motor		IPDM E/R		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E3	2	E46	59	Ground	Existed
			39		

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

Is the inspection result normal?

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

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground
- Harness for open or short between IPDM E/R and ground
- Resistor E5

>> Repair or replace malfunctioning part.

5.CHECK COOLING FAN MOTORS CIRCUIT FOR OPEN AND SHORT

1. Disconnect cooling fan motor harness connector.
2. Check the continuity between IPDM E/R harness connector and cooling fan motor harness connector.

IPDM E/R		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E44	23	E3	1	Existed
	24		2	
E45	30		3	

3. Check the continuity between cooling fan motor harness connector or IPDM E/R harness connector and ground.

Cooling fan motor		IPDM E/R		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E3	4	E46	59	Ground	Existed
			39		

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

Is the inspection result normal?

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

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground
- Harness for open or short between IPDM E/R and ground

>> Repair or replace malfunctioning part.

7. CHECK GROUND CONNECTION

Check ground connection E24. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

8. CHECK COOLING FAN MOTOR

Refer to EC-309, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace malfunctioning cooling fan motor.

9. CHECK INTERMITTENT INCIDENT

Perform GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connector.

Component Inspection

INFOID:0000000001677300

1. CHECK OVERALL FUNCTION

Check if the vehicle is equipped with an air conditioner.

Is it equipped with an air conditioner?

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

2. CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector.
3. Supply cooling fan motor terminals with battery voltage and check operation.

Terminals		Operation
(+)	(–)	
1	2	Cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan motor.

3. CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector.
3. Supply cooling fan motor terminals with battery voltage and check operation.

Terminals		Operation
(+)	(–)	
1	4	Cooling fan operates at low speed.
2	3	
1 and 2	3 and 4	Cooling fan operates at high speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan motor.

ELECTRICAL LOAD SIGNAL

Description

INFOID:0000000001671096

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:0000000001671097

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 EC-311, "Diagnosis Procedure".

2.CHECK LIGHTING SWITCH FUNCTION

Check “LOAD SIGNAL” indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Lighting switch	ON at 2nd position	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.
NO >> Go to EC-311, "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 EC-311, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001671098

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-311, "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-6, "System Diagram".

>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Refer to EXL-10, "System Diagram" (XENON TYPE) or EXL-8, "System Diagram" (HALOGEN TYPE).

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Refer to HAC-118, "System Description" (without NAVI system) or HAC-232, "System Description" (with NAVI system).

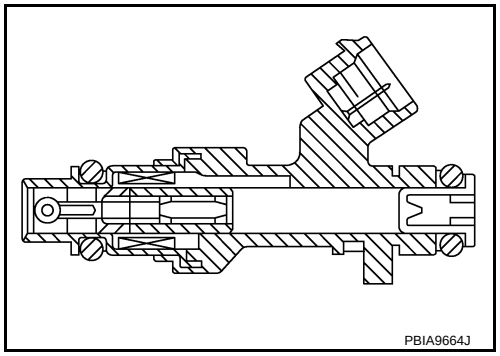
>> INSPECTION END

FUEL INJECTOR

Description

INFOID:0000000001671099

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.


PBIA9664J

Component Function Check

INFOID:0000000001671100

1. INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.
NO >> Go to EC-313, "Diagnosis Procedure".

2. CHECK FUEL INJECTOR FUNCTION

With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

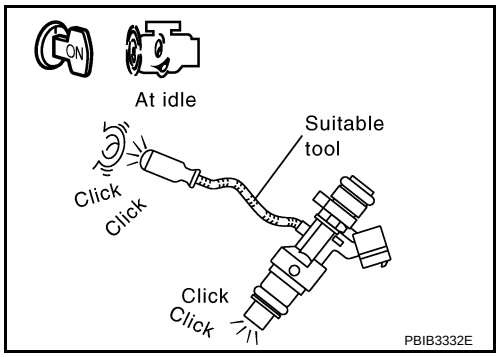
Without CONSULT-III

1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-313, "Diagnosis Procedure".



PBIB3332E

Diagnosis Procedure

INFOID:0000000001671101

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.

Fuel injector			Ground	Voltage
Cylinder	Connector	Terminal		
1	F17	1	Ground	Battery voltage
2	F18	1		
3	F19	1		
4	F20	1		

Is the inspection result normal?

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

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F8, E8
- 10A fuse (No. 55)
- 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.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F17	2	F10	31	Existed
2	F18	2		30	
3	F19	2		29	
4	F20	2		25	

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

Is the inspection result normal?

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

4.CHECK FUEL INJECTOR

Refer to EC-314, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning fuel injector.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001671102

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 [at 10 - 60°C (50 - 140°F)]
1 and 2	11.1 - 14.5Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector.

FUEL PUMP

Description

INFOID:0000000001671103

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 in 1.5 seconds.
Except as shown above	Stops.

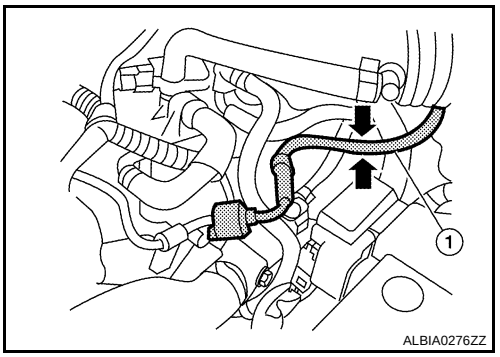
Component Function Check

INFOID:0000000001671104

1.CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.



Is the inspection result normal?

YES >> INSPECTION END
NO >> EC-316, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001671105

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 terminals as follows.

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F10	23	E16	108	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.
3. Check the continuity between IPDM E/R harness connector and ECM harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F10	23	E46	47	Existed

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. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E8, F8.
- Harness for open or short to ground and short power.

>> Repair harness or connectors.

4. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect “fuel level sensor unit and fuel pump” harness connector.
4. Turn ignition switch ON.
5. Check voltage between “fuel level sensor unit and fuel pump” harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage
Connector	Terminal		
B40	1	Ground	Battery voltage should exist 1 second after ignition switch is turn ON.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 5.

5. CHECK 10A FUSE

1. Turn ignition switch OFF.
2. Disconnect 15A fuse (No. 48) from IPDM E/R.
3. Check 15A fuse.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace fuse.

6. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between IPDM E/R harness connector and “fuel level sensor unit and fuel pump” harness connector.

IPDM E/R		Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E45	36	B40	1	Existed

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

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, M69, M12, B1.
- Harness for open or short between IPDM E/R and “fuel level sensor unit and fuel pump”

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

8.CHECK FUEL PUMP GROUND CIRCUIT

1. 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 9.
NO >> Repair open circuit or short to power in harness or connectors.

9.CHECK FUEL PUMP

Refer to EC-318, "Component Inspection (Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace fuel pump.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

Component Inspection (Fuel Pump)

INFOID:0000000001671106

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”.

IGNITION SIGNAL

Description

INFOID:0000000001671107

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.

Component Function Check

INFOID:0000000001671108

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT-III: GO TO 2.
YES-2 >> Without CONSULT-III: GO TO 3.
NO >> Go to EC-319, "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.

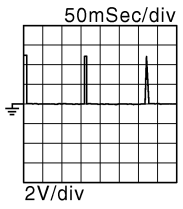
Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-319, "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.

ECM		Ground		Voltage signal
Connector	Terminal	Connector	Terminal	
F10	17	E16	108	
	18			
	21			
	22			

NOTE:
The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-319, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001671109

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	
E16	105	E16	108	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-124, "Diagnosis Procedure".

2.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser-2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between condenser-2 harness connector and ground.

Condenser-2		Ground	Voltage
Connector	Terminal		
F26	1	Ground	Battery voltage

Is the inspection result normal?

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

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and condenser-2 harness connector.

IPDM E/R		Condenser-2		Continuity
Connector	Terminal	Connector	Terminal	
E43	3	F26	1	Existed

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

Is the inspection result normal?

YES >> Go to EC-124, "Diagnosis Procedure".
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CONDENSER-2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between condenser-2 harness connector and ground.

Condenser-2		Ground	Continuity
Connector	Terminal		
F26	2	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK CONDENSER

Refer to EC-322, "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	F34	3	Ground	Battery voltage
2	F35	3		
3	F36	3		
4	F37	3		

Is the inspection result normal?

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

7. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity
Cylinder	Connector	Terminal		
1	F34	2	Ground	Existed
2	F35	2		
3	F36	2		
4	F37	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

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	F34	1	F10	17	Existed
2	F35	1		18	
3	F36	1		22	
4	F37	1		21	

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-322, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000001671110

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 [at 25°C (77°F)]
1 and 2	Except 0 or ∞ Ω
1 and 3	Except 0 Ω
2 and 3	

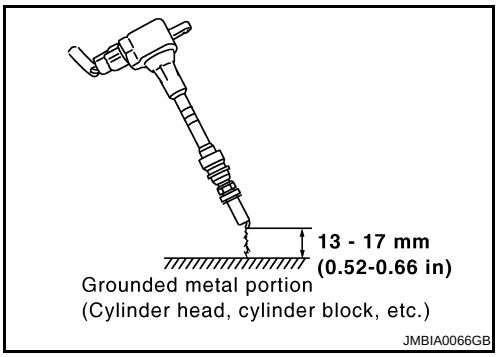
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning ignition coil with power transistor.

2. CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:
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:0000000001671111

1. CHECK CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser-2 harness connector.

3. Check resistance between condenser-2 terminals as follows.

Terminals	Resistance
1 and 2	Above 1 MΩ [at 25°C (77°F)]

Is the inspection result normal?

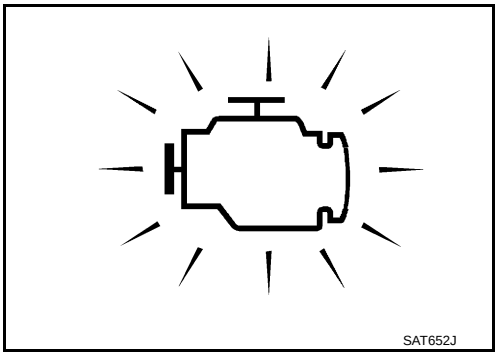
YES >> INSPECTION END
NO >> Replace condenser.

MALFUNCTION INDICATOR

Description

INFOID:0000000001671112

The Malfunction Indicator (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 EC-324, "Diagnosis Procedure".



Component Function Check

INFOID:0000000001671113

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 EC-324, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001671114

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 EC-128, "Diagnosis Procedure".

2.CHECK DTC WITH COMBINATION METER

Refer to MWI-22, "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-55, "Intermittent Incident".

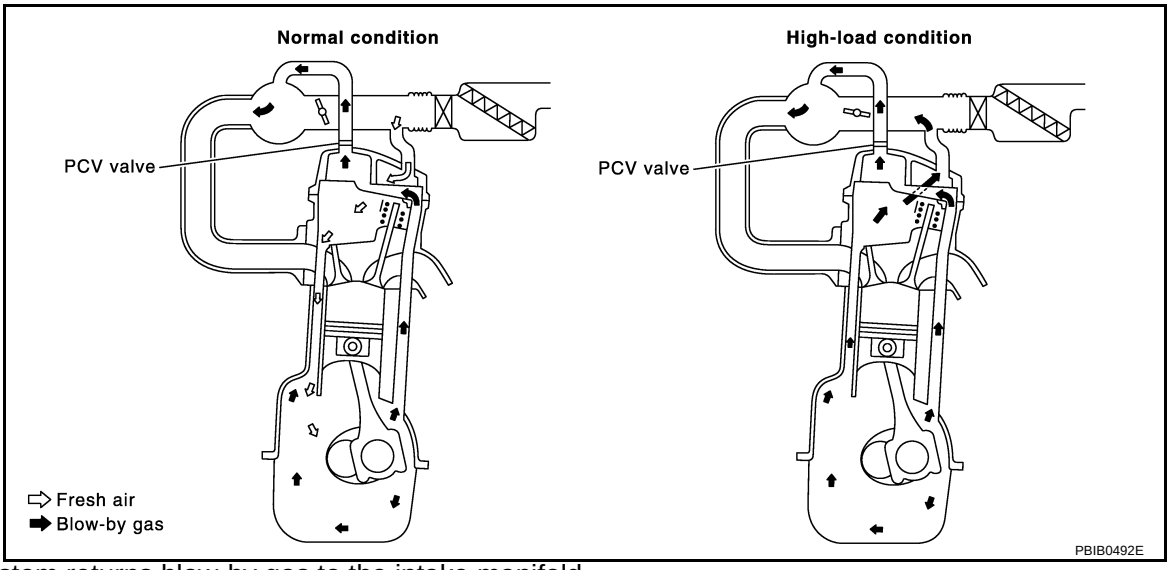
Is the inspection result normal?

YES >> Replace combination meter.
NO >> Repair or replace.

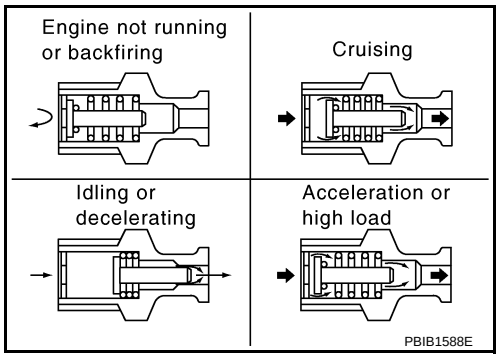
POSITIVE CRANKCASE VENTILATION

Description

INFOID:0000000001671115



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

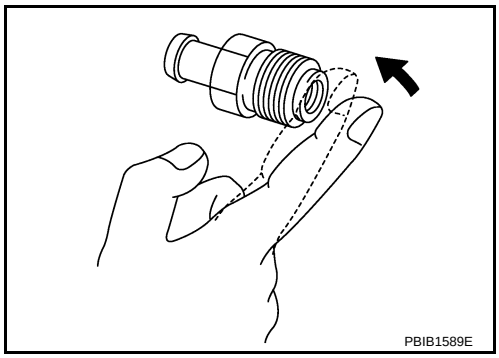
INFOID:0000000001671116

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.

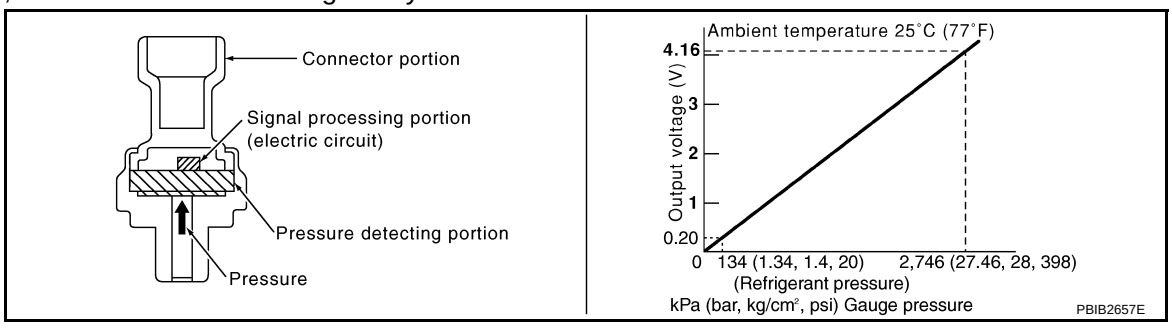


REFRIGERANT PRESSURE SENSOR

Description

INFOID:0000000001671117

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:0000000001671118

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.

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F11	41 (Refrigerant pressure sensor signal)	F11	48	1.0 - 4.0V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-326, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001671119

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 E15. Refer to Ground Inspection in GI-58, "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		
E17	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 E8, F8
- 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	
E17	1	F11	48	Existed

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

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- 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	
E17	2	F11	41	Existed

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

Is the inspection result normal?

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

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- 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-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.
NO >> Repair or replace.

ECU DIAGNOSIS

ECM

Reference Value

INFOID:0000000001161405

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 EC-117, "Diagnosis Procedure".		
B/FUEL SCHDL	See EC-117, "Diagnosis Procedure".		
A/F ALPHA-B1	See EC-117, "Diagnosis Procedure".		
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158F)
HO2S1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
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
HO2S1 MNTR (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds
HO2S2 MNTR (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		LEAN ←→ RICH
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 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	• 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 (A/T) or 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
THRL SEN 2-B1	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T) or 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
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

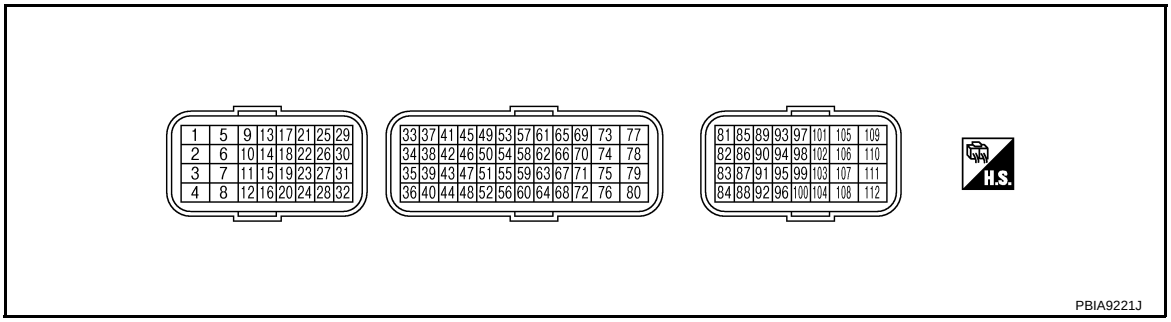
Monitor Item	Condition		Values/Status
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	• Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Shift lever: Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON
		Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	• Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF
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 (A/T), 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 • Shift lever: P or N (A/T), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	10° - 20° BTDC
		2,000 rpm	25° - 45° BTDC
CAL/ALD VALUE	• Engine: After warming up • Shift lever: P or N (A/T), 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 (A/T), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	2.0 - 10.0 g·m/s
PURG VOL C/V	• Engine: After warming up • Shift lever: P or N (A/T), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0%
		2,000 rpm	0% - 50%
INT/V TIM (B1)	• Engine: After warming up • Shift lever: P or N (A/T), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	–5° - 5°CA
		2,000 rpm	Approx. 0° - 40°CA
INT/V SOL (B1)	• Engine: After warming up • Shift lever: P or N (A/T), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0% - 2%
		2,000 rpm	Approx. 0% - 90%
AIR COND RLY	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON

Monitor Item	Condition		Values/Status
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 warning up, idle the engine • Air conditioner switch: OFF	Engine coolant temperature is 98°C (208°F) or less	OFF
		Engine coolant temperature is between 98°C (208°F) and 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH
HO2S1 HTR (B1)	• Engine: After warming up • Engine speed: Below 3,600rpm		ON
	• Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1)	• Engine speed: Below 3,900 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
VEHICLE SPEED	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
IDL A/V LEARN	• Engine: running	Idle air volume learning has not been performed yet.	YET
		Idle air volume learning has already been performed successfully.	CMPLT
TRVL AFTER MIL	• Ignition switch: ON	Vehicle has traveled after MI has turned ON.	0 - 65,535 km (0 - 40,723 miles)
O2 SEN HTR DTY	• Engine coolant temperature when engine started: More than 80°C (176F) • Engine speed: Below 3,600 rpm		Approx. 30%
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
MAIN SW	• Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	• Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	• Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	• Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
BRAKE SW1 (ASCD brake switch)	• Ignition switch: ON	• Brake pedal: Fully released (A/T) • Brake pedal and clutch pedal: Fully released (M/T)	ON
		• Brake pedal: Slightly depressed (A/T) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	OFF
BRAKE SW2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

Monitor Item	Condition		Values/Status
VHCL SPD CUT	• Ignition switch: ON		NON
LO SPEED CUT	• Ignition switch: ON		NON
AT OD MONITOR	• Ignition switch: ON		OFF
AT OD CANCEL	• Ignition switch: ON		OFF
CRUISE LAMP	• Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed: Between 40 km/h (25 MPH) and 153 km/h (95 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

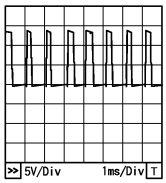
TERMINAL LAYOUT

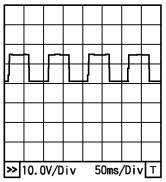
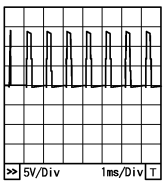
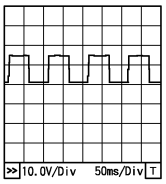
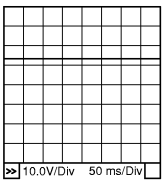
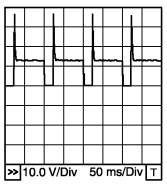


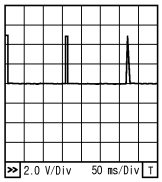
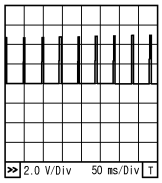
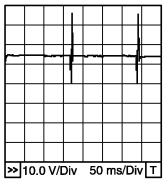
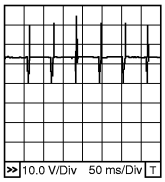
PHYSICAL VALUES

NOTE:
- ECM is located in the engine room left side near battery.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

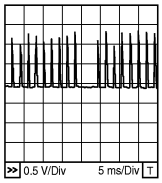
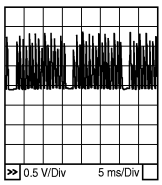
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

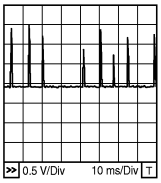
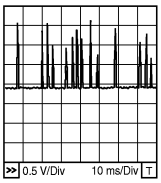
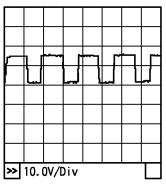
Terminal No. +	Terminal No. −	Wire color	Description: Signal name	Description: Input/Output	Condition	Value (Approx.)
1	Ground	L/W	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	3.2V★  PBIA8150J
2	Ground	R/Y	Throttle control motor relay power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

Terminal No. +	Terminal No. –	Wire color	Description Signal name	Description Input/ Output	Condition	Value (Approx.)
3	Ground	LG/R	Heated oxygen sensor 1 heater	Output	[Engine is running] • Warm up condition • Engine speed: Below 3,600 rpm	Approximately 3.2V★  PBIA8148J
					[Engine is running] • Warm-up condition • Idle speed [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
4	Ground	P	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	0 - 14V★  PBIA8149J
5	Ground	R	Heated oxygen sensor 2 heater	Output	[Engine is running] • Engine speed: Below 3,900 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	10V★  PBIA8148J
					[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,900 rpm	BATTERY VOLTAGE (11 - 14V)
9	Ground	W/B	EVAP canister purge volume control solenoid valve	Output	[Engine is running] • Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
					[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)	BATTERY VOLTAGE (11 - 14V)★  PBIB0520E
10 11	Ground	B B/W	ECM ground	—	[Engine is running] • Idle speed	Body ground

Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
15	Ground	G/L	Throttle control motor relay	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
					[Ignition switch: ON]	0 - 1.0V
17 18 21 22	Ground	L/Y BR/Y R/G SB	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 4 Ignition signal No. 3	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.3V★  PBIA9265J
					[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	0.2 - 0.5V★  PBIA9266J
23	Ground	B/O	Fuel pump relay	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.0V
					[Ignition switch: ON] • More than a few seconds after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)
25 29 30 31	Ground	R/O Y O L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
					[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIA4943J
32	Ground	Y/L	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] • A few seconds after turning ignition switch OFF	0 - 1.0V
					[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)

Terminal No.		Wire color	Description		Condition	Value (Approx.)
+	–		Signal name	Input/ Output		
33	Ground	L/R	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
					[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
34	Ground	L/O	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
					[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
36	Ground	V/W	Sensor ground (Throttle position sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
37	Ground	W	Knock sensor	Input	[Engine is running] • Idle speed	2.5V
38	Ground	GR/B	Engine coolant temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with engine coolant temperature.
40	Ground	—	Sensor ground (Knock sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
41	Ground	G/P	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
44	Ground	B	Sensor ground (Engine coolant temperature sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
45	Ground	BR	Mass air flow sensor	Input	[Ignition switch ON] • Engine stopped	0.4V
					[Engine is running] • Warm-up condition • Idle speed	1.0 - 1.3V
					[Engine is running] • Warm-up condition • Engine is revving from idle to about 4,000 rpm	1.0 - 1.3 to 2.4V (Check for linear voltage rise in response to engine being increased to about 4,000 rpm.)
46	Ground	V	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with intake air temperature.

Terminal No. +	Terminal No. –	Wire color	Description Signal name	Description Input/ Output	Condition	Value (Approx.)
48	Ground	R/L	Sensor ground (Refrigerant pressure sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
49	Ground	L/G	Heated oxygen sensor 1	—	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 - 1.0V (Periodically change)
50	Ground	Y	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
52	Ground	LG	Sensor ground (Mass air flow sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
55	Ground	O	Sensor power supply (Intake air temperature sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
56	Ground	P	Sensor ground (Heated oxygen sensor 1)	—	[Engine is running] • Warm-up condition • Idle speed	0V
59	Ground	SB	Sensor ground (Heated oxygen sensor 2)	—	[Engine is running] • Warm-up condition • Idle speed	0V
61	Ground	LG/B	Crankshaft position sensor (POS)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 1.0V★  MBIB1453E
					[Engine is running] • Engine speed: 2,000 rpm	0 - 1.0V★  MBIB1454E
62	Ground	GR/L	Sensor ground [Crankshaft position sensor (POS)]	—	[Engine is running] • Warm-up condition • Idle speed	0V
63	Ground	L	Sensor ground [Camshaft position sensor (PHASE)]	—	[Engine is running] • Warm-up condition • Idle speed	0V

Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
65	Ground	G	Camshaft position sensor (PHASE)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 1.0V★  MBIB1455E
					[Engine is running] • Engine speed is 2,000 rpm	0 - 1.0V★  MBIB1456E
69	Ground	W/B	Neutral position switch	Input	[Ignition switch: ON] • Shift lever: P or N (A/T), Neutral (M/T)	BATTERY VOLTAGE (11 - 14V)
					[Ignition switch: ON] • Shift lever: Except above position	0V
72	Ground	V/R	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5V
73	Ground	Y/R	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	7 - 10V★  PBIA4937J
74	Ground	Y/W	Sensor power supply (Refrigerant pressure sensor)	—	[Ignition switch: ON]	5V
75	Ground	L/W	Sensor power supply [Crankshaft position sensor (POS)]	—	[Ignition switch: ON]	5V
78	Ground	Y/V	Sensor power supply [Camshaft position sensor (PHASE)]	—	[Ignition switch: ON]	5V
83	Ground	P	CAN communication line	Input/ Output	—	—
84	Ground	L	CAN communication line	Input/ Output	—	—
88	Ground	O	Data link connector	Input/ Output	[Ignition switch: ON] • CONSULT-III or GST: Disconnected	2.7V

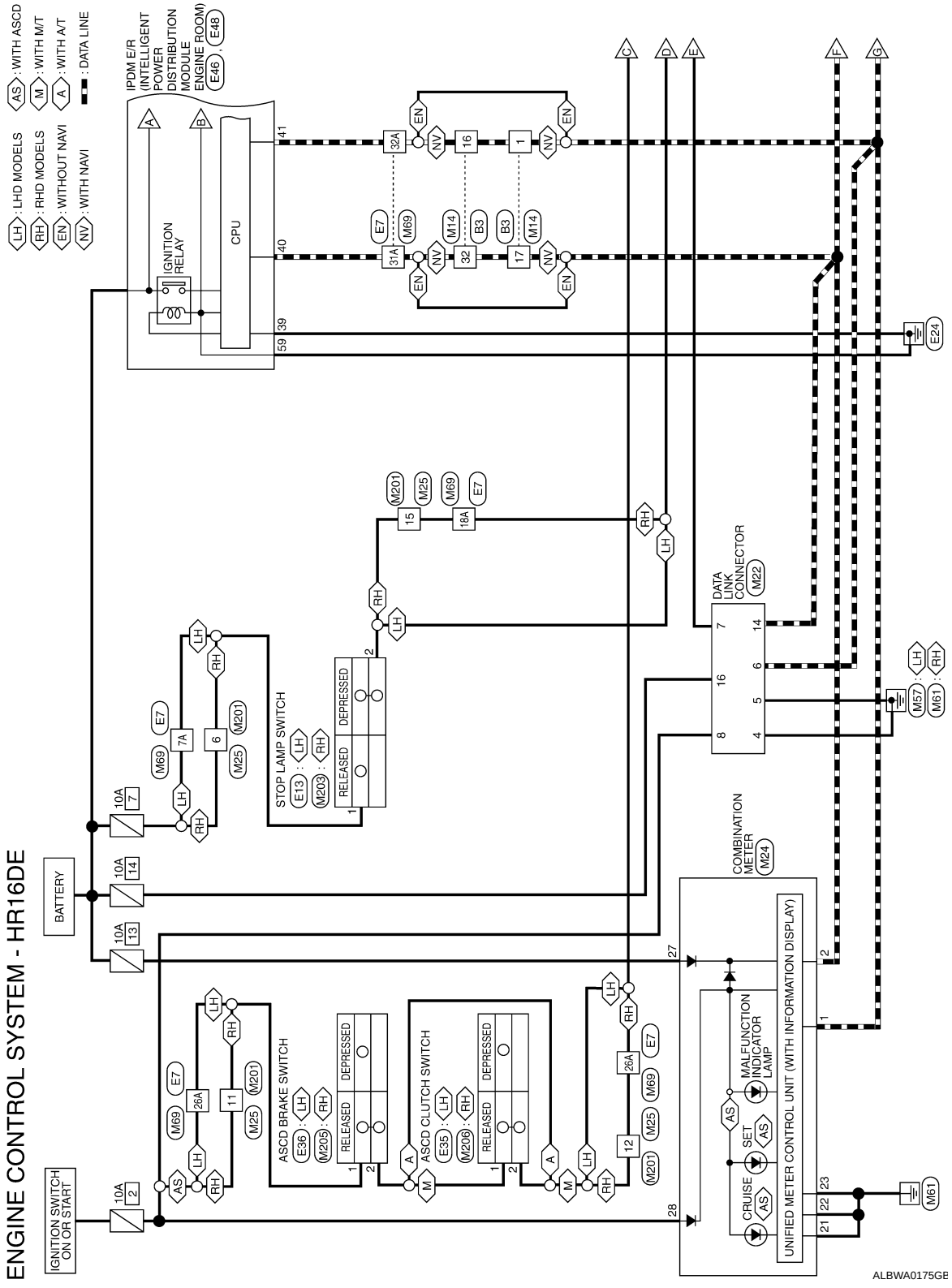
Terminal No. +	Terminal No. –	Wire color	Description Signal name	Description Input/ Output	Condition	Value (Approx.)
93	Ground	W/L	Ignition switch	Input	[Ignition switch: OFF]	0V
					[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
94	Ground	V	ASCD steering switch	Input	[Ignition switch: ON] • ASCD steering switch: OFF	4V
					[Ignition switch: ON] • CANCEL switch: Pressed	1V
					[Ignition switch: ON] • MAIN switch: Pressed	0V
					[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3V
					[Ignition switch: ON] • SET/COAST switch: Pressed	2V
95	Ground	B	Sensor ground (ASCD steering switch)	—	[Engine is running] • Warm-up condition • Idle speed	0V
99	Ground	R/W	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0V
					[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
100	Ground	R	ASCD brake switch	Input	[Ignition switch: ON] • Brake pedal: Slightly depressed (A/T) • Brake pedal and clutch pedal: Slightly depressed (M/T)	0V
					[Ignition switch: ON] • Brake pedal: Fully released (A/T) • Brake pedal and/or clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)
102	Ground	BR	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5V
103	Ground	GR	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
104	Ground	Y	Sensor ground (Accelerator pedal position sensor 2)	—	[Engine is running] • Warm-up condition • Idle speed	0V
105	Ground	G	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
106	Ground	V	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5V
108	Ground	B	ECM ground	—	[Engine is running] • Idle speed	Body ground

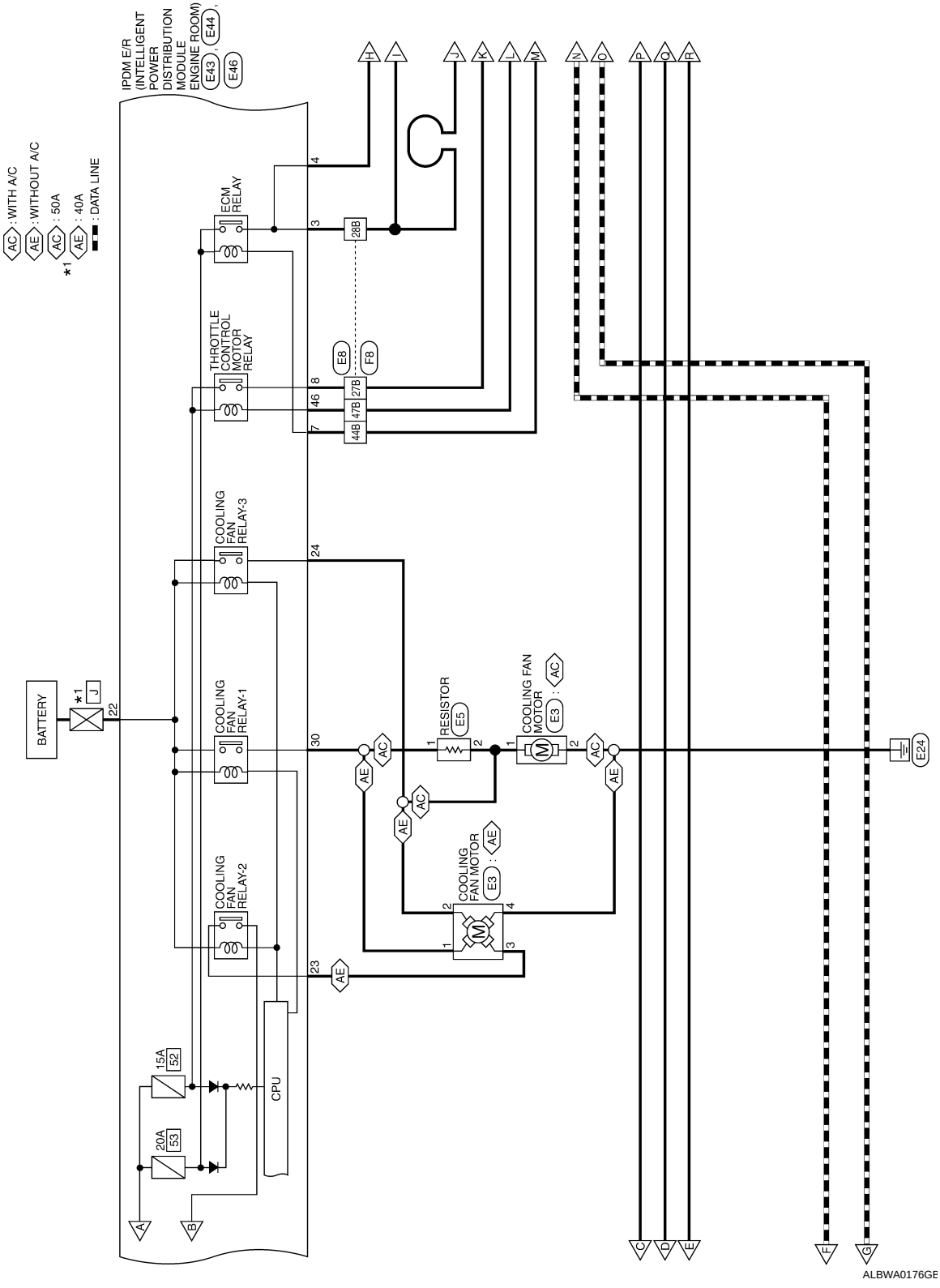
Terminal No.		Wire color	Description		Condition	Value (Approx.)
+	–		Signal name	Input/ Output		
110	Ground	G	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9V
					[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7V
111	Ground	R	Sensor ground (Accelerator pedal position sensor 1)	—	[Engine is running] • Warm-up condition • Idle speed	0V

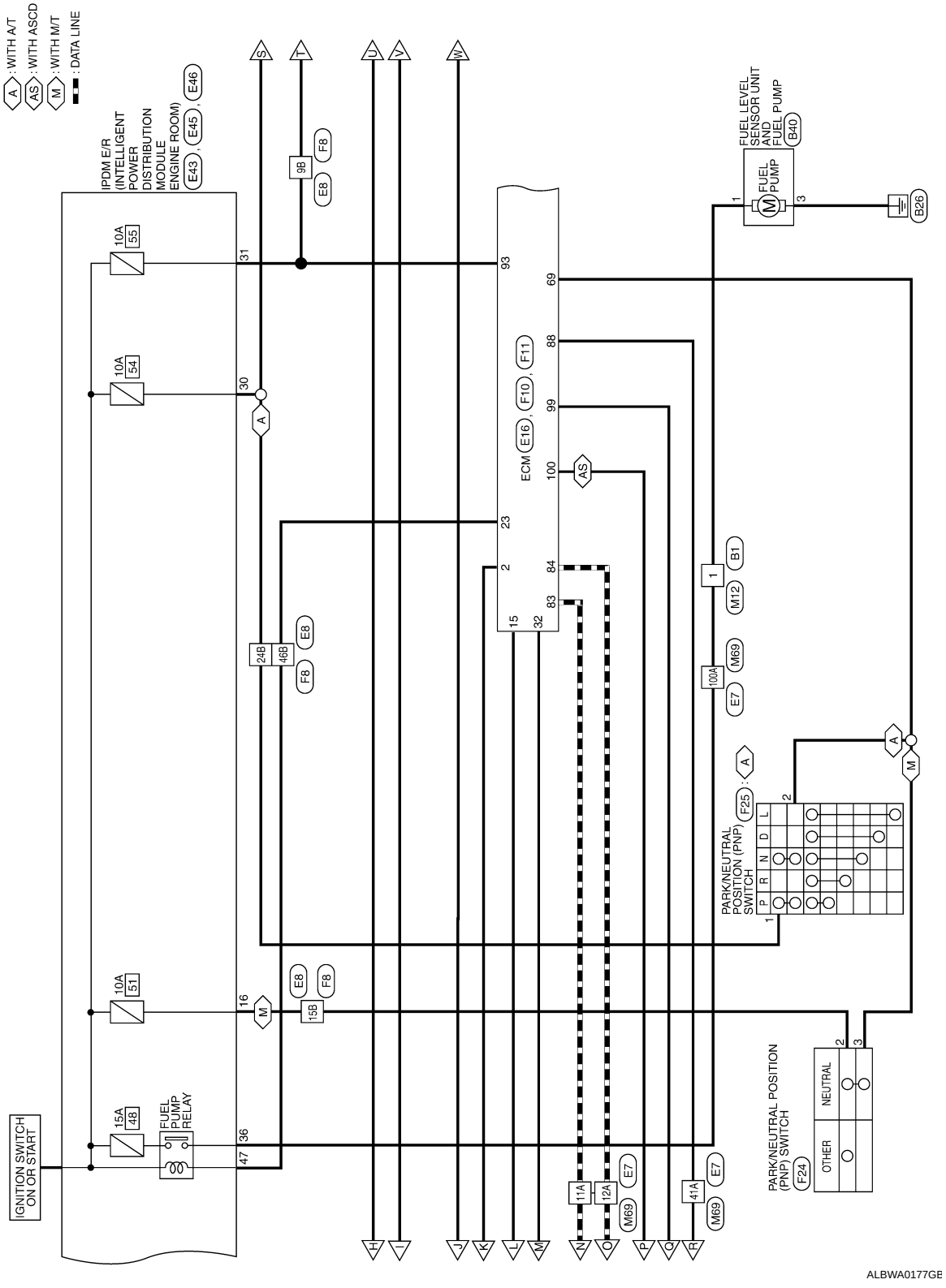
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

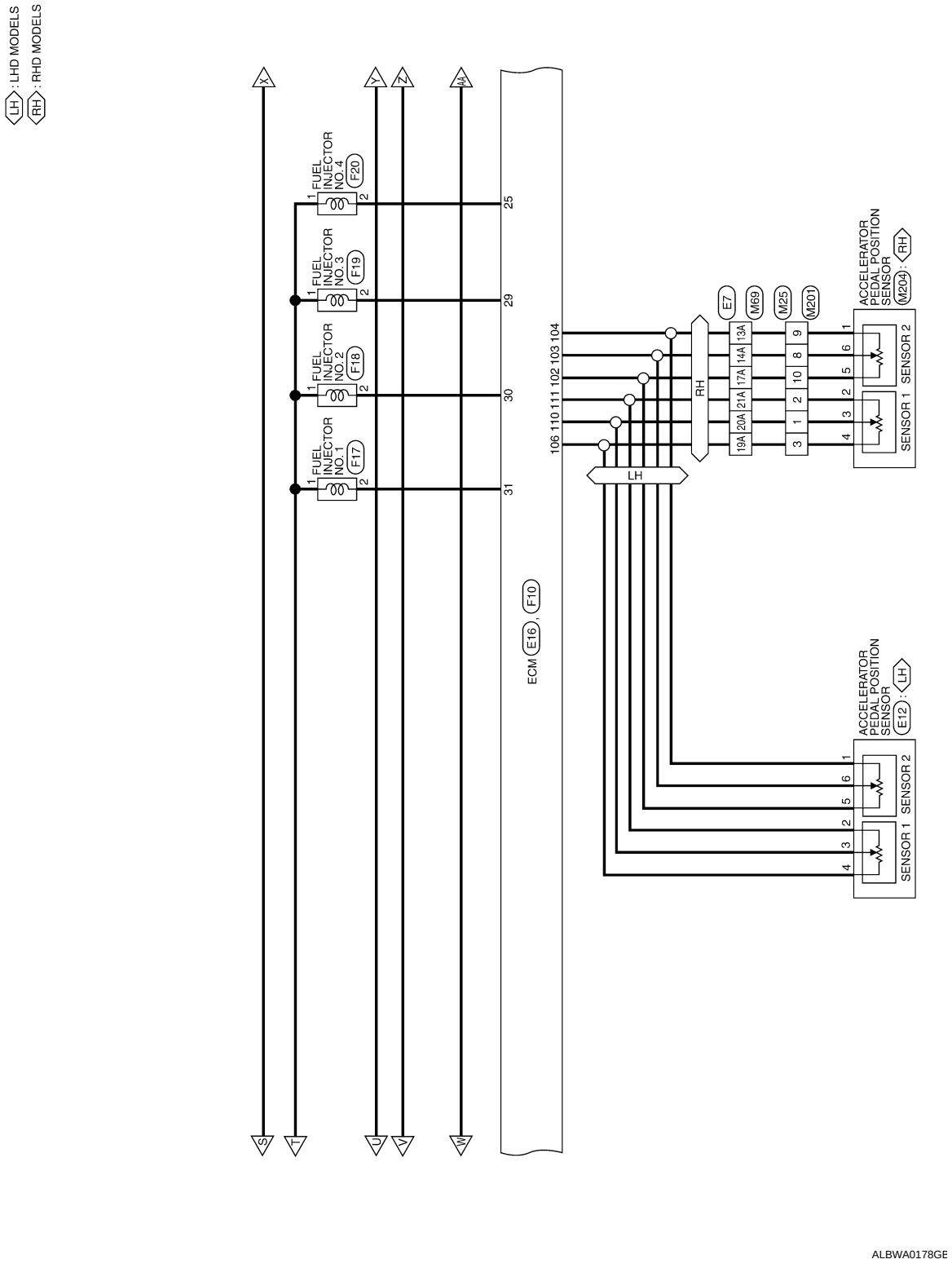
Wiring Diagram - ENGINE CONTROL SYSTEM -

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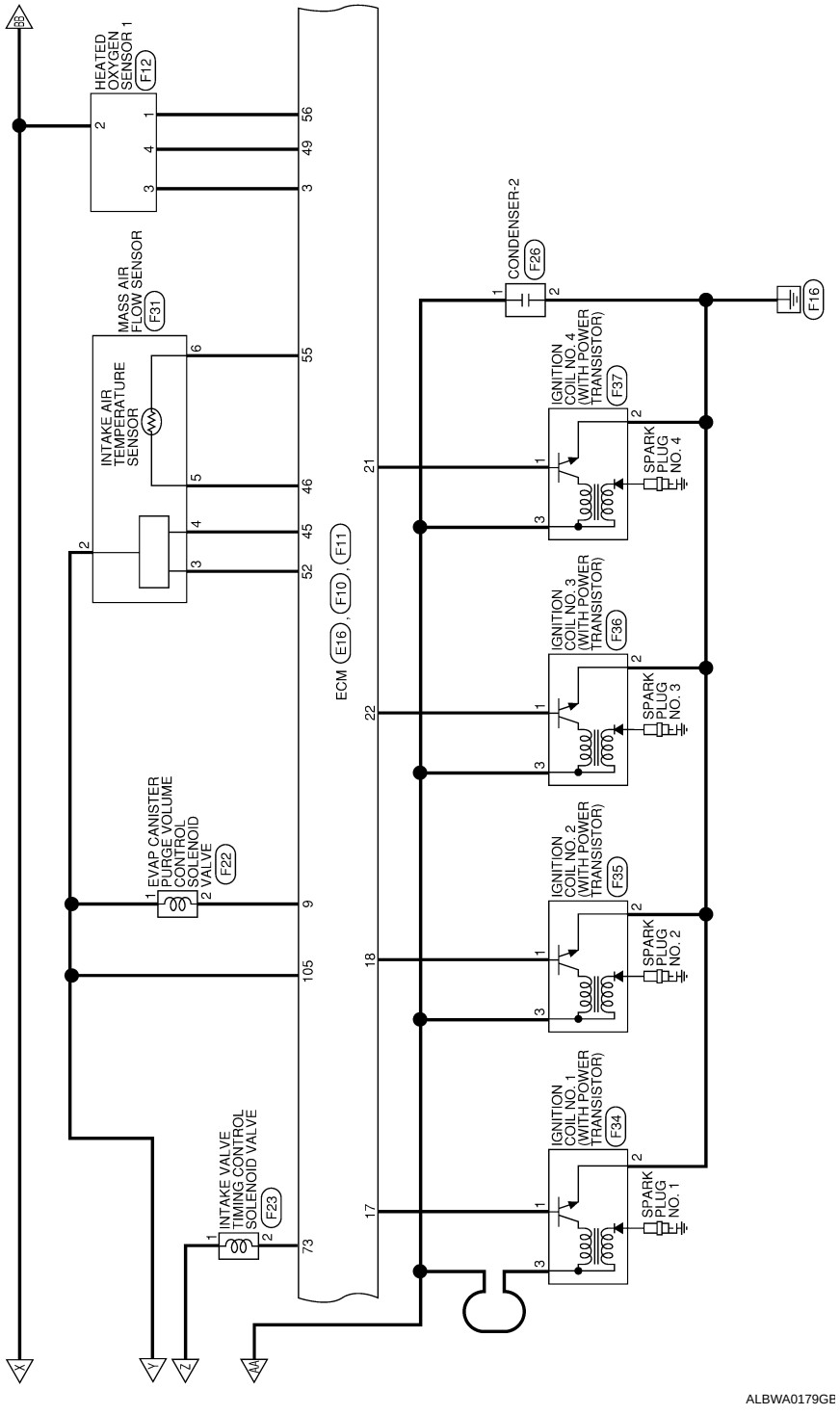


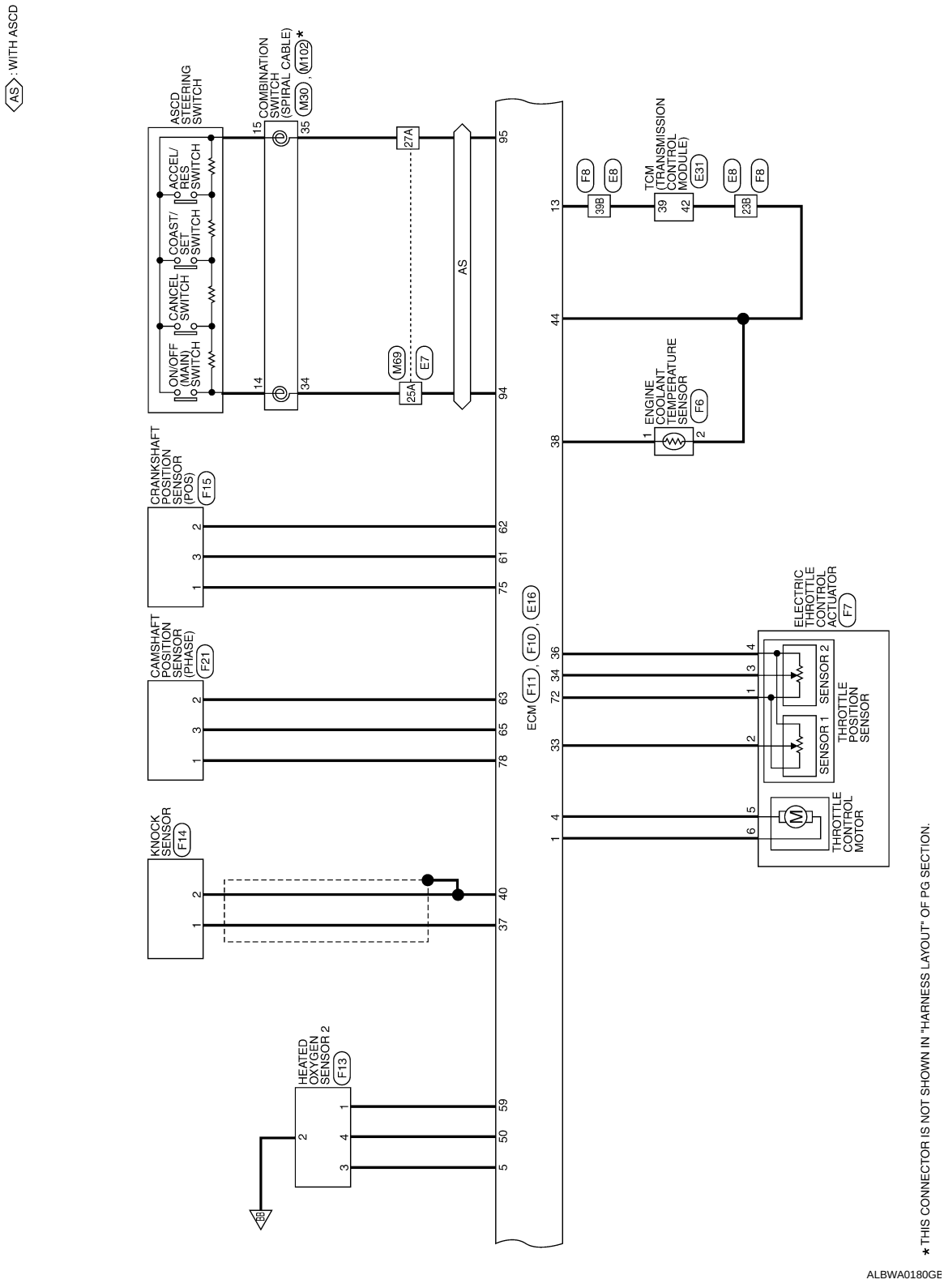

IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) E43, E44, E46
AC : WITH A/C
AE : WITHOUT A/C
AC : 50A
AE : 40A
*1
: DATA LINE
ECM RELAY
THROTTLE CONTROL MOTOR RELAY
COOLING FAN RELAY-3
COOLING FAN RELAY-1
COOLING FAN RELAY-2
BATTERY
RESISTOR E5
COOLING FAN MOTOR E3
COOLING FAN MOTOR E3
E8
F8
28B
27B
47B
44B
15A 52
20A 53
CPU
E24
ALBWA0176GE

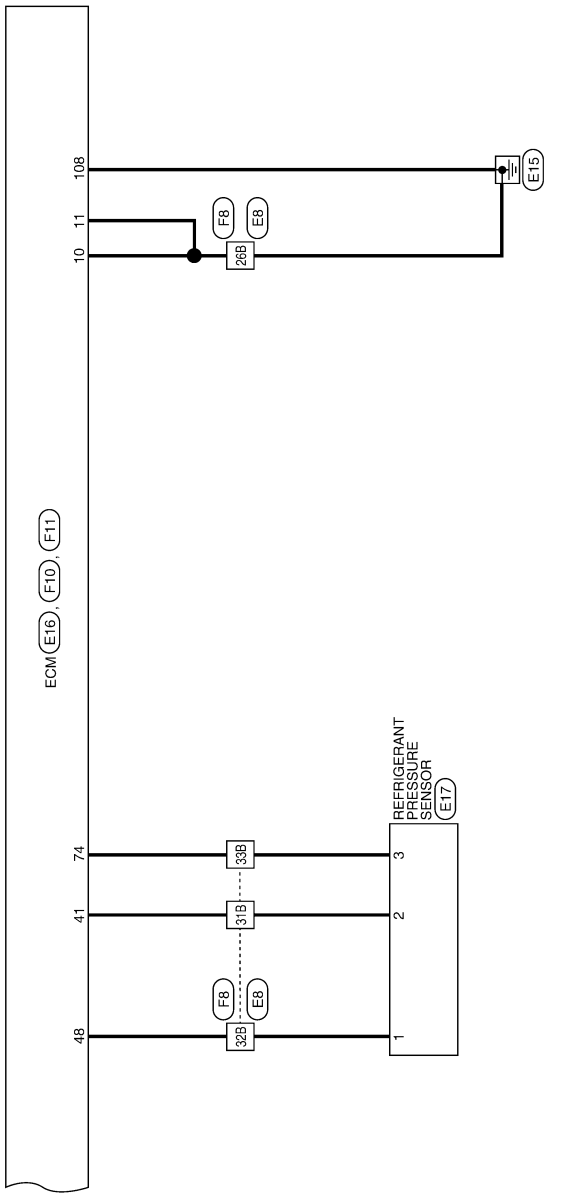

A : WITH A/T
AS : WITH ASCD
M : WITH M/T
: DATA LINE
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) E43, E45, E46
10A 55
10A 54
10A 51
15A 48
FUEL PUMP RELAY
IGNITION SWITCH ON OR START
ECM E16, F10, F11
FUEL LEVEL SENSOR UNIT AND FUEL PUMP B40
FUEL PUMP
B26
B1
M12
M69
E7
E8
F8
PARK/NEUTRAL POSITION (PNP) SWITCH F25
PARK/NEUTRAL POSITION (PNP) SWITCH F24
NEUTRAL
OTHER
ALBWA0177GE



ALBWA0178GE

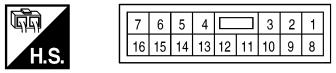

BB
HEATED OXYGEN SENSOR 1
F12
MASS AIR FLOW SENSOR
F31
INTAKE AIR TEMPERATURE SENSOR
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
F22
INTAKE VALVE TIMING CONTROL SOLENOID VALVE
F23
ECM E16, F10, F11
CONDENSER-2
F26
IGNITION COIL NO. 4 (WITH POWER TRANSISTOR)
F37
SPARK PLUG NO. 4
IGNITION COIL NO. 3 (WITH POWER TRANSISTOR)
F36
SPARK PLUG NO. 3
IGNITION COIL NO. 2 (WITH POWER TRANSISTOR)
F35
SPARK PLUG NO. 2
IGNITION COIL NO. 1 (WITH POWER TRANSISTOR)
F34
SPARK PLUG NO. 1
F16
X
Y
Z
AA
ALBWA0179GB


AS : WITH ASCD
ASCD STEERING SWITCH
ON/OFF (MAIN) SWITCH
CANCEL SWITCH
COAST/ SET SWITCH
ACCEL/ RES SWITCH
COMBINATION SWITCH (SPIRAL CABLE) (M30), (M102)*
M69
E7
25A
27A
AS
TCM (TRANSMISSION CONTROL MODULE) (E31)
F8
E8
39B
23B
ENGINE COOLANT TEMPERATURE SENSOR (F6)
CRANKSHAFT POSITION SENSOR (POS) (F15)
CAMSHAFT POSITION SENSOR (PHASE) (F21)
KNOCK SENSOR (F14)
HEATED OXYGEN SENSOR 2 (F13)
ECM (F11), (F10), (E16)
ELECTRIC THROTTLE CONTROL ACTUATOR (F7)
THROTTLE POSITION SENSOR
SENSOR 1
SENSOR 2
THROTTLE CONTROL MOTOR
* THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION.
ALBWA0180GE


ECM E16, F10, F11
108
11
10
74
41
48
F8
E8
26B
33B
31B
32B
T1
E15
REFRIGERANT PRESSURE SENSOR E17
3
2
1
ALBWA0181GE

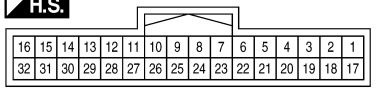
ENGINE CONTROL SYSTEM - HR16DE CONNECTORS

Connector No.	M12
Connector Name	WIRE TO WIRE
Connector Color	WHITE



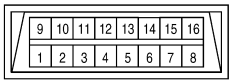
Terminal No.	Color of Wire	Signal Name
1	W	—

Connector No.	M14
Connector Name	WIRE TO WIRE
Connector Color	WHITE



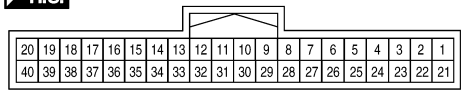
Terminal No.	Color of Wire	Signal Name
1	L	—
16	L	—
17	P	—
32	P	—

Connector No.	M22
Connector Name	DATA LINK CONNECTOR
Connector Color	WHITE



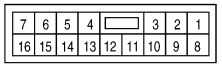
Terminal No.	Color of Wire	Signal Name
4	B	GND
5	B	GND
6	L	CAN-H
7	GR	K-LINE
8	LG	IGN
14	P	CAN-L
16	V	B+

Connector No.	M24
Connector Name	COMBINATION METER
Connector Color	WHITE



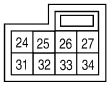
Terminal No.	Color of Wire	Signal Name
1	L	CAN-H
2	P	CAN-L
21	B	GND 1(ILL)
22	B	GND2(POWER)
23	B	GND3
27	G	BAT
28	SB	IGN

Connector No.	M25
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	G	—
2	R	—
3	P	—
6	L	—
8	GR	—
9	Y	—
10	SB	—
11	GR	—
12	G	—
15	R	—

Connector No.	M30
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Color	GRAY



Terminal No.	Color of Wire	Signal Name
33	B	GND ASCD SW
34	R	SCCD SW

ALBIA0450GB

Connector No.	M102
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Color	GRAY

H.S.

14 15 16 17 18 19 20 21

Terminal No.	Color of Wire	Signal Name
14	R	—
15	B	—

Connector No.	M203
Connector Name	STOP LAMP SWITCH (WITH AUTOMATIC TRANSMISSION)
Connector Color	WHITE

H.S.

3 4
1 2

Terminal No.	Color of Wire	Signal Name
1	L	—
2	R	—

Terminal No.	Color of Wire	Signal Name
7A	L	—
11A	P	—
12A	L	—
13A	Y	—
14A	GR	—
17A	SB	—
18A	R	—
19A	P	—
20A	G	—
21A	R	—
25A	R	—
26A	GR	—
27A	B	—
31A	P	—
32A	L	—
41A	GR	—
100A	W	—

Connector No.	M69
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Connector No.	M201
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16

Terminal No.	Color of Wire	Signal Name
1	G	—
2	R	—
3	V	—
6	L	—
8	GR	—
9	Y	—
10	BR	—
11	O	—
12	G	—
15	R	—

ALBIA0451GB

Connector No.	M205
Connector Name	ASCD BRAKE SWITCH (WITH AUTOMATIC TRANSMISSION)
Connector Color	BROWN



Terminal No.	Color of Wire	Signal Name
1	O	—
2	G	—

Connector No.	M204
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	Y	GND A APS 2
2	R	GND A APS 1
3	G	APS 1
4	V	AVCC APS 1
5	BR	AVCC APS 2
6	GR	APS 2

Connector No.	E3
Connector Name	COOLING FAN MOTOR (WITHOUT A/C)
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	LG	LO (+)
2	Y	HI (+)
3	L	HI (-)
4	B	LO (-)

Connector No.	M203
Connector Name	STOP LAMP SWITCH (WITH MANUAL TRANSMISSION)
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	L	—
2	R	—

Connector No.	M206
Connector Name	ASCD CLUTCH SWITCH
Connector Color	BROWN



Terminal No.	Color of Wire	Signal Name
1	G	—
2	B	—

Connector No.	M205
Connector Name	ASCD BRAKE SWITCH (WITH MANUAL TRANSMISSION)
Connector Color	BROWN

Terminal No.	Color of Wire	Signal Name
1	O	—
2	GR	—

ALBIA0452GB

Connector No.	E3
Connector Name	COOLING FAN MOTOR (WITH A/C)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	—
2	B	—

Connector No.	E5
Connector Name	RESISTOR
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	—
2	Y	—

Connector No.	E7
Connector Name	WIRE TO WIRE
Connector Color	WHITE

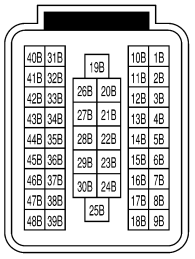
H.S.

Terminal No.	Color of Wire	Signal Name
7A	L	—
11A	P	—
12A	L	—
13A	Y	—
14A	GR	—
17A	SB	—
18A	R	—
19A	O	—
20A	G	—
21A	R	—
25A	R	—
26A	GR	—
27A	B	—
31A	P	—
32A	L	—
41A	LG	—
100A	BR	—

ALBIA0453GB

Connector No.	E8
Connector Name	WIRE TO WIRE
Connector Color	BLACK

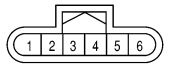
H.S.



Terminal No.	Color of Wire	Signal Name
9B	O	—
15B	BR	—
23B	B	—
24B	R	—
26B	B	—
27B	G	—
28B	Y	—
31B	GR	—
32B	BR	—
33B	W	—
39B	L	—
44B	G	—
46B	GR	—
47B	Y	—

Connector No.	E12
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Color	BLACK

H.S.



Terminal No.	Color of Wire	Signal Name
1	Y	GND A APS 2
2	R	GND A APS 1
3	G	APS 1
4	P	AVCC APS 1
5	SB	AVCC APS 2
6	GR	APS 2

Connector No.	E13
Connector Name	STOP LAMP SWITCH (AUTOMATIC TRANSMISSION)
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
1	L	—
2	R	—

Connector No.	E13
Connector Name	STOP LAMP SWITCH (MANUAL TRANSMISSION)
Connector Color	BLACK

H.S.



Terminal No.	Color of Wire	Signal Name
1	L	—
2	R	—

ALBIA0454GB

Connector No.	E16
Connector Name	ECM
Connector Color	BLACK

H.S.

81	85	89	93	97	101	105	109
82	86	90	94	98	102	106	110
83	87	91	95	99	103	107	111
84	88	92	96	100	104	108	112

Terminal No.	Color of Wire	Signal Name
83	P	CAN-L
84	L	CAN-H
88	LG	K-LINE
93	O	IGN SW
94	R	ASCD SW
95	B	GND ASCD SW
99	R	BRAKE
100	G	ASCD BRAKE SW
102	SB	AVCC-APS2
103	GR	APS2
104	Y	GND-A-APS2
105	G	VBR
106	P	AVCC-APS1
108	B	GND
110	G	APS1
111	R	GND-A-APS1

Connector No.	E17
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Color	BLACK

H.S.

1 2 3

Terminal No.	Color of Wire	Signal Name
1	BR	—
2	GR	—
3	W	—

Connector No.	E36
Connector Name	ASCD BRAKE SWITCH (WITH AUTOMATIC TRANSMISSION)
Connector Color	BROWN

H.S.

2 1

Terminal No.	Color of Wire	Signal Name
1	O	—
2	G	—

Connector No.	E35
Connector Name	ASCD CLUTCH SWITCH
Connector Color	BROWN

H.S.

2 1

Terminal No.	Color of Wire	Signal Name
1	G	—
2	B	—

Connector No.	E31
Connector Name	TCM (TRANSMISSION CONTROL MODULE)
Connector Color	GRAY

H.S.

25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42
43	44	45				46	47	48

Terminal No.	Color of Wire	Signal Name
39	L	TACHO
42	B	GND A

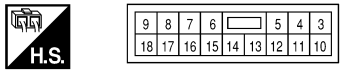
ALBIA0455GB

Connector No.	E36
Connector Name	ASCD BRAKE SWITCH (WITH MANUAL TRANSMISSION)
Connector Color	BROWN



Terminal No.	Color of Wire	Signal Name
1	O	—
2	GR	—

Connector No.	E43
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE



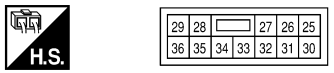
Terminal No.	Color of Wire	Signal Name
3	Y	IGN COIL
4	G	ECM (VB)
7	G	ECM CONT
8	G	ELEC THROTTLE
16	SB	REV LAMP

Connector No.	E44
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE



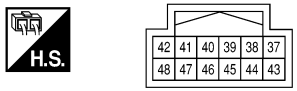
Terminal No.	Color of Wire	Signal Name
20	L	MOTOR FAN LO
22	G	FL50A MOTOR FAN
23	L	MOTOR FAN GND
24	Y	MOTOR FAN HI

Connector No.	E45
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BROWN



Terminal No.	Color of Wire	Signal Name
30	R	O2 SENS (IGN)
31	O	INJ ECU
36	BR	F/PUMP MOTOR

Connector No.	E46
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
39	B	SIGNAL GND
40	P	CAN-L
41	L	CAN-H
46	Y	ETC CONT
47	GR	FUEL PUMP CONT

Connector No.	E48
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
59	B	POWER GND

ALBIA0456GB

Connector No.	F6
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	P	—
2	B	—

Connector No.	F7
Connector Name	ELECTRONIC THROTTLE CONTROL ACTUATOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	V	AVCC-TPS
2	LG	TPS1
3	O	TPS2
4	Y	GND-A2
5	P	MOTOR(+)
6	L	MOTOR(-)

Connector No.	F8
Connector Name	WIRE TO WIRE
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
9B	SB	—
15B	R	—
23B	B	—

Terminal No.	Color of Wire	Signal Name
24B	R	—
26B	B	—
27B	SB	—
28B	V	—
31B	GR	—
32B	BR	—
33B	W	—
39B	L	—
44B	P	—
46B	GR	—
47B	Y	—

ALBIA0457GB

Connector No.	F10
Connector Name	ECM
Connector Color	GRAY

H.S.

33	37	41	45	49	53	57	61	65	69	73	77
34	38	42	46	50	54	58	62	66	70	74	78
35	39	43	47	51	55	59	63	67	71	75	79
36	40	44	48	52	56	60	64	68	72	76	80

Terminal No.	Color of Wire	Signal Name
1	L	MOTOR 1
2	SB	VMOT
3	G	O2 HF
4	P	MOTOR 2
5	G	O2HR
9	P	EVAP
10	B	GND
11	B	GND
13	L	TACHO
15	Y	MOTRLY

Terminal No.	Color of Wire	Signal Name
17	R	IGN COIL #1
18	LG	IGN COIL #2
21	G	IGN COIL #4
22	SB	IGN COIL #3
23	GR	FPR
25	V	INJ #4
29	Y	INJ #3
30	O	INJ #2
31	L	INJ #1
32	P	SSOF

Connector No.	F11
Connector Name	ECM
Connector Color	BROWN

H.S.

1	5	9	13	17	21	25	29	33	37	41	45
2	6	10	14	18	22	26	30	34	38	42	46
3	7	11	15	19	23	27	31	35	39	43	47
4	8	12	16	20	24	28	32	36	40	44	48

Terminal No.	Color of Wire	Signal Name
33	LG	TPS 1
34	O	TPS 2
36	Y	GND-A TPS
37	W	KNK
38	P	TW
40	SHIELD	GND KNK
41	GR	PDPRES
44	B	GND-A TW
45	G	QA+
46	V	TA
48	BR	GND-A (PDPRES)
49	W	O2SF
50	W	O2SR

Terminal No.	Color of Wire	Signal Name
52	LG	QA-
55	O	GND-TA
56	B	GNDA-O2SF
59	O	GND-A O2SR
61	W	POS
62	R	GND POS
63	BR	GND-(A)-PHASE
65	G	PHASE
69	L	NEUT H
72	V	AVCC-TPS
73	P	CVTC
74	W	AVCC(PDPRES)
75	BR	POS AVCC
78	O	PHASE AVCC

ALBIA0458GB

Connector No.	F12
Connector Name	HEATED OXYGEN SENSOR 1
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	B	GND-O2
2	R	PWR SUPPLY
3	SG	HEATER GND
4	W	SIGNAL

Connector No.	F13
Connector Name	HEATED OXYGEN SENSOR 2
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	GND-02
2	R	PWR SUPPLY
3	G	HEATER GND
4	W	SIGNAL

Connector No.	F14
Connector Name	KNOCK SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	KNK
2	SHIELD	GND

Connector No.	F15
Connector Name	CRANKSHAFT POSITION SENSOR (POS)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	BR	POWER SUPPLY
2	R	GND
3	W	SIGNAL

Connector No.	F17
Connector Name	FUEL INJECTOR NO. 1
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	—
2	L	—

Connector No.	F18
Connector Name	FUEL INJECTOR NO. 2
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	—
2	0	—

ALBIA0459GB

Connector No.	F19
Connector Name	FUEL INJECTOR NO. 3
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	—
2	Y	—

Connector No.	F20
Connector Name	FUEL INJECTOR NO. 4
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	—
2	V	—

Connector No.	F21
Connector Name	CAMSHAFT POSITION SENSOR (PHASE)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	POWER SUPPLY
2	BR	GND
3	G	SIGNAL

Connector No.	F22
Connector Name	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	G	—
2	P	—

Connector No.	F23
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
Connector Color	GREEN

H.S.

Terminal No.	Color of Wire	Signal Name
1	V	—
2	P	—

Connector No.	F24
Connector Name	NEUTRAL AND REVERSE SWITCH
Connector Color	GREEN

H.S.

Terminal No.	Color of Wire	Signal Name
2	R	—
3	L	—

ALBIA0460GB

Connector No.	F25
Connector Name	PARK/NEUTRAL POSITION (PNP) SWITCH
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	
2	L	

Connector No.	F26
Connector Name	CONDENSER-2
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	V	—
2	B	—

Connector No.	F31
Connector Name	MASS AIR FLOW SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
2	BR	POWER SUPPLY
3	V	TA SIGNAL
4	G	QA (+)
5	LG	QA (-)
6	O	TA GND

Connector No.	F34
Connector Name	IGNITION COIL NO. 1 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	—
2	B	—
3	V	—

Connector No.	F35
Connector Name	IGNITION COIL NO. 2 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

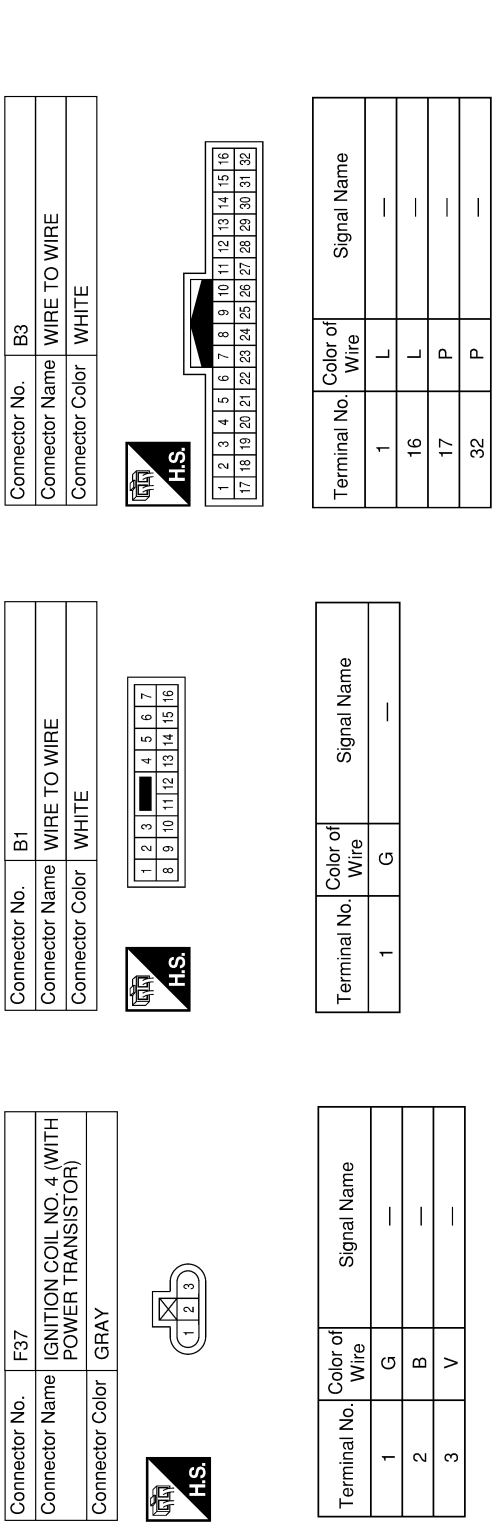
Terminal No.	Color of Wire	Signal Name
1	LG	—
2	B	—
3	V	—

Connector No.	F36
Connector Name	IGNITION COIL NO. 3 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	—
2	B	—
3	V	—

ALBIA0461GB



ALBIA0462GB

Fail Safe

INFOID:0000000001161407

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.	EC-324

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 turning ignition switch ON or START. 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)
		More than approx. 4 minutes after ignition ON or START	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 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.	
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.	
P1121	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 P or N (A/T), Neutral (M/T) position, and engine speed will not exceed 1,000 rpm or more.	
P1122	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.	
P1124 P1126	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.	

DTC No.	Detected items	Engine operating condition in fail-safe mode
P1128	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.
P1229	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.
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
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:0000000001161408

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 • P0102 P0103 Mass air flow sensor • P0112 P0113 Intake air temperature sensor • P0117 P0118 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0327 P0328 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0500 Vehicle speed sensor • P0605 ECM • P1229 Sensor power supply • P1610 - P1615 NATS • P0705 P1706 Park/neutral position (PNP) switch • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	• P0132 P0133 P0134 P1143 P1144 Heated oxygen sensor 1 • P0135 Heated oxygen sensor 1 heater • P0138 P0139 P1146 P1147 Heated oxygen sensor 2 • P0141 Heated oxygen sensor 2 heater • P0444 EVAP canister purge volume control solenoid valve • P1065 ECM • P1111 Intake valve timing control solenoid valve • P1122 Electric throttle control function • P1124 P1126 Throttle control motor relay • P1128 Throttle control motor • P1217 Engine over temperature (OVERHEAT) • P1805 Brake switch • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD vehicle speed sensor
3	• P0011 Intake valve timing control • P0171 P0172 Fuel injection system function • P0300 - P0304 Misfire • P0420 Three way catalyst function • P0710 P0720 P0725 P0731 P0732 P0733 P0734 P0740 P0744 P0745 P0750 P0755 P1705 P1760 A/T related sensors, solenoid valves and switches • P1121 Electric throttle control actuator • P1212 ESP communication line

DTC Index

INFOID:0000000001161409

×: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	×	EC-128
U1001	1001*4	CAN COMM CIRCUIT	—	—	2	—	EC-128
U1010	1010	CONTROL UNIT(CAN)	—	—	1 (A/T)	× (A/T)	EC-129
					2 (M/T)	— (M/T)	
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	—	**Flashing***5	EC-94
P0011	0011	INT/V TIM CONT-B1	—	—	2	—	EC-130
P0102	0102	MAF SEN/CIRCUIT-B1	—	—	1	×	EC-134
P0103	0103	MAF SEN/CIRCUIT-B1	—	—	1	×	EC-134
P0112	0112	IAT SEN/CIRCUIT-B1	—	—	2	×	EC-139
P0113	0113	IAT SEN/CIRCUIT-B1	—	—	2	×	EC-139
P0117	0117	ECT SEN/CIRC	—	—	1	×	EC-142
P0118	0118	ECT SEN/CIRC	—	—	1	×	EC-142
P0122	0122	TP SEN 2/CIRC-B1	—	—	1	×	EC-145
P0123	0123	TP SEN 2/CIRC-B1	—	—	1	×	EC-145
P0132	0132	HO2S1 (B1)	—	×	2	×	EC-148
P0133	0133	HO2S1 (B1)	×	×	2	×	EC-152
P0134	0134	HO2S1 (B1)	—	×	2	×	EC-158
P0135	0135	HO2S1 HTR (B1)	×	×	2	×	EC-163
P0138	0138	HO2S2 (B1)	×	×	2	×	EC-166
P0139	0139	HO2S2 (B1)	×	×	2	×	EC-170
P0141	0141	HO2S2 HTR (B1)	×	×	2	×	EC-176
P0171	0171	FUEL SYS-LEAN-B1	—	—	2	×	EC-179
P0172	0172	FUEL SYS-RICH-B1	—	—	2	×	EC-183
P0222	0222	TP SEN 1/CIRC-B1	—	—	1	×	EC-187
P0223	0223	TP SEN 1/CIRC-B1	—	—	1	×	EC-187
P0300	0300	MULTICYL MISFIRE	—	—	2	×	EC-190
P0301	0301	CYL 1 MISFIRE	—	—	2	×	EC-190
P0302	0302	CYL 2 MISFIRE	—	—	2	×	EC-190
P0303	0303	CYL 3 MISFIRE	—	—	2	×	EC-190
P0304	0304	CYL 4 MISFIRE	—	—	2	×	EC-190
P0327	0327	KNOCK SEN/CIRC-B1	—	—	2	—	EC-195
P0328	0328	KNOCK SEN/CIRC-B1	—	—	2	—	EC-195
P0335	0335	CKP SEN/CIRCUIT	—	—	2	×	EC-197
P0340	0340	CMP SEN/CIRC-B1	—	—	2	×	EC-201
P0420	0420	TW CATALYST SYS-B1	×	×	2	×	EC-205
P0444	0444	PURG VOLUME CONT/V	—	—	2	×	EC-210
P0500	0500	VEH SPEED SEN/CIRC*6	—	—	2	×	EC-213
P0605	0605	ECM	—	—	1 or 2	× or —	EC-215

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						
P0705	0705	PNP SW/CIRC	—	—	2	×	TM-44
P0710	0710	ATF TMP SEN/CIRC	—	—	2	×	TM-48
P0720	0720	VEH SPD SEN/CIR AT*6	—	—	2	×	TM-52
P0725	0725	ENGINE SPEED SIG	—	—	2	×	TM-56
P0731	0731	A/T 1ST GR FUNCTN	—	—	2	×	TM-59
P0732	0732	A/T 2ND GR FUNCTN	—	—	2	×	TM-62
P0733	0733	A/T 3RD GR FUNCTN	—	—	2	×	TM-65
P0734	0734	A/T 4TH GR FUNCTN	—	—	2	×	TM-68
P0740	0740	TCC SOLENOID/CIRC	—	—	2	×	TM-73
P0744	0744	A/T TCC S/V FNCTN	—	—	2	×	TM-76
P0745	0745	L/PRESS SOL/CIRC	—	—	2	×	TM-81
P0750	0750	SFT SOL A/CIRC	—	—	1	×	TM-85
P0755	0755	SFT SOL B/CIRC	—	—	1	×	TM-89
P1065	1065	ECM BACK UP/CIRCUIT	—	—	2	×	EC-217
P1111	1111	INT/V TIM C/CIRC	—	—	2	×	EC-219
P1121	1121	ETC ACTR-B1	—	—	1	×	EC-222
P1122	1122	ETC FUNCTION/CIRC-B1	—	—	1	×	EC-224
P1124	1124	ETC MOT PWP	—	—	1	×	EC-228
P1126	1126	ETC MOT PWP-B1	—	—	1	×	EC-228
P1128	1128	ETC MOT-B1	—	—	1	×	EC-231
P1143	1143	HO2S1 (B1)	×	×	2	×	EC-233
P1144	1144	HO2S1 (B1)	×	×	2	×	EC-238
P1146	1146	HO2S2 (B1)	×	×	2	×	EC-243
P1147	1147	HO2S2 (B1)	×	×	2	×	EC-250
P1212	1212	TCS/CIRC	—	—	2	—	EC-256
P1217	1217	ENG OVER TEMP	—	—	1	×	EC-257
P1225	1225	CTP LEARNING-B1	—	—	2	—	EC-261
P1226	1226	CTP LEARNING-B1	—	—	2	—	EC-263
P1229	1129	SENSOR POWER/CIRC	—	—	1	×	EC-265
P1564	1564	ASCD SW	—	—	1	—	EC-267
P1572	1572	ASCD BRAKE SW	—	—	1	—	EC-270
P1574	1574	ASCD VHL SPD SEN	—	—	1	—	EC-278
P1610	1610	LOCK MODE	—	—	2	—	SEC-12
P1611	1611	ID DISCARD IMM-ECM	—	—	2	—	SEC-12
P1615	1615	DIFFERENCE OF KEY	—	—	2	—	SEC-12
P1706	1706	P-N POS SW/CIRCUIT	—	—	2	×	EC-280
P1760	1760	O/R CLTCH SOL/CIRC	—	—	2	×	TM-93
P1805	1805	BRAKE SW/CIRCUIT	—	—	2	—	EC-283
P2122	2122	APP SEN 1/CIRC	—	—	1	×	EC-286
P2123	2123	APP SEN 1/CIRC	—	—	1	×	EC-286
P2127	2127	APP SEN 2/CIRC	—	—	1	×	EC-290

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						
P2128	2128	APP SEN 2/CIRC	—	—	1	×	EC-290
P2135	2135	TP SENSOR-B1	—	—	1	×	EC-294
P2138	2138	APP SENSOR	—	—	1	×	EC-297

*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 engine is running, MI may flash. For details, refer to EC-94, "Diagnosis Description".

*6: When the fail-safe operations for both self-diagnoses occur, the MI illuminates.

How to Set SRT Code

INFOID:0000000001161410

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.

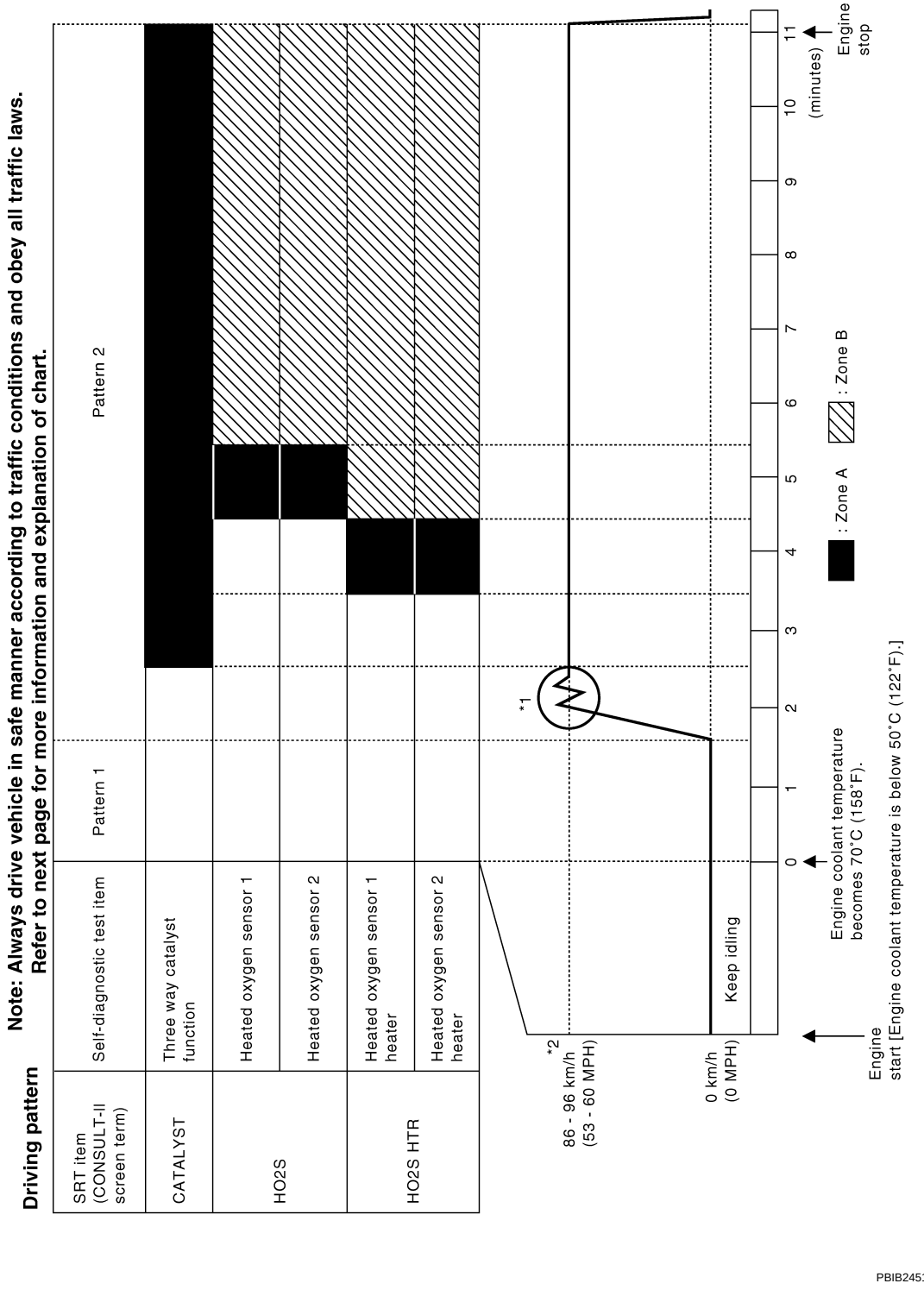
WITH CONSULT-III

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 38 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 38 and ground is lower than 1.4V).**

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.

*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.

Test Value and Test Limit

INFOID:0000000001161411

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
			TID	CID	
CATALYST	Three way catalyst function	P0420	01H	81H	Min.
		P0420	02H	81H	Min.
HO2S	Heated oxygen sensor 1	P0133	09H	04H	Max.
		P1143	0AH	84H	Min.
		P1144	08H	04H	Max.
		P0132	0CH	04H	Max.
		P0134	0DH	04H	Max.
	Heated oxygen sensor 2	P0139	19H	86H	Min.
		P1147	1AH	86H	Min.
		P1146	1BH	06H	Max.
		P0138	1CH	06H	Max.
HO2S HEATER	Heated oxygen sensor 1 heater	P0135	29H	08H	Max.
			2AH	88H	Min.
	Heated oxygen sensor 2 heater	P0141	2DH	0AH	Max.
			2EH	8AH	Min.

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:0000000001161412

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	EC-316
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-377
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-313
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-379
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-325
	Incorrect idle speed adjustment						1	1	1	1		1			EC-26
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-222, EC-224, EC-231
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-26
	Ignition circuit	1	1	2	2	2		2	2			2			EC-319
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-124
Mass air flow sensor circuit		1	1	2	2	2		2	2			2			EC-134
Engine coolant temperature sensor circuit							3			3					EC-142
Heated oxygen sensor 1 circuit			1	2	3	2		2	2			2			EC-148, EC-152, EC-158
Throttle position sensor circuit							2			2					EC-145, EC-187, EC-261, EC-263, EC-294
Accelerator pedal position sensor circuit				3	2	1									EC-265, EC-286, EC-290, EC-294
Knock sensor circuit				2								3			EC-195
Crankshaft position sensor (POS) circuit		2	2												EC-197

	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	
Camshaft position sensor (PHASE) circuit	3	2												EC-201
Vehicle speed signal circuit		2	3		3						3			EC-213
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-215, EC-217
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-219
PNP switch circuit			3		3		3	3			3			EC-280
Refrigerant pressure sensor circuit		2				3			3		4			EC-326
Electrical load signal circuit							3							EC-311
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-298 (with NAVI) HAC-184 (without NAVI)
ABS actuator and electric unit (control unit)			4											BRC-86

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-10
	Fuel piping			5	5	5		5	5			5			FL-4
	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-27
	Air cleaner														EM-27
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)														EM-27
	Electric throttle control actuator														EM-29
	Air leakage from intake manifold/ Collector/Gasket														EM-29
Cranking	Battery	1	1	1		1		1	1					1	PG-6
	Generator circuit														CHG-15
	Starter circuit	3										1			STR-13
	Signal plate	6													EM-89
	PNP switch	4													TM-621 (M/T) TM-44 (A/T)
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-80
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-89
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														

		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	
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			EM-50
	Camshaft														EM-59
	Intake valve timing control														EM-50
	Intake valve												3		EM-80
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-32
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-40, EM-42, LU-9
	Oil level (Low)/Filthy oil														LU-6
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-16
	Thermostat									5					CO-22
	Water pump														CO-20
	Water gallery														CO-24
	Cooling fan									5					CO-18 (with A/C) CO-18 (without A/C)
	Coolant level (Low)/Contaminated coolant														CO-11
NATS (NISSAN Vehicle Immobilizer System)		1	1												SEC-7

1 - 6: The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

Description

INFOID:0000000001161413

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,500 rpm under no load [for example, the shift lever position is P or N (A/T), Neutral (M/T) and engine speed is over 2,500 rpm] fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.
Fuel cut will be operated until the engine speed reaches 2,000 rpm, then fuel cut will be cancelled.

NOTE:
This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, EC-38, "System Description".

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000001161414

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SRC and SB section of this Service Manual.

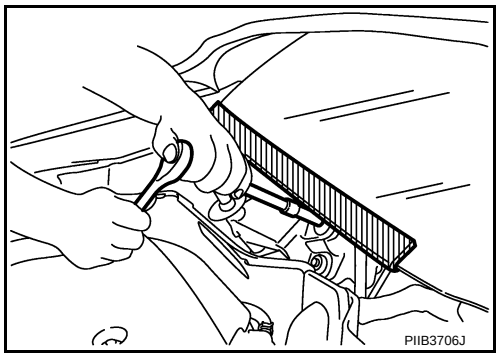
WARNING:

- **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 SRC section.**
- **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 for Procedure without Cowl Top Cover

INFOID:0000000001161415

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



Precautions For Xenon Headlamp Service

INFOID:0000000001161416

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 A/T

INFOID:0000000001161417

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.

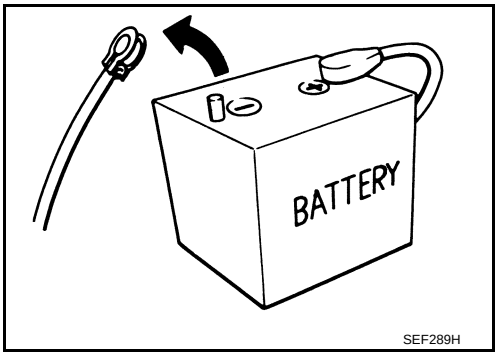
CAUTION:

- **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 XX-XX, "*****".**
- **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 fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.**

General Precautions

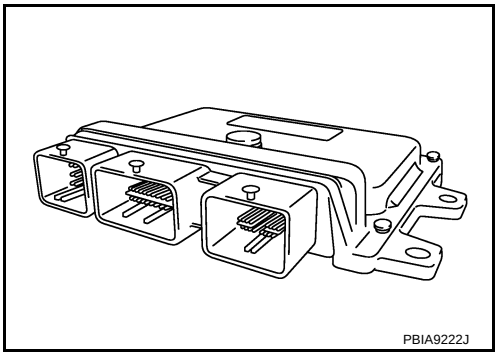
INFOID:0000000001161418

- **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.**



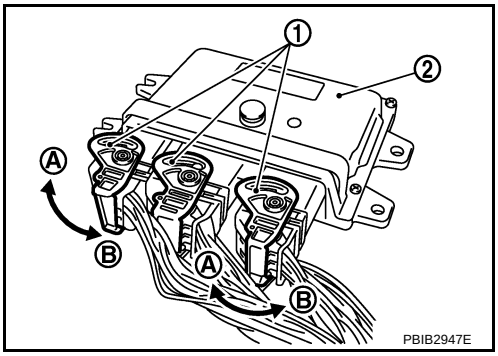
SEF289H

- **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**


PBIA9222J

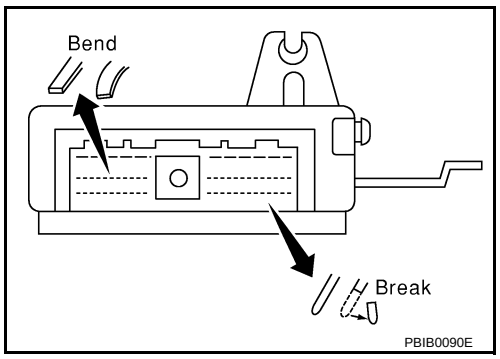
- **When connecting ECM harness connector (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.**

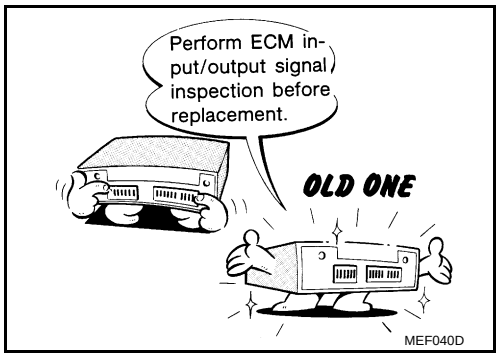
2. ECM
A. Loosen



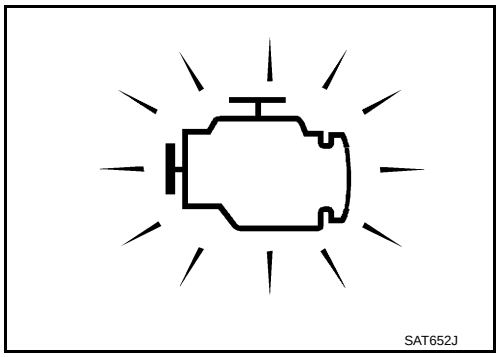
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- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect 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 EC-328, "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).**

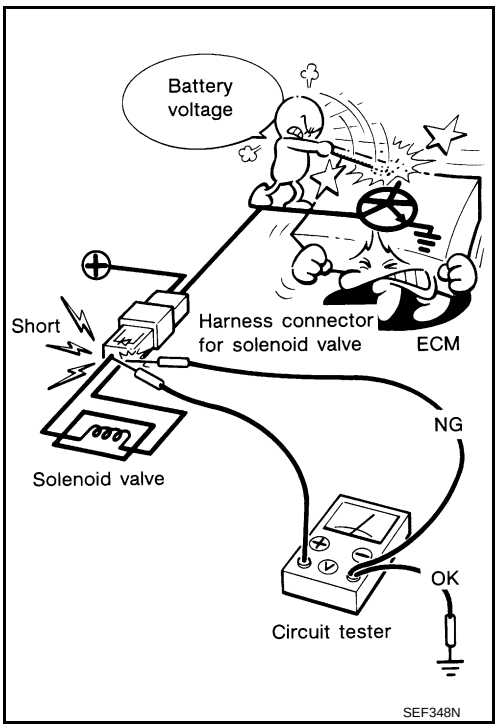




- **After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check.** The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.

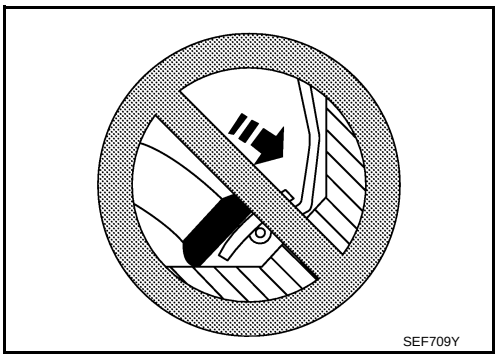


- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

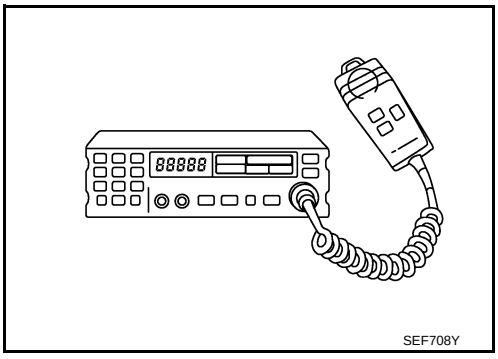


- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**

- **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.**



- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
- **Keep the antenna as far as possible from the electronic control units.**
- **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
  Do not let them run parallel for a long distance.
- **Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.**
- **Be sure to ground the radio to vehicle body.**

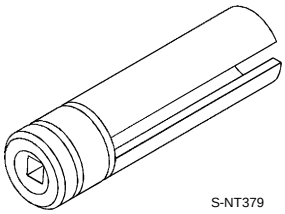
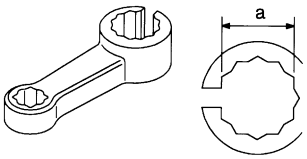
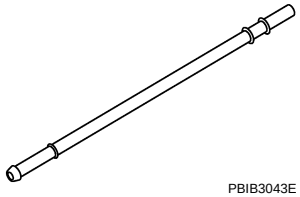


PREPARATION

PREPARATION

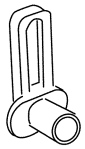
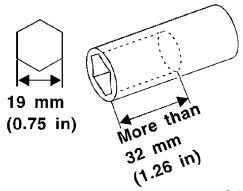
Special Service Tools

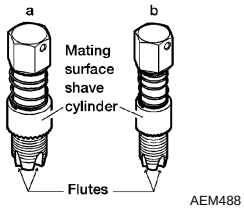
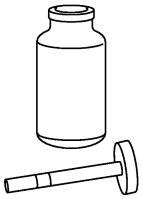
INFOID:0000000001161419

Tool number Tool name	Description
KV10117100 Heated oxygen sensor wrench  S-NT379	Loosening or tighening heated oxygen sensor with 22 mm (0.87 in) hexagon unit
KV10114400 Heated oxygen sensor wrench  S-NT636	Loosening or tighening heated oxygen sensor 2 a: 22 mm (0.87 in)
KV10118400 Fuel tube adapter  PBIB3043E	Measuring fuel pressure

Commercial Service Tools

INFOID:0000000001161420

Tool name	Description
Quick connector release  PBIC0198E	Removing fuel tube quick connectors in engine room (Available in SEC. 164 of PARTS CATALOG: Par No. 16441 6N210)
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor

Tool name	Description
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 MAINTENANCE

FUEL PRESSURE

Inspection

INFOID:0000000001161421

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

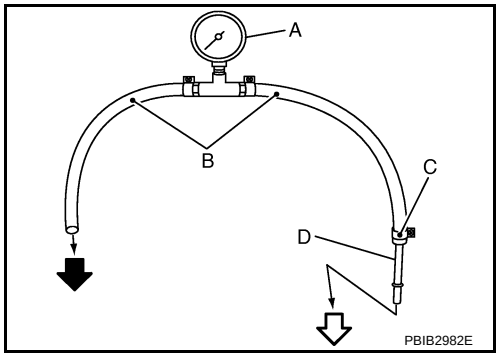
CAUTION:

- **Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.**
- **The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.**
- **Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains sealability with O-rings inside.**
- **Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.**

NOTE:

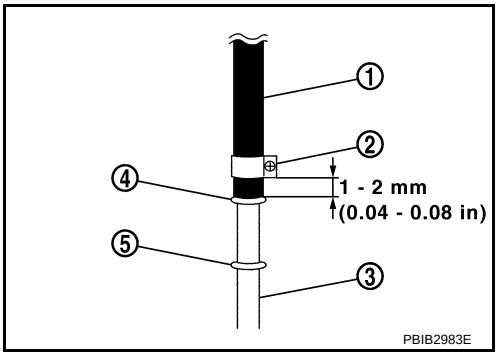
Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because C11 models do not have fuel return system.

1. Release fuel pressure to zero.
2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.
   - ⇦: To quick connector
   - ⬅: To fuel tube (engine side)
   - C: Clamp
   - Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
   - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
   - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
   - Use Pressure Gauge to check fuel pressure.



3. Remove fuel hose.
   - Do not twist or kink fuel hose because it is plastic hose.

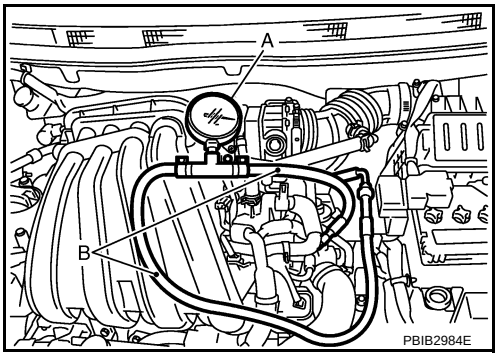
4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
   - No.2 spool (5)
   - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
   - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
   - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
   - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
   - When reconnecting fuel line, always use new clamps.
   - Use a torque driver to tighten clamps.
   - Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).



Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

   - Make sure that clamp screw does not contact adjacent parts.

5. Connect fuel tube adapter to quick connector.
   - A: Fuel pressure gauge
   - B: Fuel hose for fuel pressure check
6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
7. Turn ignition switch ON and check for fuel leakage.
8. Start engine and check for fuel leakage.
9. Read the indication of fuel pressure gauge.
   - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
   - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.



At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2, 51 psi)

10. If result is unsatisfactory, go to next step.
11. Check the following.
    - Fuel hoses and fuel tubes for clogging
    - Fuel filter for clogging
    - Fuel pump
    - Fuel pressure regulator for clogging

    If OK, replace fuel pressure regulator.
    If NG, repair or replace.

EVAPORATIVE EMISSION SYSTEM

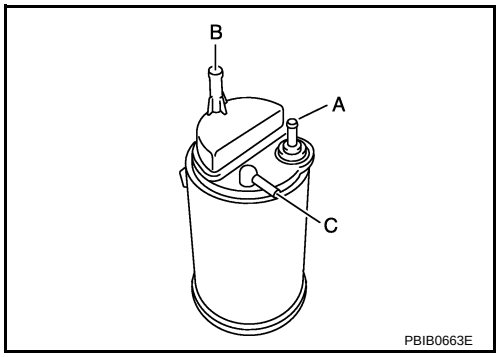
Inspection

INFOID:0000000001161422

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).

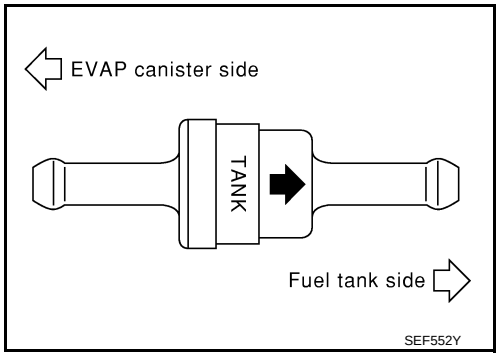


3. Visually inspect the fuel check valve for cracks, damage, loose connections chafing and deterioration.
4. Check fuel check valve as follows:

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.

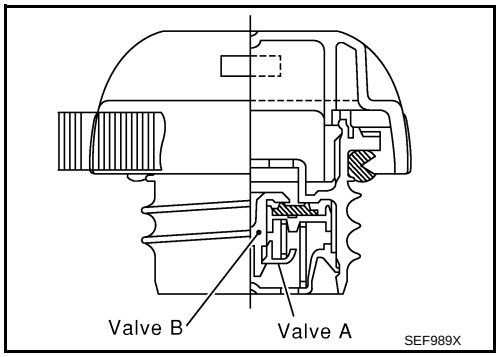
b. Blow air through connector on EVAP canister side. Air flow should be smoothly directed toward fuel tank side.

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.

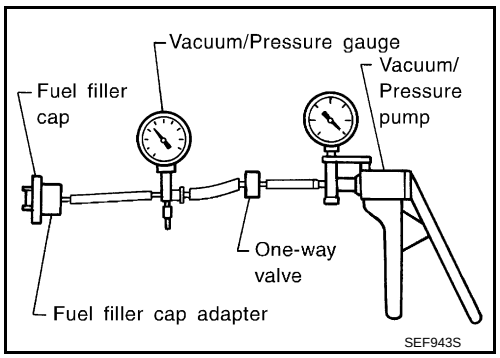
a. Wipe clean valve housing.



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:0000000001161423

Transmission	Condition	Specification
A/T	No load* (in P or N position)	700 ±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:0000000001161424

Transmission	Condition	Specification
A/T	No load* (in P or N position)	6 ± 5° BTDC
M/T	No load* (in Neutral position)	6 ± 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:0000000001161425

Condition	Specification (Using CONSULT-III or GST)
At idle	10 – 35 %
At 2,500 rpm	10 – 35 %

Mass Air Flow Sensor

INFOID:0000000001161426

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	1.0 – 1.3V*
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.

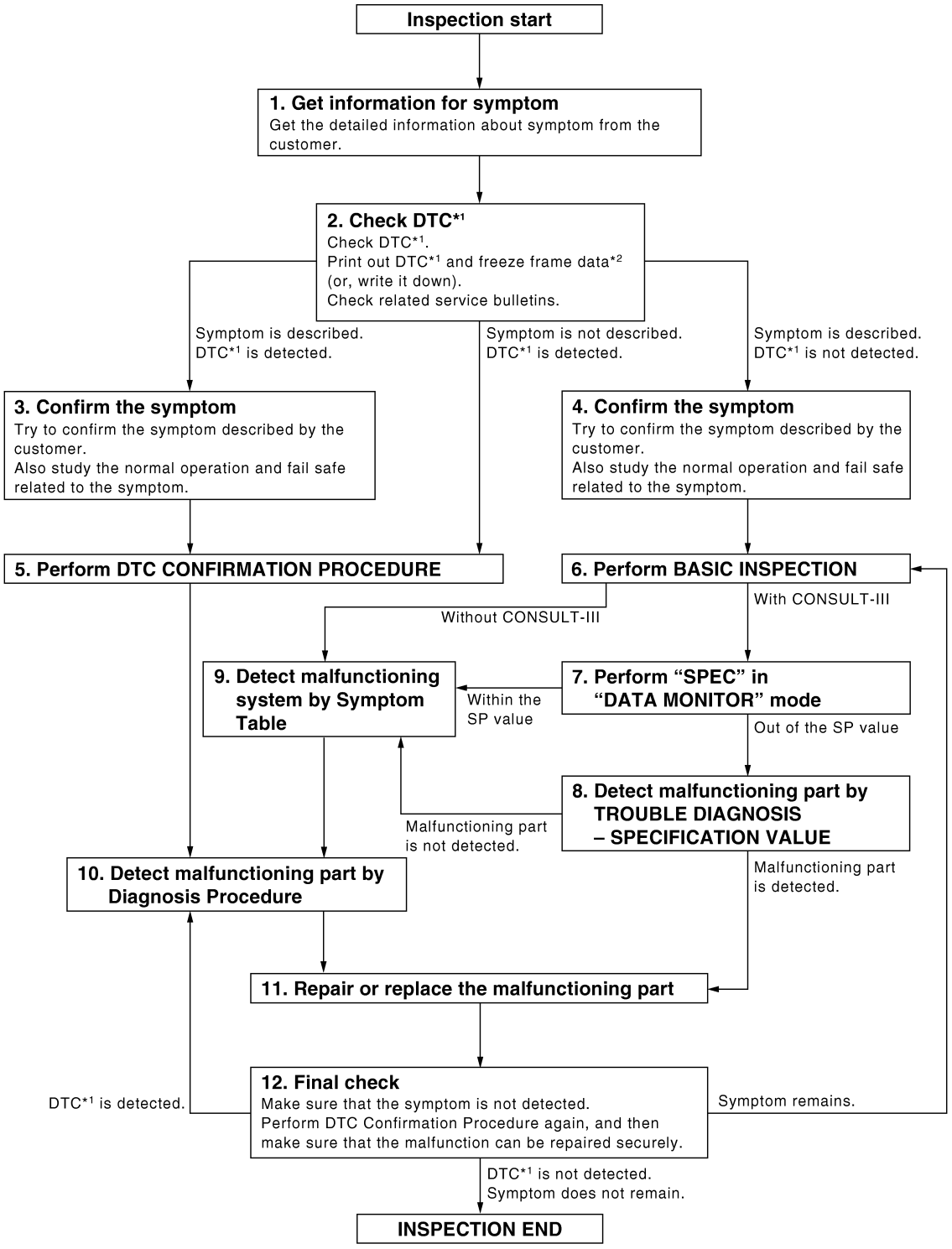
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000001161427

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 EC-383, "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 EC-457, "Diagnosis Description".)
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to EC-670, "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 EC-674, "Description" and EC-665, "Fail Safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
Also study the normal operation and fail safe related to the symptom. Refer to EC-674, "Description" and EC-665, "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 EC-667, "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 EC-667, "DTC Index".

6.PERFORM BASIC INSPECTION

Perform EC-385, "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 EC-469, "Component Function Check".

Is the measurement value within the SP value?

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

8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-470, "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 EC-670, "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-58, "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 EC-635, "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 EC-457, "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. (Refer to EC-457, "Diagnosis Description".)

Diagnostic Work Sheet

INFOID:0000000001161428

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.

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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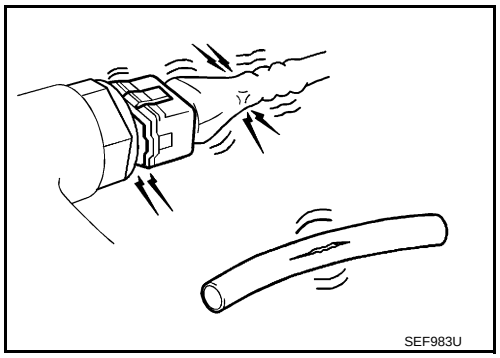
INSPECTION AND ADJUSTMENT
BASIC INSPECTION

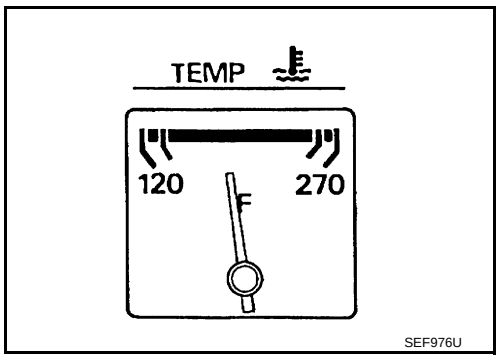
BASIC INSPECTION : Special Repair Requirement

INFOID:0000000001161429

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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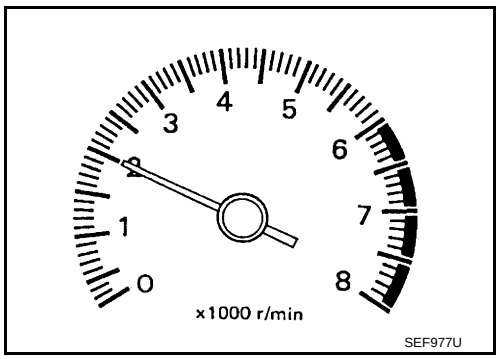


SEF976U

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.

Is any DTC detected?

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



SEF977U

2.REPAIR OR REPLACE

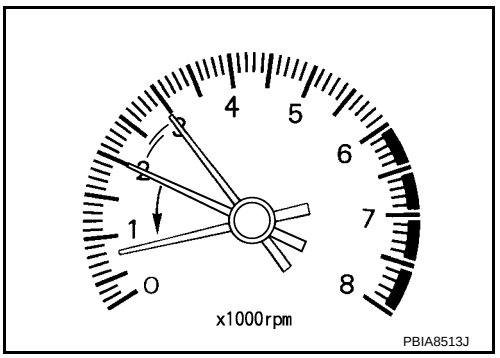
Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> 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 EC-389, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-684, "Idle Speed".



Is the inspection result normal?

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

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-389, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-390, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-390, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 7.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   For procedure, refer to EC-389, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-684, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the Following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-520, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-516, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace. Then GO TO 4.

9. CHECK ECM FUNCTION

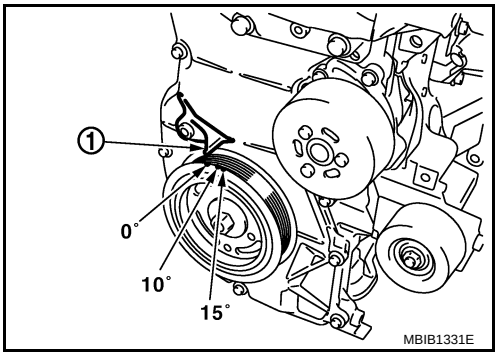
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-7, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement".

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.

2. Check ignition timing with a timing light.
For procedure, refer to EC-389, "IGNITION TIMING : Special Repair Requirement".
For specification, refer to EC-684, "Ignition Timing".



1 : Timing indicator

Is the inspection result normal?

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

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-389, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-390, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-390, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 14.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

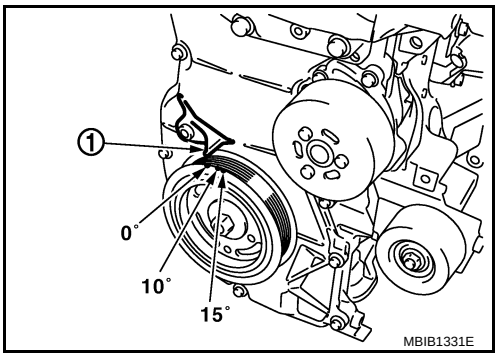
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
For procedure, refer to EC-389, "IDLE SPEED : Special Repair Requirement".
For specification, refer to EC-684, "Idle Speed".

Is the inspection result normal?

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

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.
For procedure, refer to EC-389, "IGNITION TIMING : Special Repair Requirement".
For specification, refer to EC-684, "Ignition Timing".



1 : Timing indicator

Is the inspection result normal?

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

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-50, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair the timing chain installation. Then GO TO 4.

17.DETECT MALFUNCTIONING PART

Check the following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-520, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-516, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair or replace. Then GO TO 4.

18.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 and registration of all NATS ignition key IDs. Refer to SEC-7, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement".

>> GO TO 4.

19.INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, go to EC-388, "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:0000000001161430

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement

INFOID:0000000001161431

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

Refer to EC-388, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 2.

2.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-388, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 3.

3.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-390, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 4.

4.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-390, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

IDLE SPEED

IDLE SPEED : Description

INFOID:0000000001161432

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

IDLE SPEED : Special Repair Requirement

INFOID:0000000001161433

1.CHECK IDLE SPEED

With CONSULT-III
Check idle speed in “DATA MONITOR” mode with CONSULT-III.

Without CONSULT-III
Check the idle speed by installing the pulse type tachometer clamp on No.4 ignition coil harness.

>> INSPECTION END

IGNITION TIMING

IGNITION TIMING : Description

INFOID:0000000001161434

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

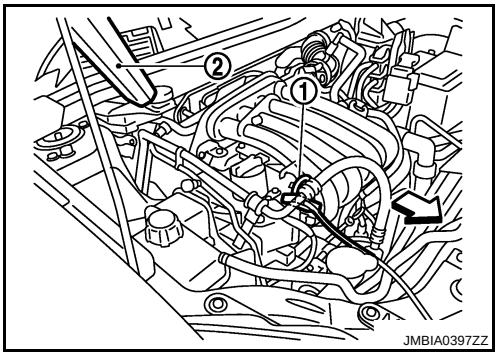
IGNITION TIMING : Special Repair Requirement

INFOID:0000000001161435

1.CHECK IGNITION TIMING

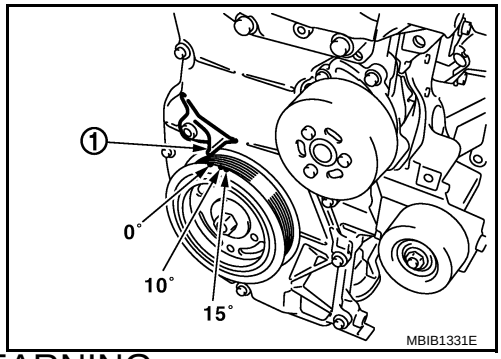
1. Attach timing light to No.1 ignition coil wire harness (1) as shown.

2 : Timing light
⇦ : Vehicle front



2. Check ignition timing.

1 : Timing indicator



>> INSPECTION END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description

INFOID:0000000001161436

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 Re-

quirement

INFOID:0000000001161437

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:0000000001161438

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

THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement

INFOID:0000000001161439

1.START

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
   Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

>> END

IDLE AIR VOLUME LEARNING

IDLE AIR VOLUME LEARNING : Description

INFOID:0000000001161440

Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps each engine idle speed within the specific range. It must be performed under any of the following conditions:
- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

IDLE AIR VOLUME LEARNING : Special Repair Requirement

INFOID:0000000001161441

1.PRECONDITIONING

Make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.
- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 100°C (158 - 212°F)
- Park/neutral position switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
  On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up

- For A/T models
- With CONSULT-III: Drive vehicle until “FLUID TEMP SE” in “DATA MONITOR” mode of “A/T” system indicates less than 0.9V.
- Without CONSULT-III: Drive vehicle for 10 minutes.

- For M/T models
- Drive vehicle for 10 minutes.

Do you have CONSULT-III?

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

2. IDLE AIR VOLUME LEARNING

With CONSULT-III

1. Perform Accelerator Pedal Released Position Learning. Refer to EC-389, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-390, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
3. Start engine and warm it up to normal operating temperature.
4. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.
5. Touch “START” and wait 20 seconds.

Is “CMPLT” displayed on CONSULT-III screen?

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

3. IDLE AIR VOLUME LEARNING

Without CONSULT-III

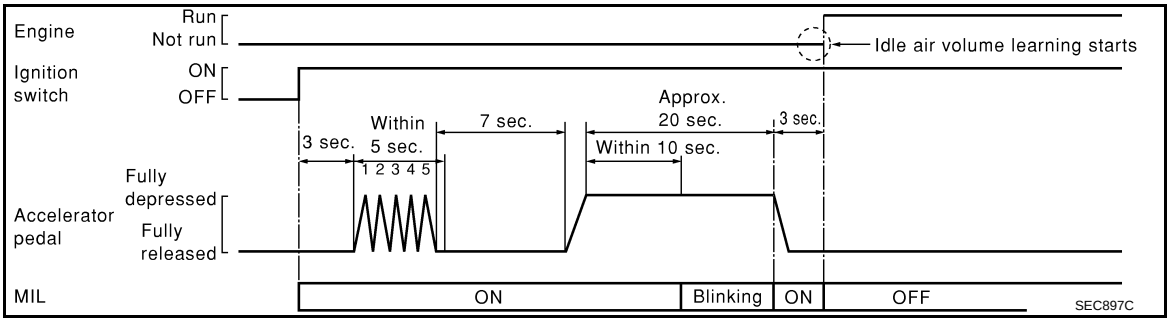
NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

1. Perform Accelerator Pedal Released Position Learning. Refer to EC-389, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-390, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
3. Start engine and warm it up to normal operating temperature.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
6. Repeat the following procedure quickly five times within 5 seconds.

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

7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MI stops blinking and turned ON.
8. Fully release the accelerator pedal within 3 seconds after the MI turned ON.
9. Start engine and let it idle.
10. Wait 20 seconds.



>> GO TO 4.

4. CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.
For specification, refer to EC-684, "Idle Speed" and EC-684, "Ignition Timing".

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

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

Is the inspection result normal?

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

6. DETECT MALFUNCTIONING PART

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.
It is useful to perform “TROUBLE DIAGNOSIS - SPECIFICATION VALUE”. Refer to EC-469, "Description".
If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:
- Engine stalls.
- Erroneous idle.

>> INSPECTION END

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description

INFOID:0000000001161442

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:0000000001161443

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, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure that DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-457, "Diagnosis Description".
7. Make sure that DTC P0000 is displayed.

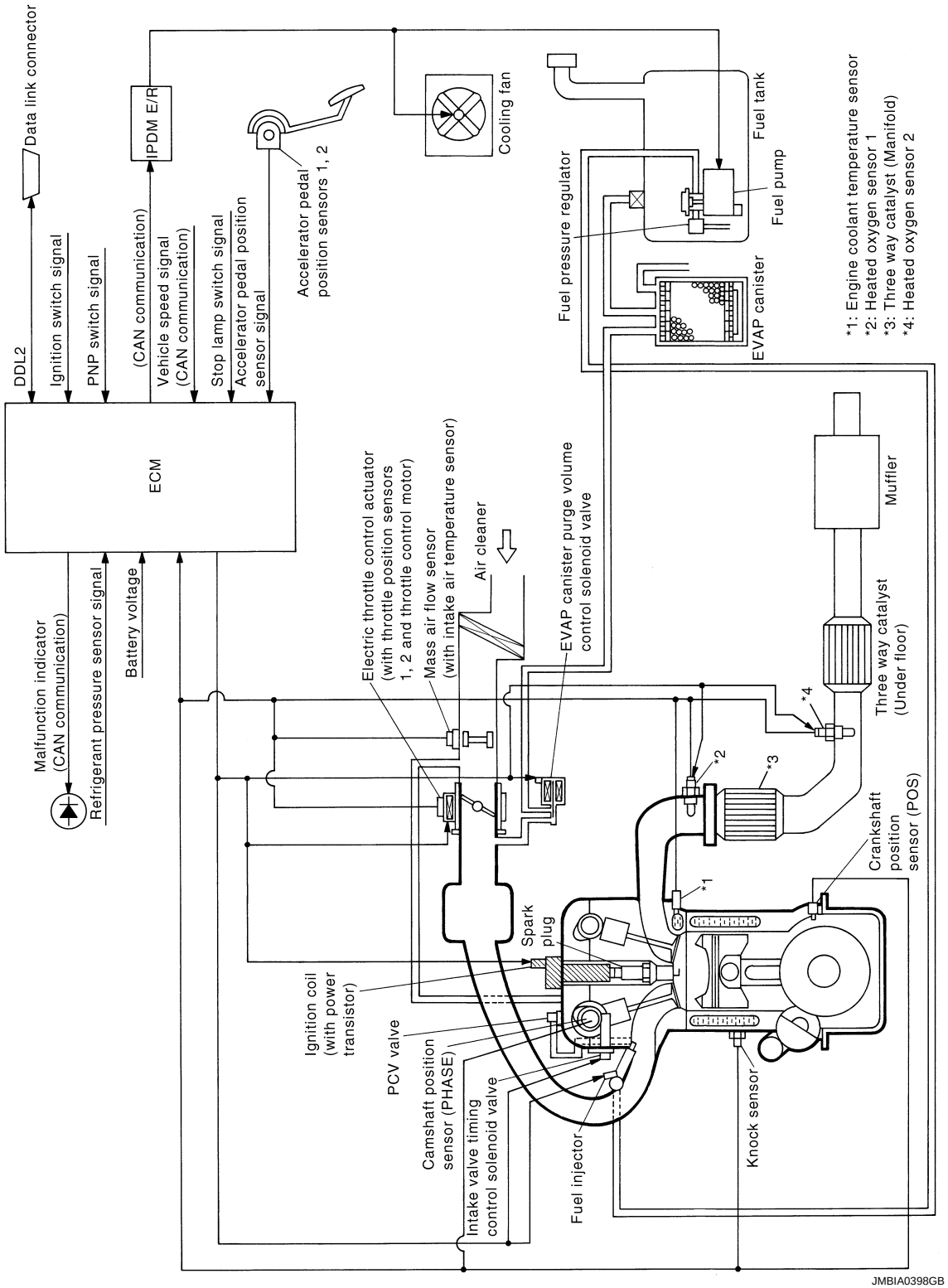
>> END

FUNCTION DIAGNOSIS

ENGINE CONTROL SYSTEM

System Diagram

INFOID:0000000001693459



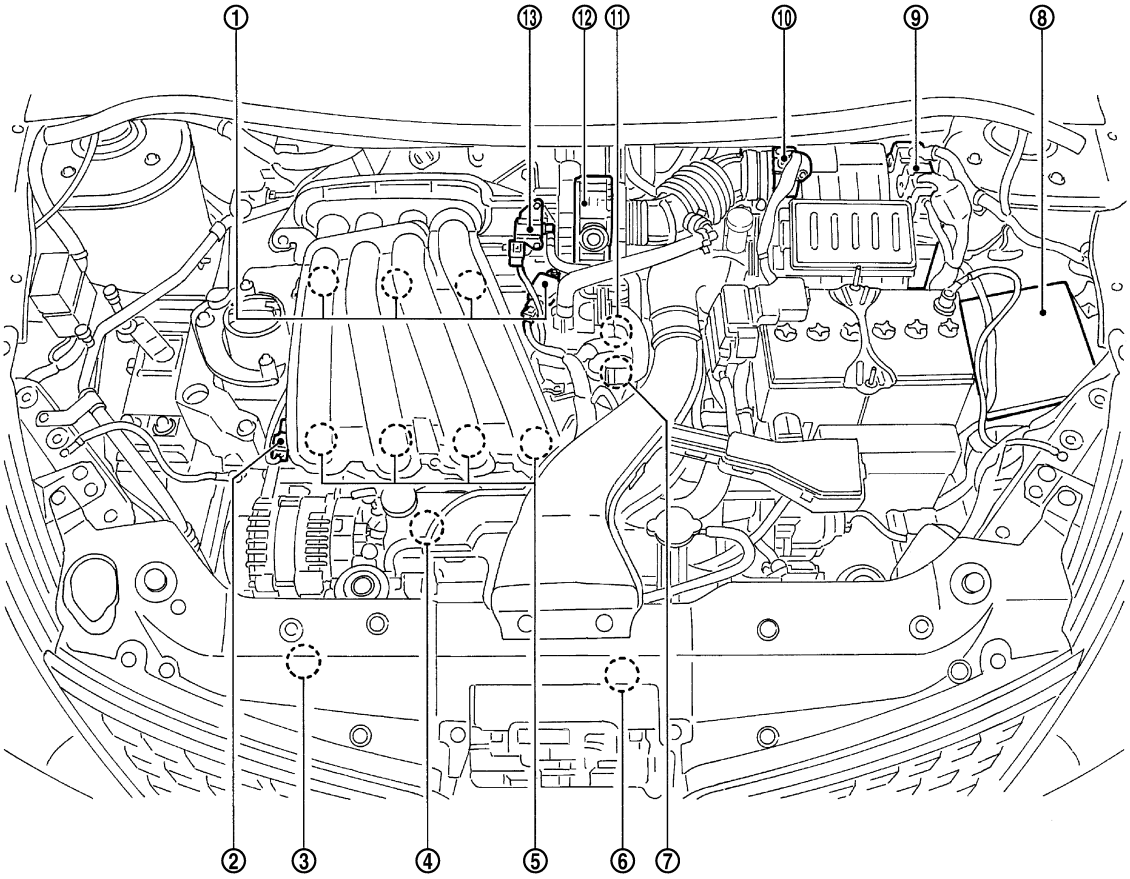
System Description

INFOID:0000000001693460

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

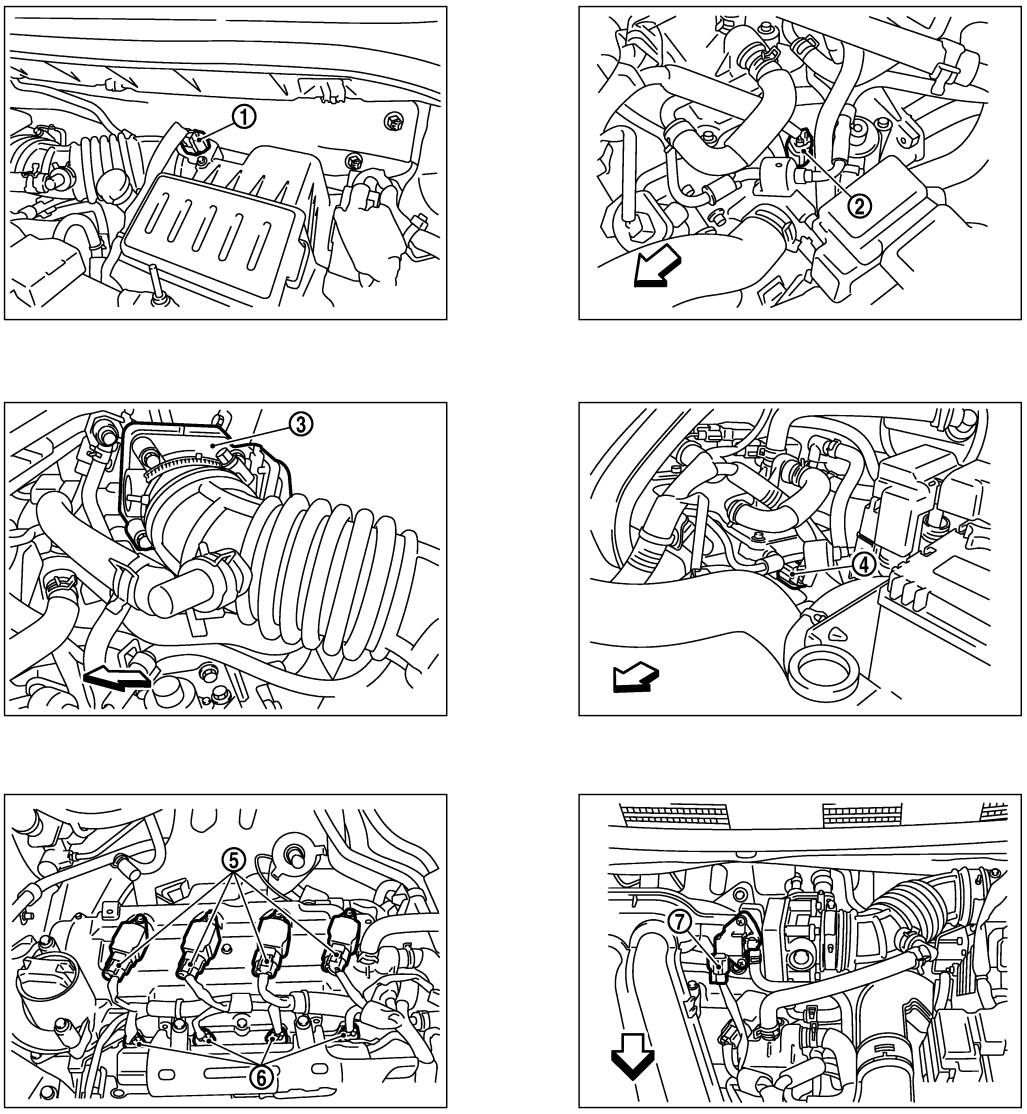
Component Parts Location

INFOID:0000000001693461



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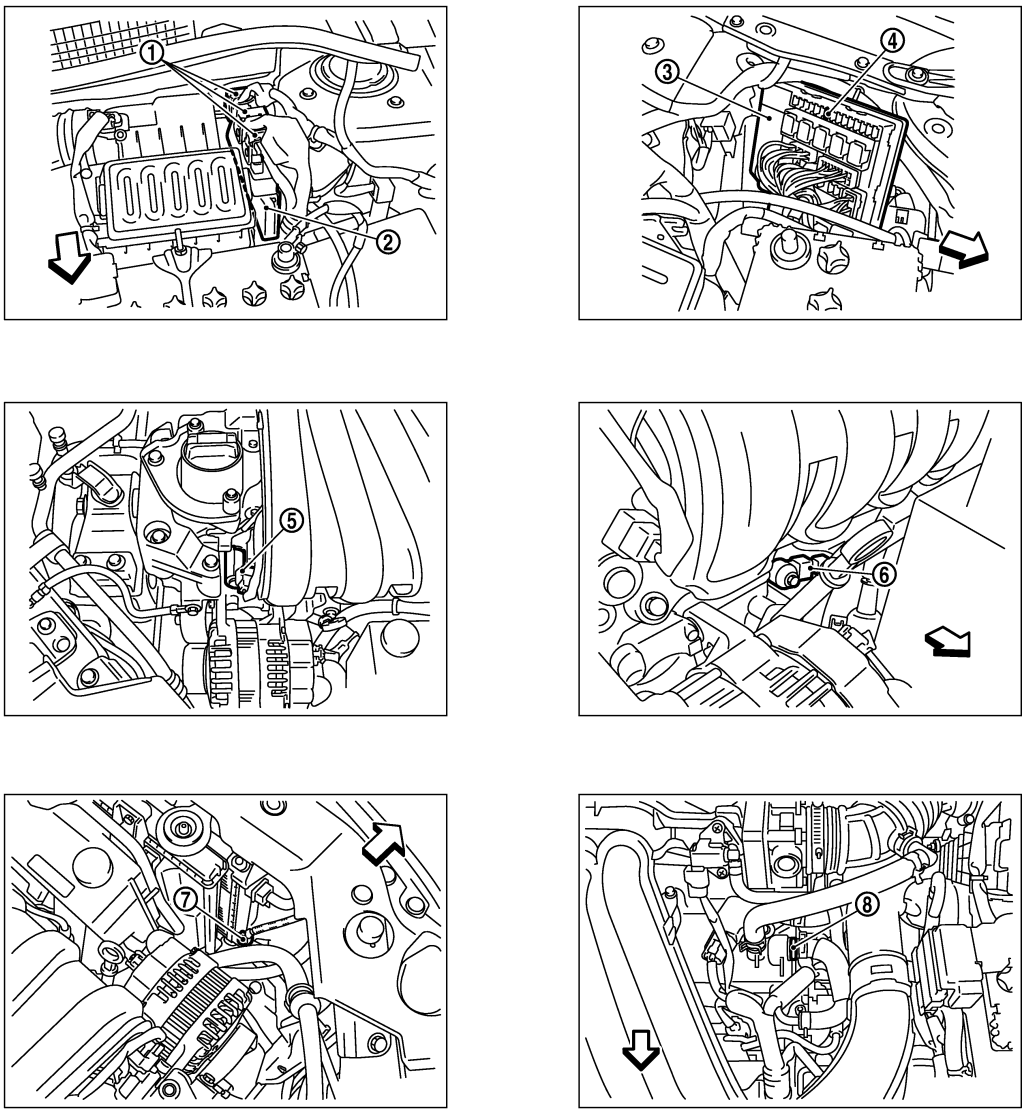
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Camshaft position sensor (PHASE)
5. Ignition coil (with power transistor)
6. Fuel injector
7. EVAP canister purge volume control solenoid valve

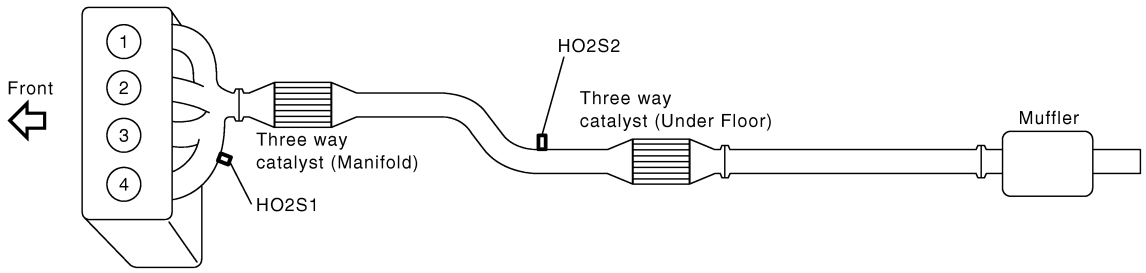
⇦ Vehicle front



PBIB2941E

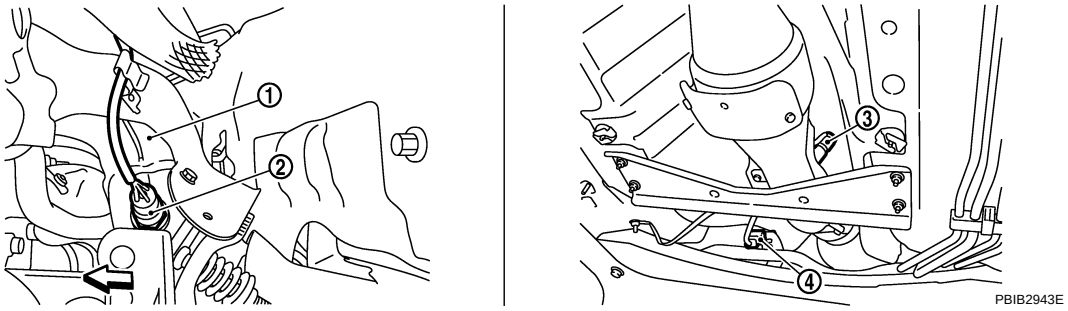
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

⇦ Vehicle front



No. of sensor
Location of a sensor in relation the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on

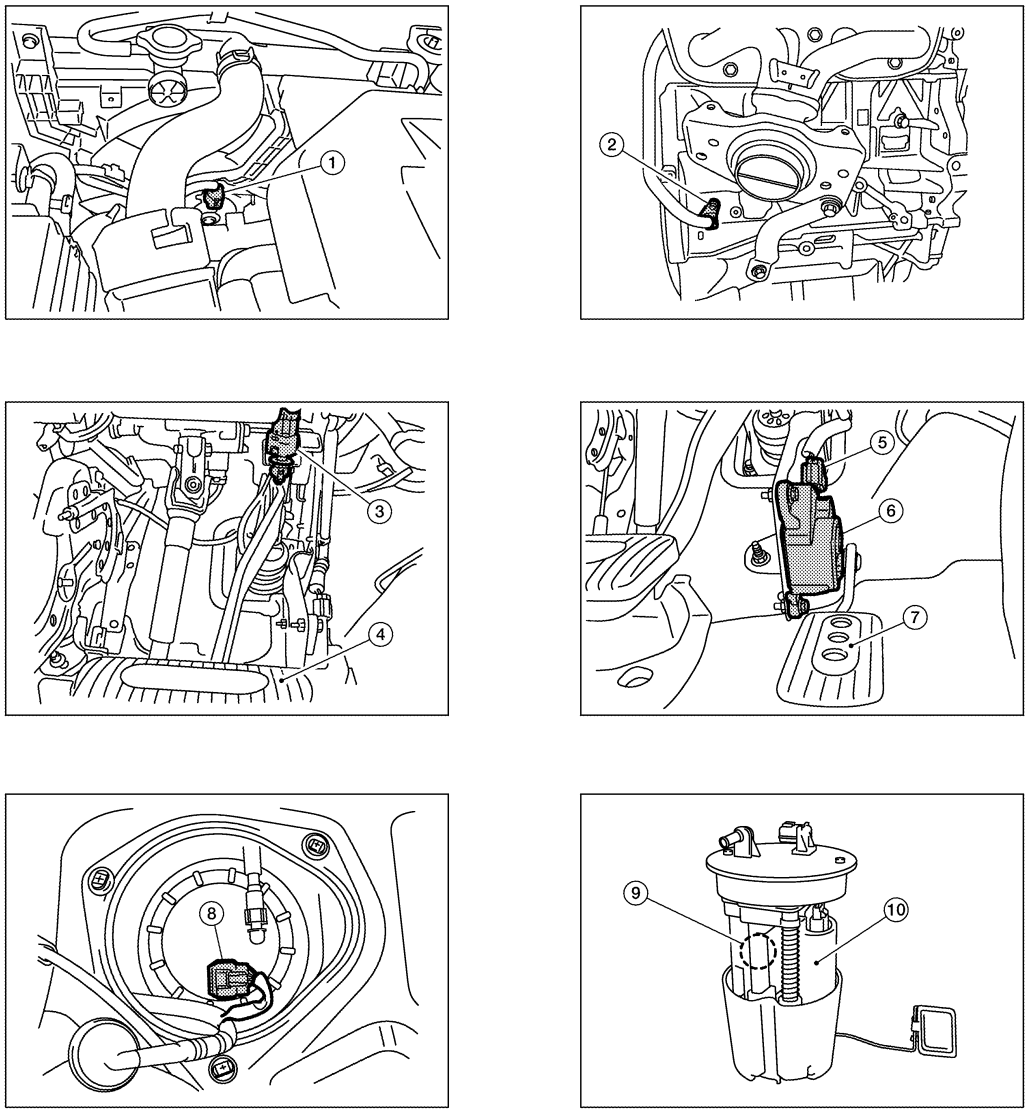
PBIB2942E



PBIB2943E

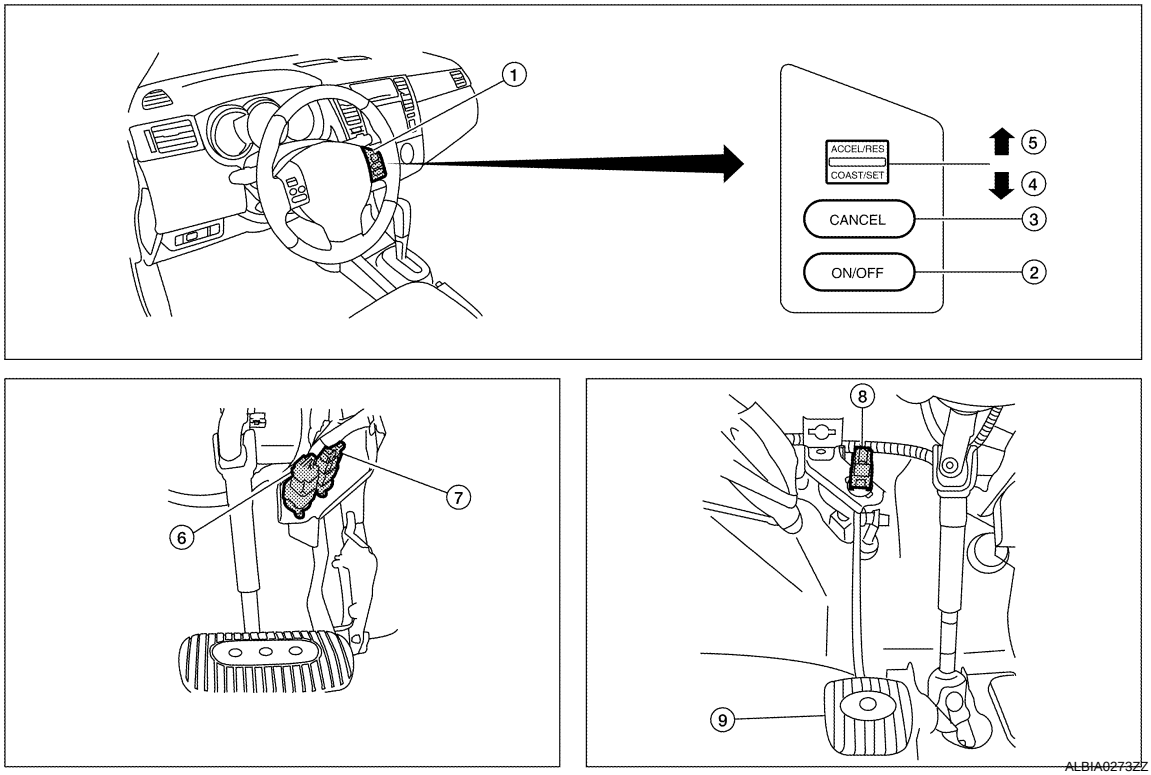
1. Exhaust manifold
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

⇦ Vehicle front



AWBIA0044ZZ

1. Cooling fan motor harness connector
2. Crankshaft position sensor
3. Stop lamp switch
4. Brake pedal
5. Accelerator pedal position sensor harness connector
6. Accelerator pedal position sensor
7. Accelerator pedal
8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
9. Fuel pressure regulator
10. Fuel pump



1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELERATE switch
6. ASCD brake switch
7. Stop lamp switch
8. ASCD clutch switch
9. Clutch pedal

Component Description

INFOID:0000000001693462

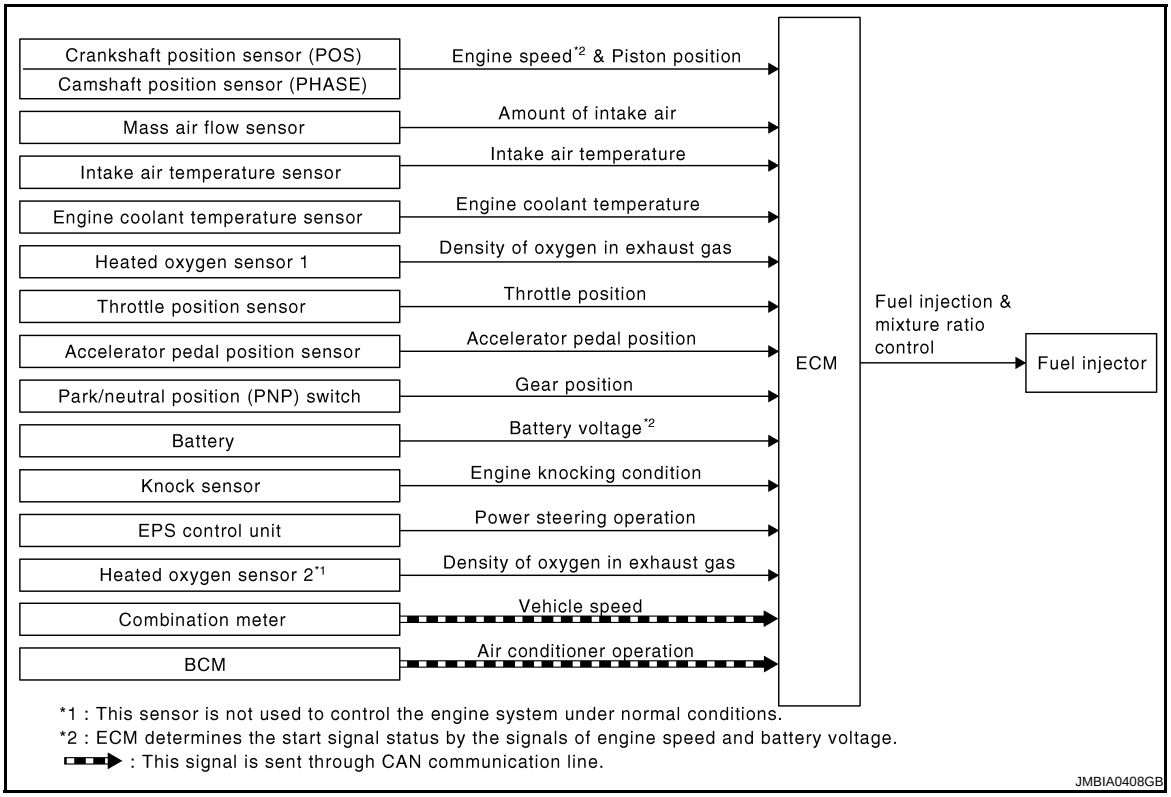
Component	Reference
Accelerator pedal position sensor	EC-572, "Description"
ASCD brake switch	EC-556, "Description"
ASCD steering switch	EC-553, "Description"
ASCD vehicle speed sensor	EC-564, "Description"
Camshaft position sensor (PHASE)	EC-520, "Description"
Crankshaft position sensor (POS)	EC-516, "Description"
Cooling fan motor	EC-593, "Description"
Electric throttle control actuator	EC-531, "Description"
Engine coolant temperature sensor	EC-492, "Description"
Fuel injector	EC-602, "Description"
Fuel pump	EC-605, "Description"
Heated oxygen sensor 1	EC-498, "Description"
Heated oxygen sensor 1 heater	EC-613, "Description"
Heated oxygen sensor 2	EC-507, "Description"
Heated oxygen sensor 2 heater	EC-620, "Description"
Ignition signal	EC-625, "Description"
Intake air temperature sensor	EC-623, "Description"
Intake valve timing control solenoid valve	EC-528, "Description"

Component	Reference
Knock sensor	EC-514, "Description"
Mass air flow sensor	EC-487, "Description"
Park/neutral position switch	EC-566, "Description"
PCV valve	EC-631, "Description"
Refrigerant pressure sensor	EC-632, "Description"
Stop lamp switch	EC-569, "Description"
Throttle control motor	EC-540, "Description"
Throttle control motor relay	EC-533, "Description"
Throttle position sensor	EC-495, "Description"
Vehicle speed sensor	EC-634, "Description"

MULTIPORT FUEL INJECTION SYSTEM

System Diagram

INFOID:0000000001693463



System Description

INFOID:0000000001693464

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		
Heated oxygen 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	Power steering operation		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
BCM	Air conditioner operation*2		
Combination meter	Vehicle speed*2		

*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.

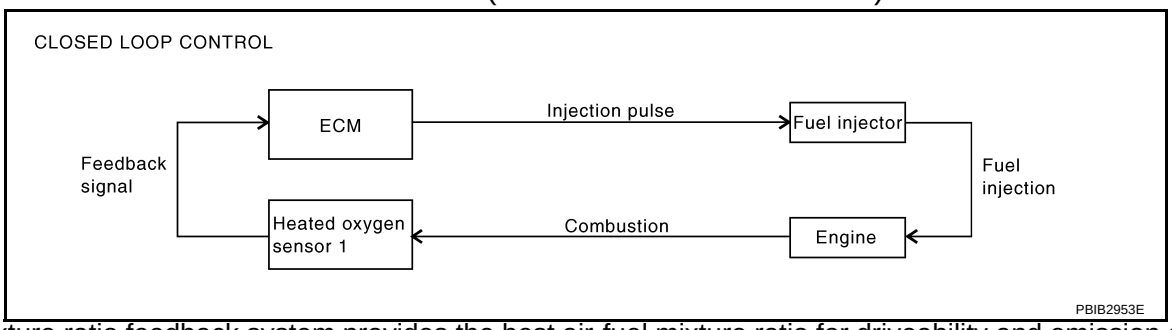
VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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
- When selector lever is changed from N to D (A/T models)
- High-load, high-speed operation

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

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses heated oxygen 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 heated oxygen sensor 1, refer to EC-498, "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 heated oxygen 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 heated oxygen sensor 1 or its circuit
- Insufficient activation of heated sensor 1 at low engine coolant temperature
- 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 heated oxygen 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.

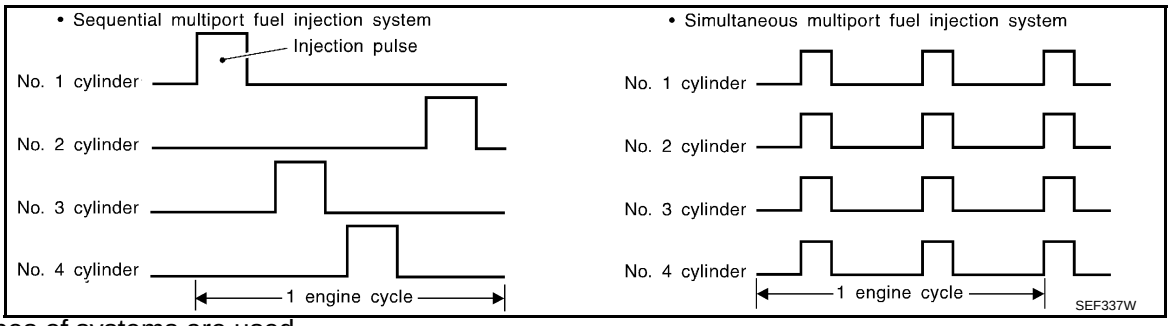
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios.

“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 heated oxygen 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.

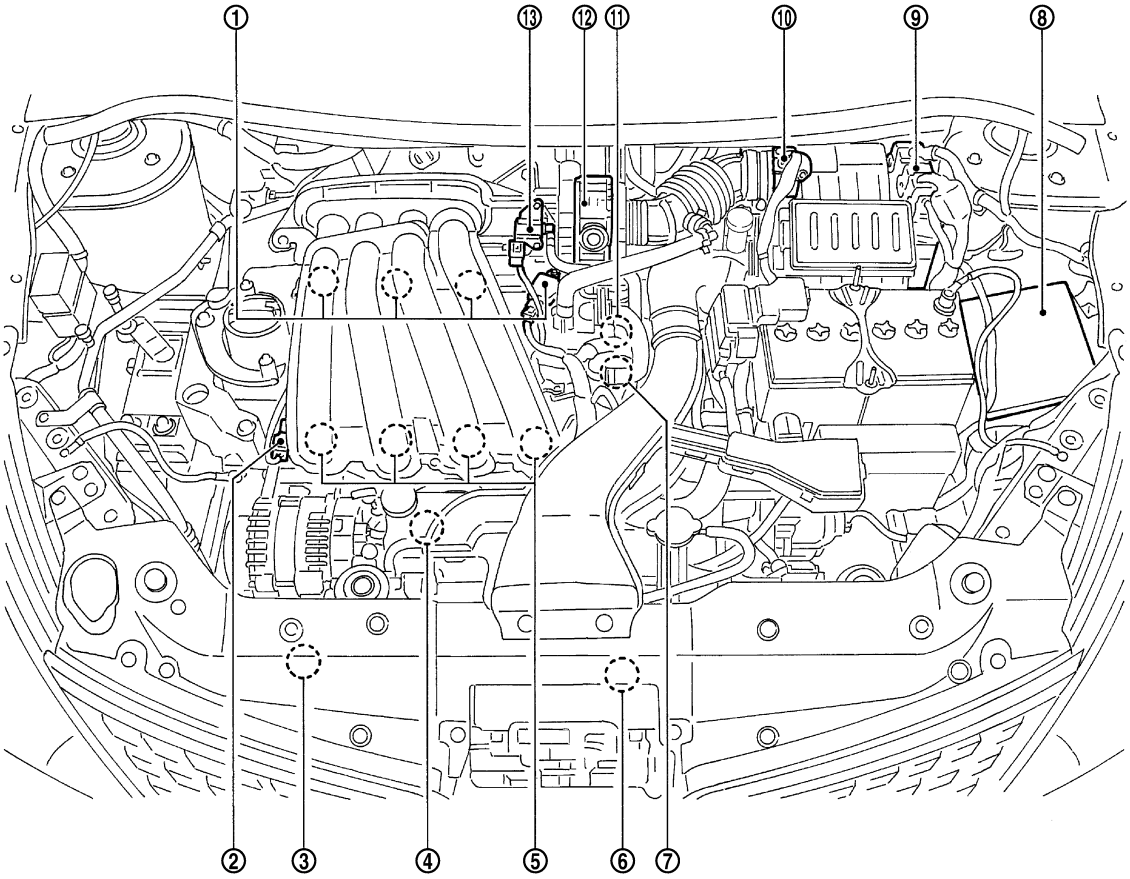
- Sequential Multiport Fuel Injection System
  Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.
- Simultaneous Multiport Fuel Injection System
  Fuel is injected simultaneously into all four cylinders twice each 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 when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

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

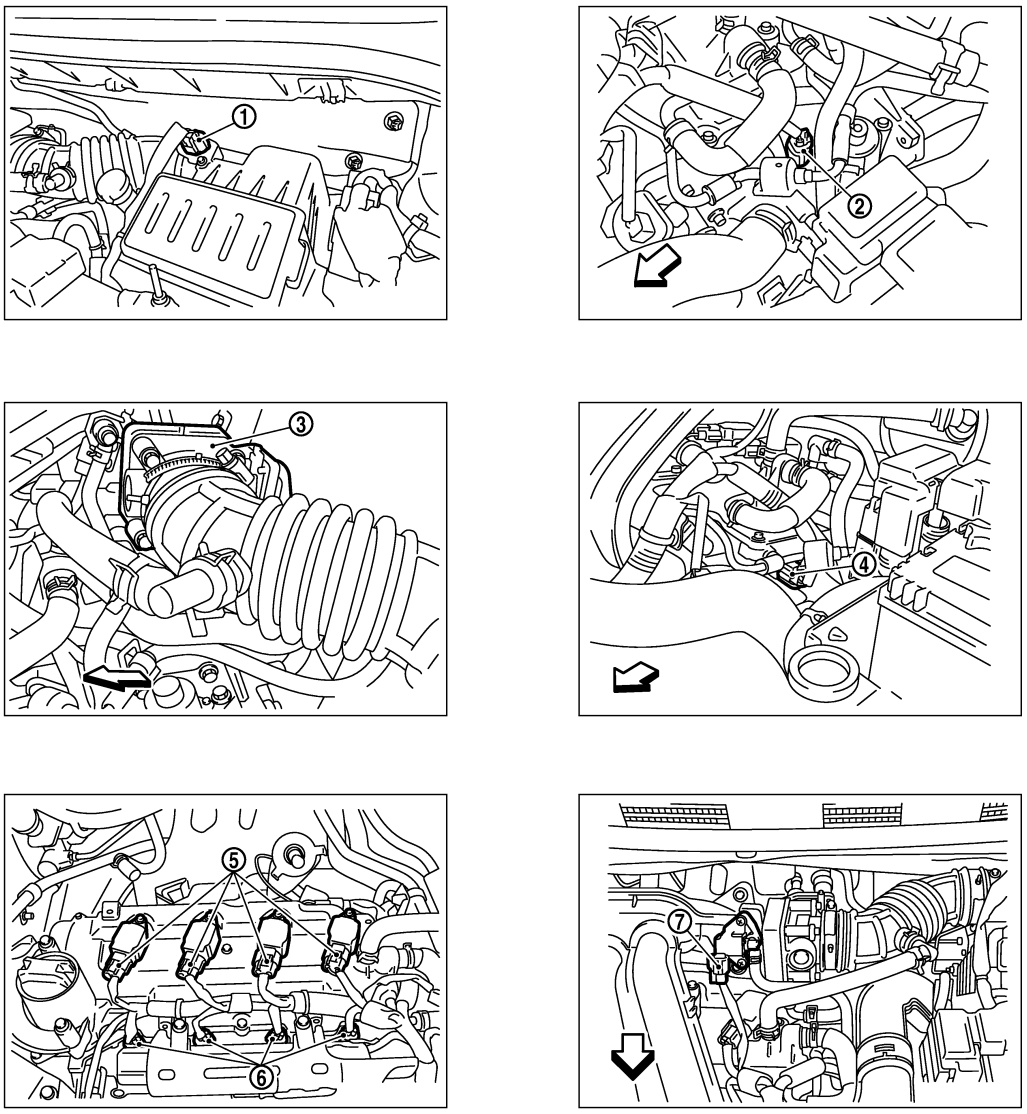
Component Parts Location

INFOID:0000000001693465



PBIB2939E

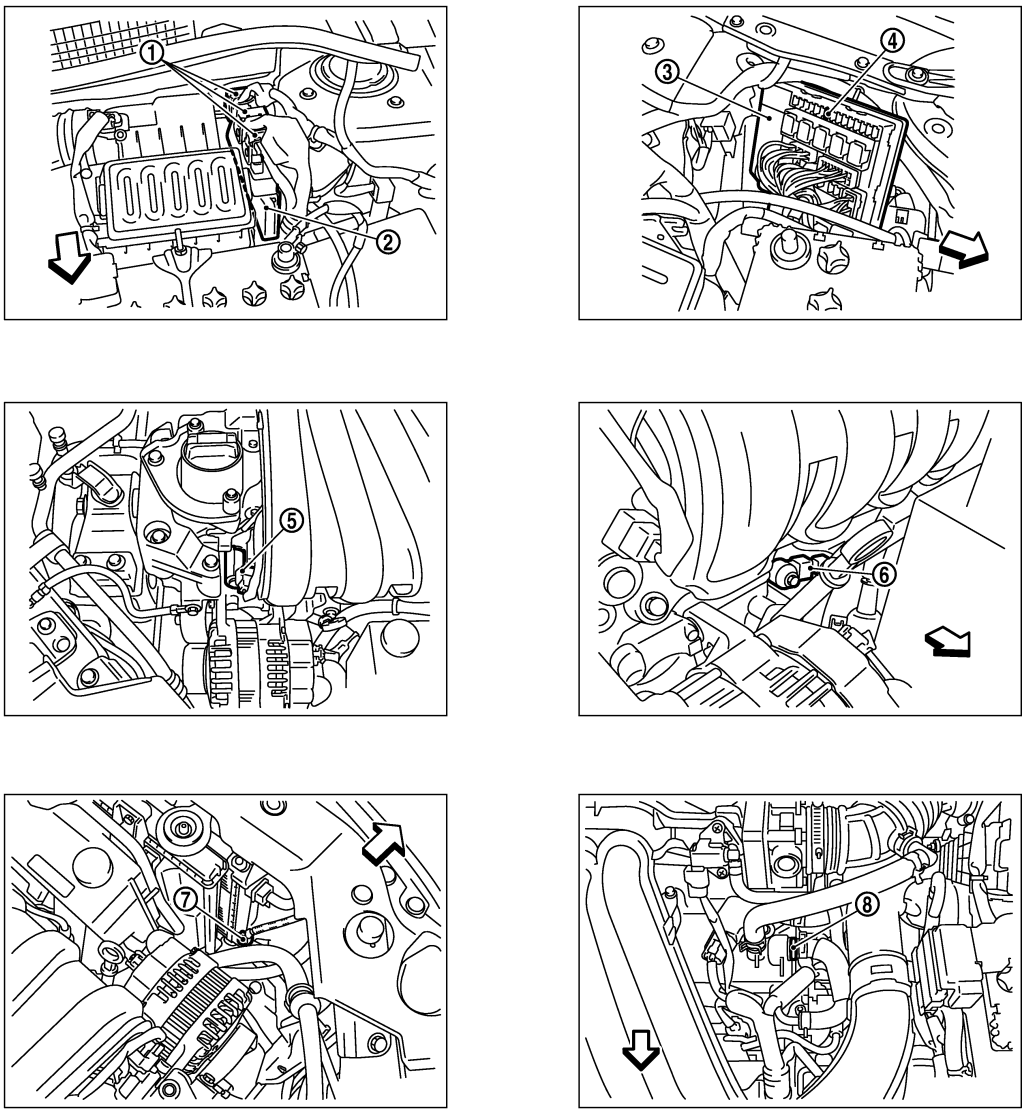
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Camshaft position sensor (PHASE)
5. Ignition coil (with power transistor)
6. Fuel injector
7. EVAP canister purge volume control solenoid valve

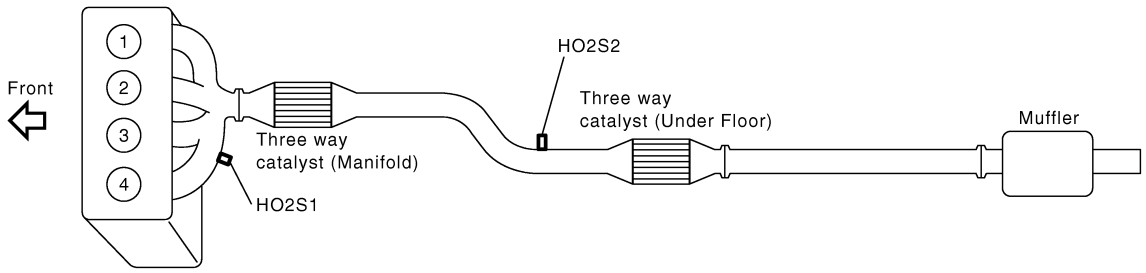
⇦ Vehicle front



PBIB2941E

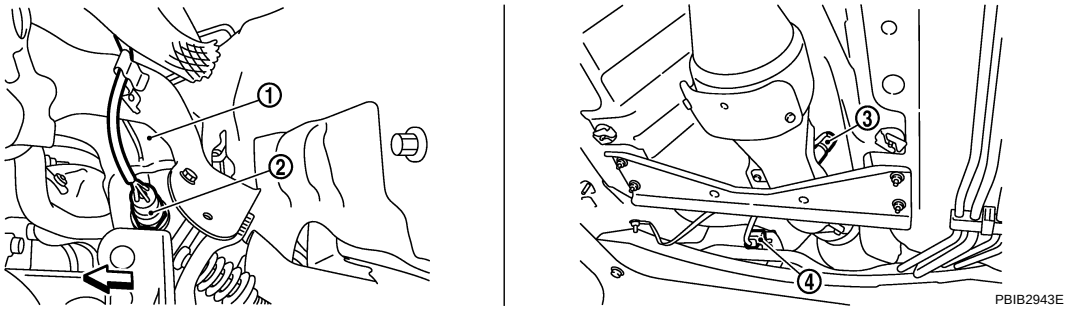
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

⇦ Vehicle front



No. of sensor
Location of a sensor in relation the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on

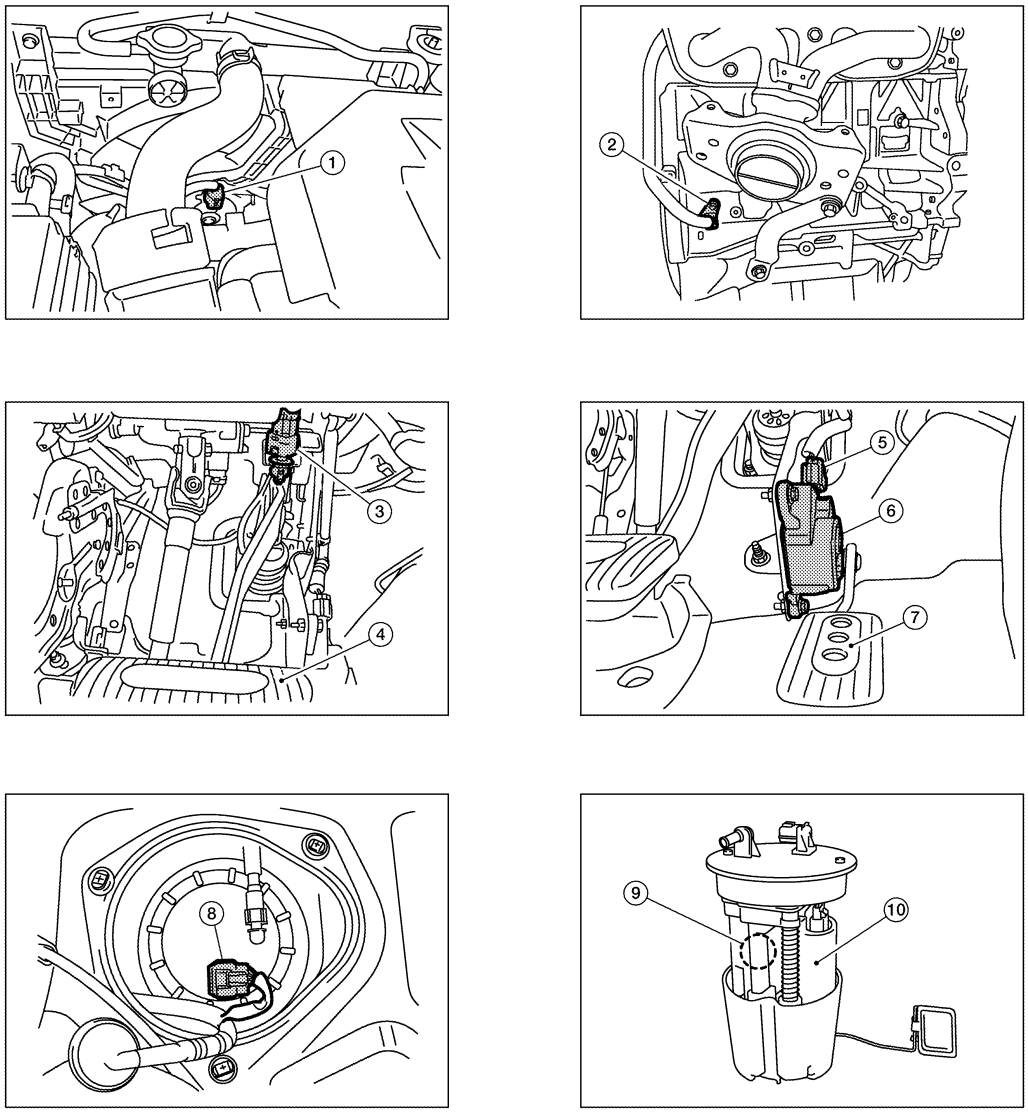
PBIB2942E



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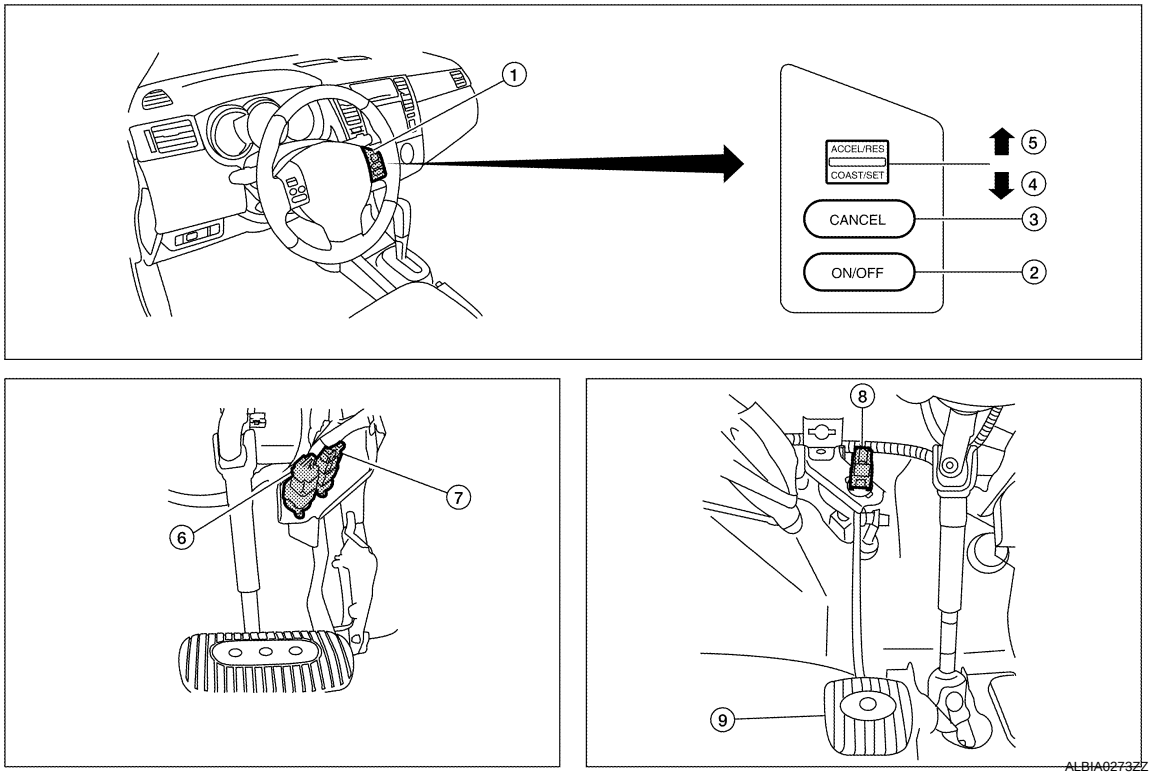
1. Exhaust manifold
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

⇦ Vehicle front



AWBIA0044ZZ

1. Cooling fan motor harness connector
2. Crankshaft position sensor
3. Stop lamp switch
4. Brake pedal
5. Accelerator pedal position sensor harness connector
6. Accelerator pedal position sensor
7. Accelerator pedal
8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
9. Fuel pressure regulator
10. Fuel pump



1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELERATE switch
6. ASCD brake switch
7. Stop lamp switch
8. ASCD clutch switch
9. Clutch pedal

Component Description

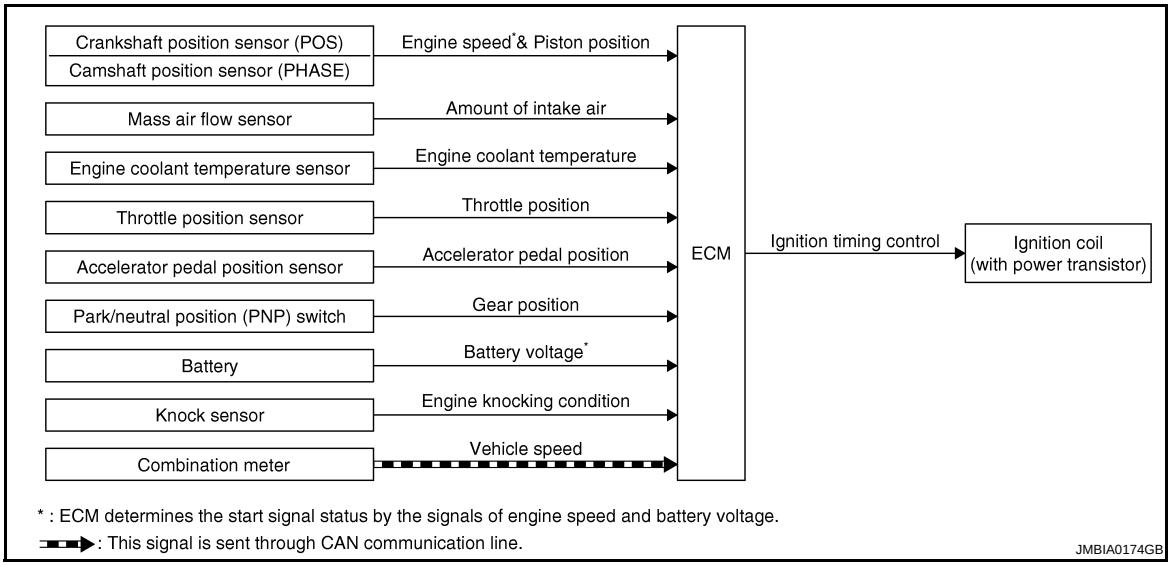
INFOID:0000000001693466

Component	Reference
Accelerator pedal position sensor	EC-572, "Description"
Camshaft position sensor (PHASE)	EC-520, "Description"
Crankshaft position sensor (POS)	EC-516, "Description"
Engine coolant temperature sensor	EC-492, "Description"
Fuel injector	EC-602, "Description"
Heated oxygen sensor 1	EC-608, "Description"
Heated oxygen sensor 2	EC-616, "Description"
Intake air temperature sensor	EC-623, "Description"
Knock sensor	EC-514, "Description"
Mass air flow sensor	EC-487, "Description"
Park/neutral position (PNP) switch	EC-566, "Description"
Throttle position sensor	EC-495, "Description"
Vehicle speed sensor	EC-634, "Description"

ELECTRIC IGNITION SYSTEM

System Diagram

INFOID:0000000001693467



System Description

INFOID:0000000001693468

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.

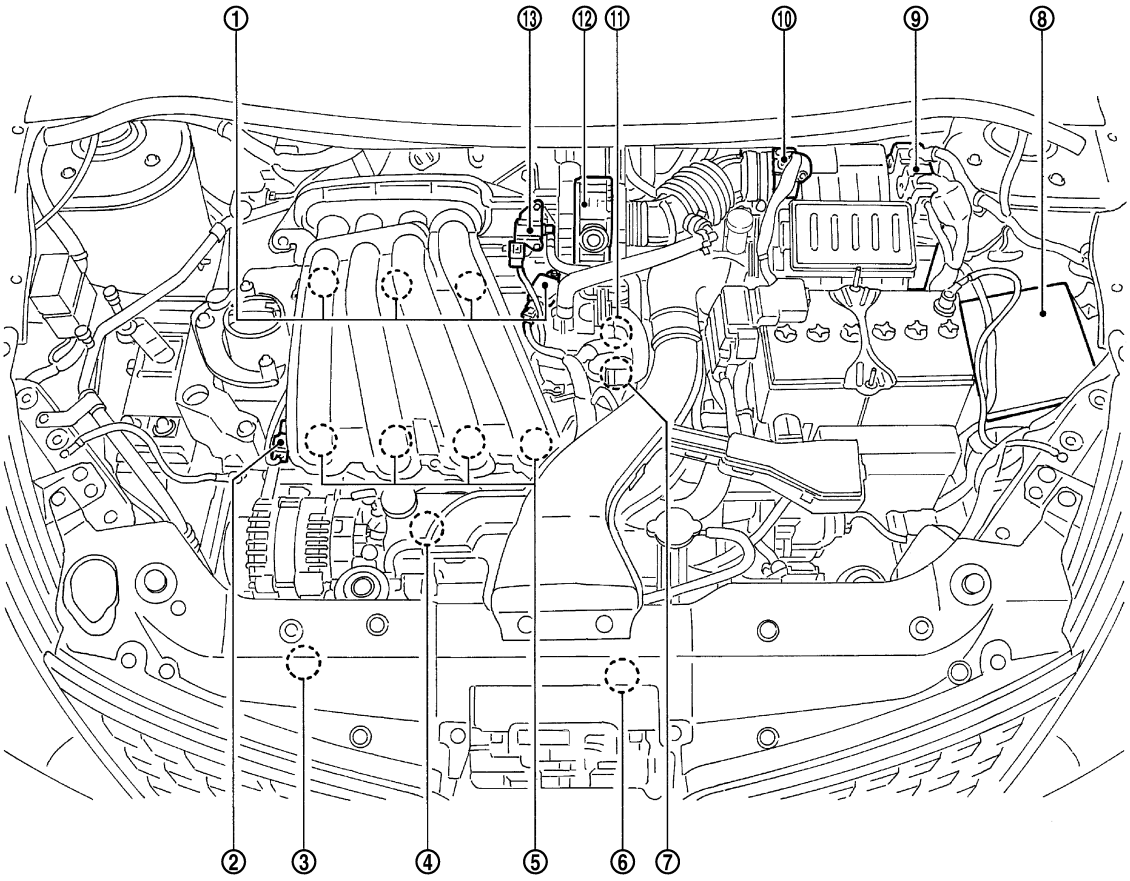
- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

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.

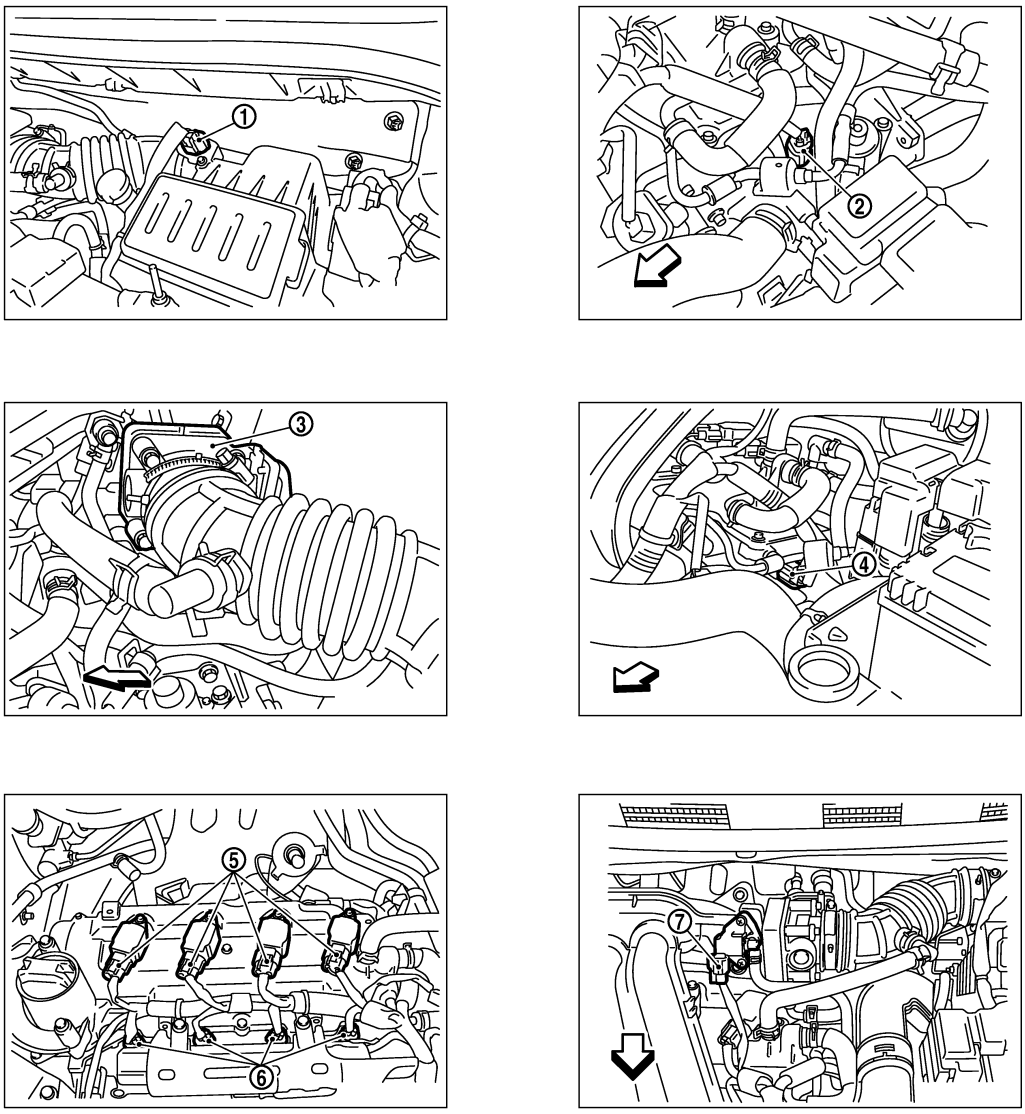
Component Parts Location

INFOID:0000000001693469



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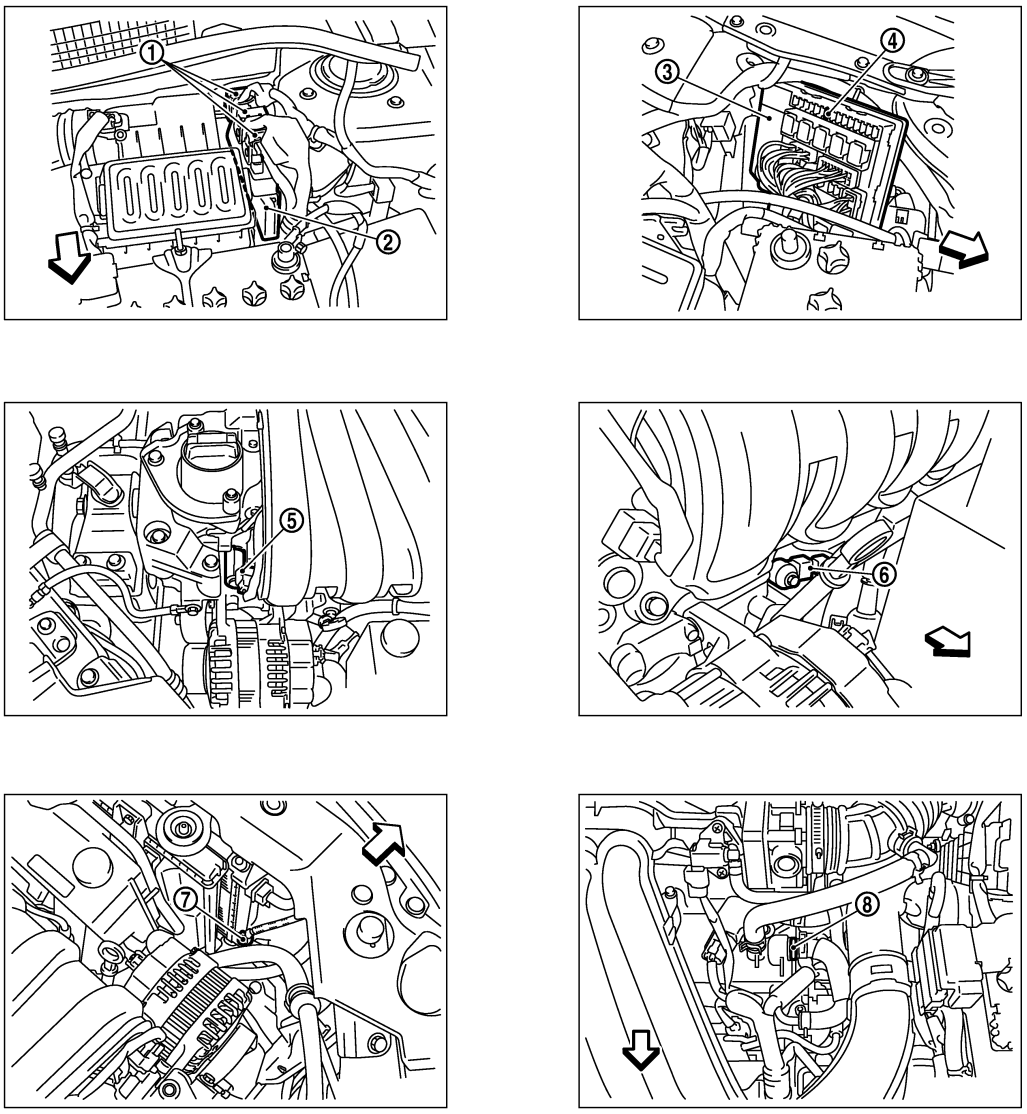
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



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1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Camshaft position sensor (PHASE)
5. Ignition coil (with power transistor)
6. Fuel injector
7. EVAP canister purge volume control solenoid valve

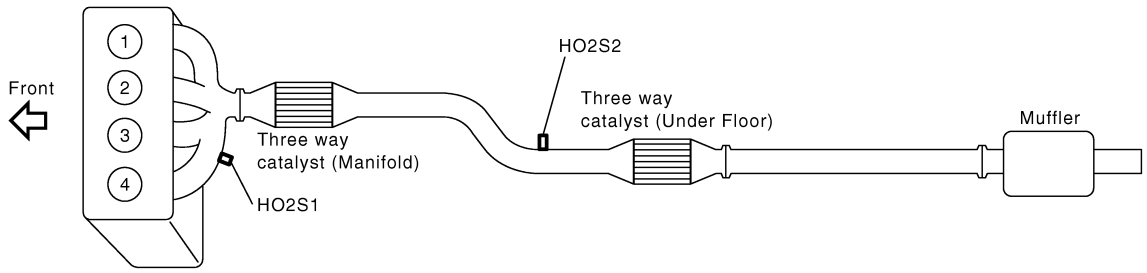
⇦ Vehicle front



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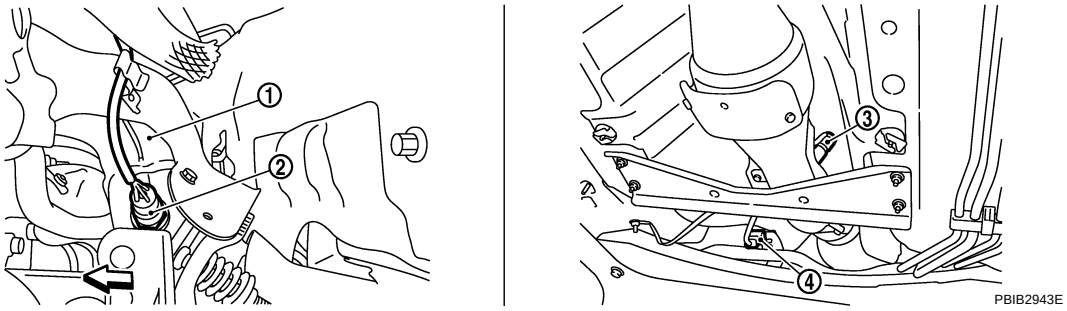
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

⇦ Vehicle front



No. of sensor
Location of a sensor in relation the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on

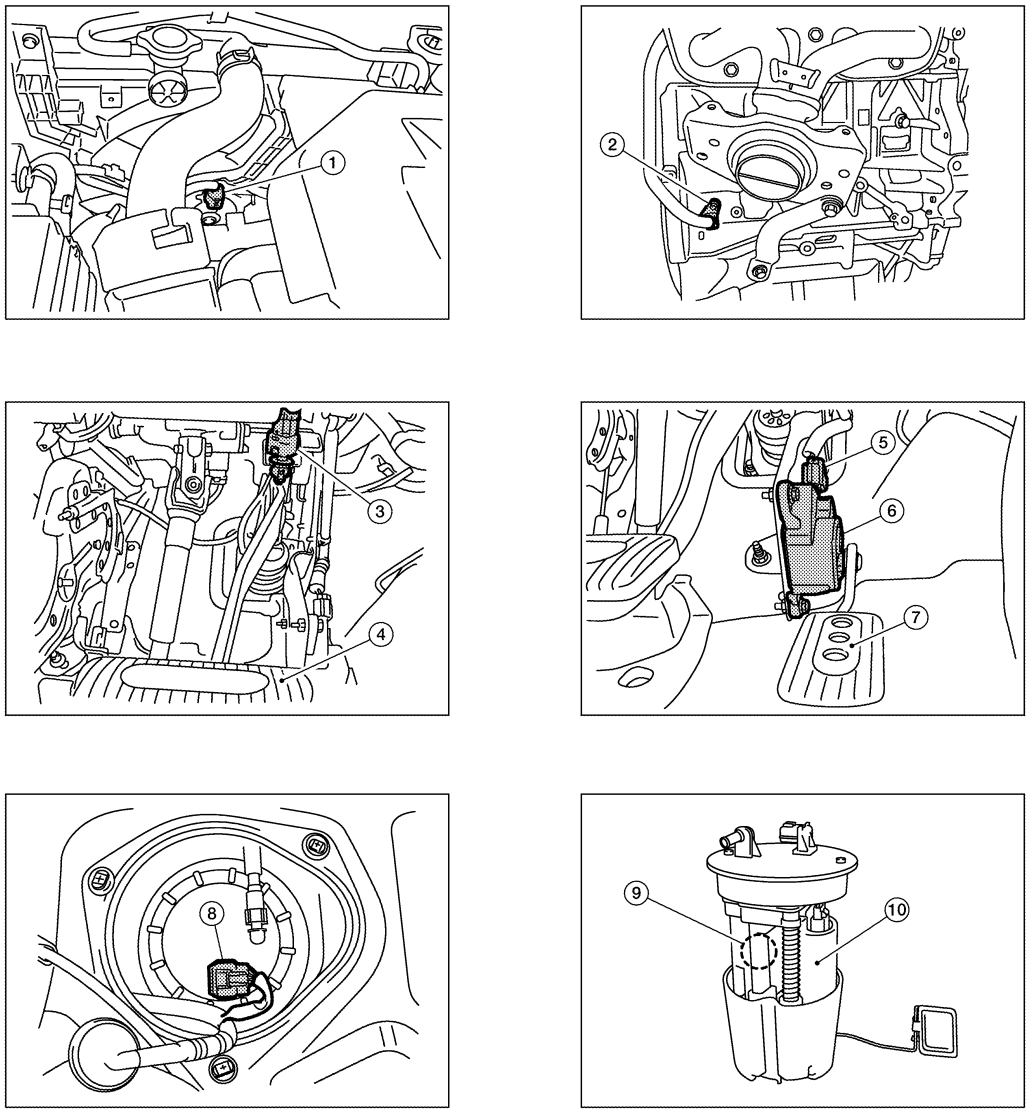
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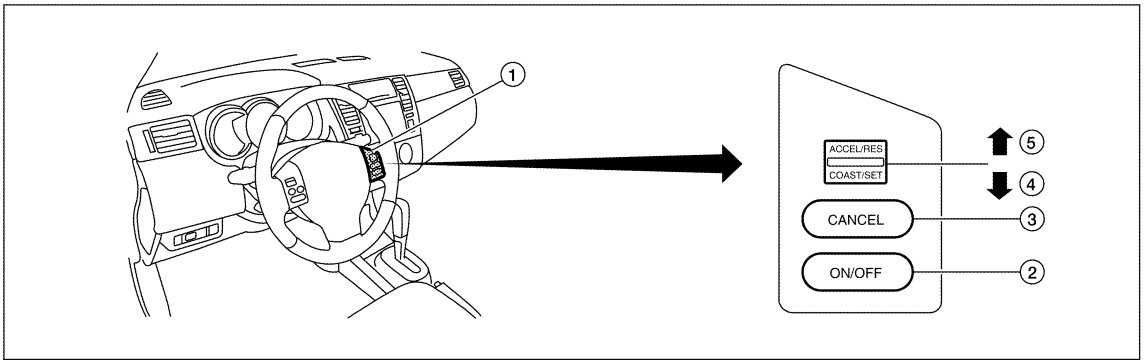
1. Exhaust manifold
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

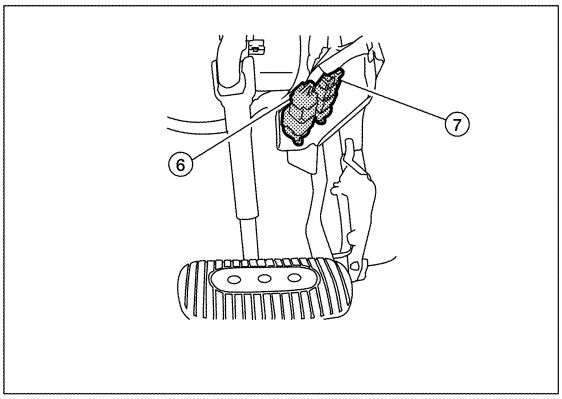
⇦ Vehicle front

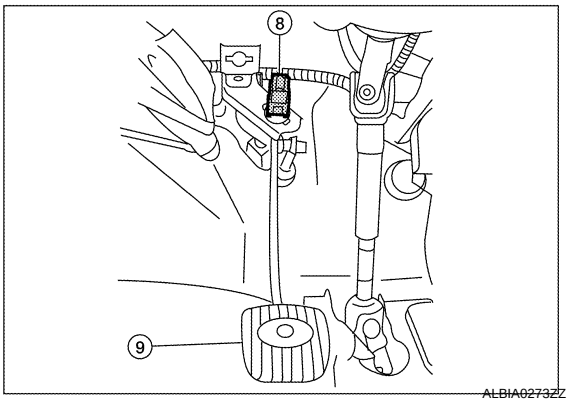


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1. Cooling fan motor harness connector
2. Crankshaft position sensor
3. Stop lamp switch
4. Brake pedal
5. Accelerator pedal position sensor harness connector
6. Accelerator pedal position sensor
7. Accelerator pedal
8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
9. Fuel pressure regulator
10. Fuel pump







ALBIA0273ZZ

1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELERATE switch
6. ASCD brake switch
7. Stop lamp switch
8. ASCD clutch switch
9. Clutch pedal

Component Description

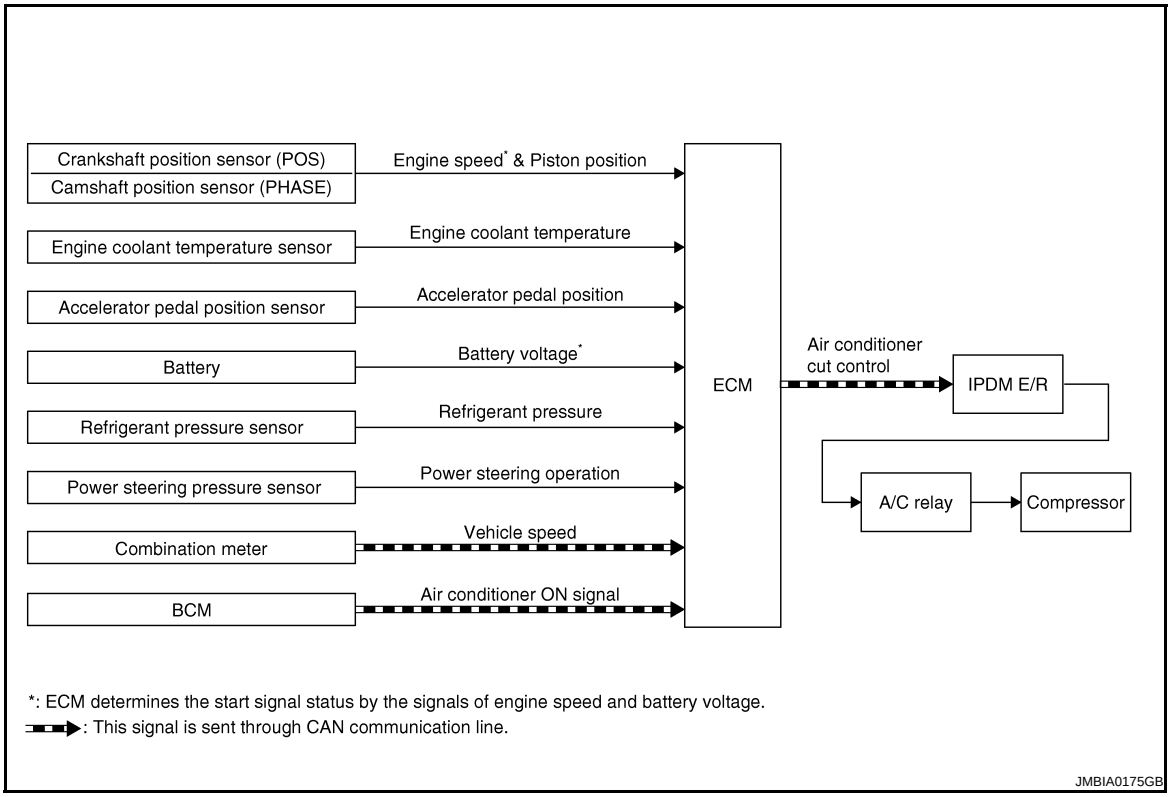
INFOID:0000000001693470

Component	Reference
Accelerator pedal position sensor	EC-572, "Description"
Camshaft position sensor (PHASE)	EC-520, "Description"
Crankshaft position sensor (POS)	EC-516, "Description"
Engine coolant temperature sensor	EC-492, "Description"
Ignition signal	EC-625, "Description"
Knock sensor	EC-514, "Description"
Mass air flow sensor	EC-487, "Description"
Park/neutral position (PNP) switch	EC-566, "Description"
Throttle position sensor	EC-495, "Description"
Vehicle speed sensor	EC-634, "Description"

AIR CONDITIONING CUT CONTROL

System Diagram

INFOID:0000000001693471



System Description

INFOID:0000000001693472

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

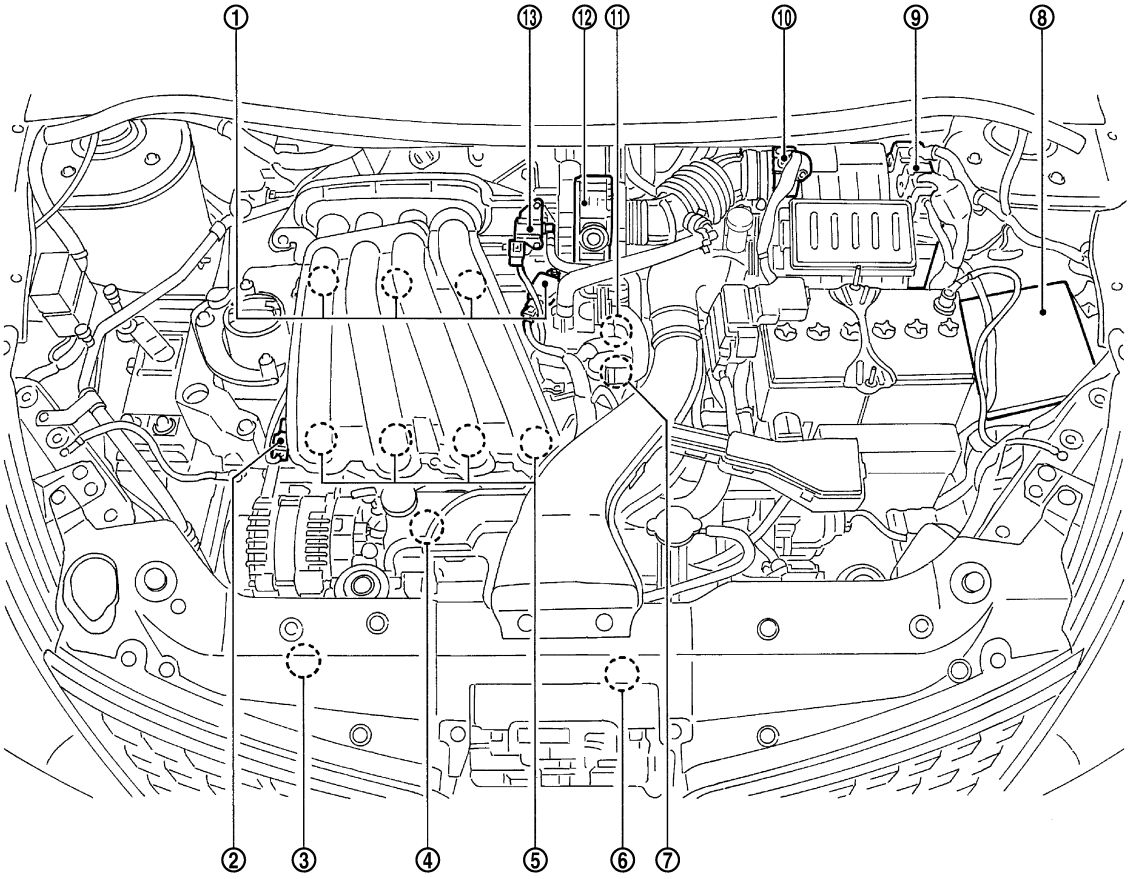
This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

- 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.

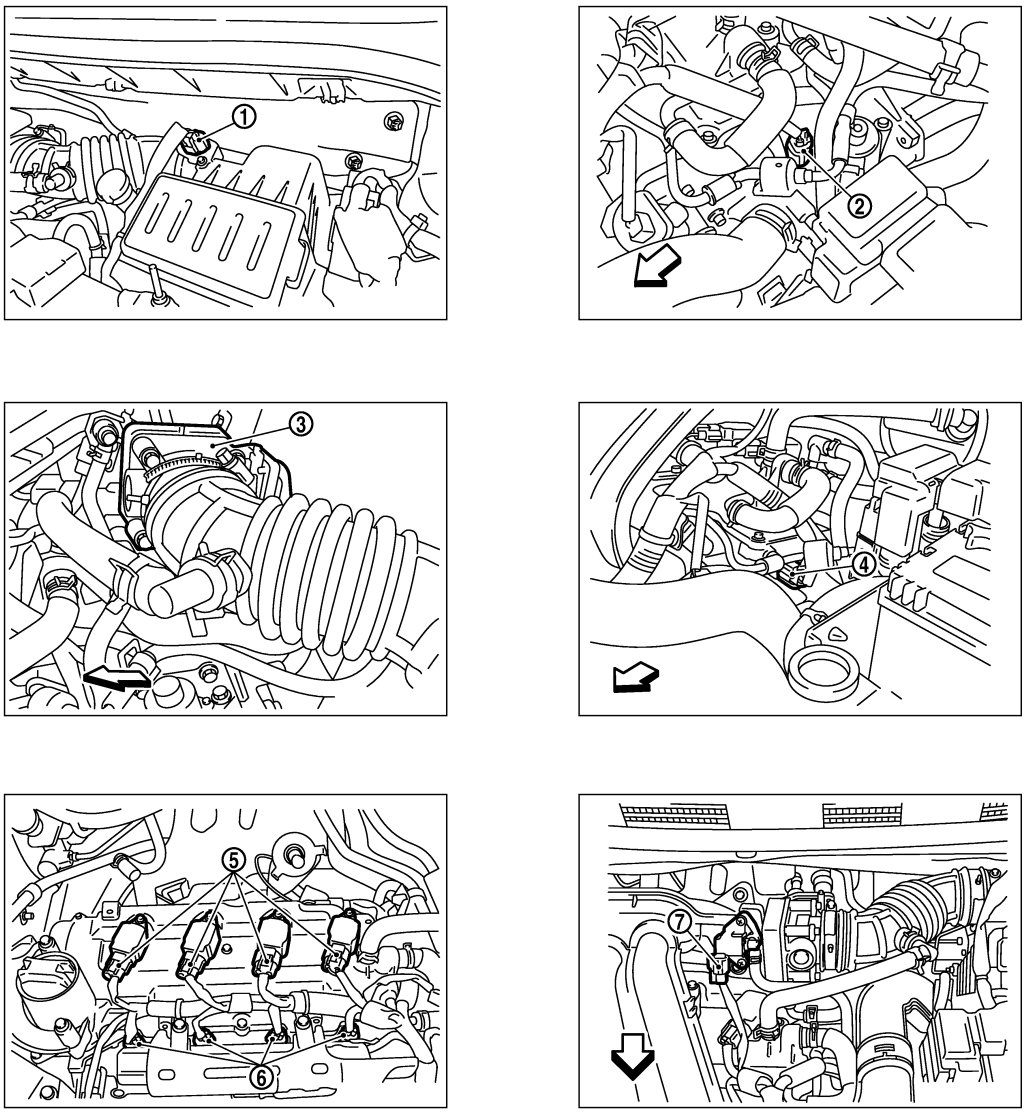
Component Parts Location

INFOID:0000000001693473



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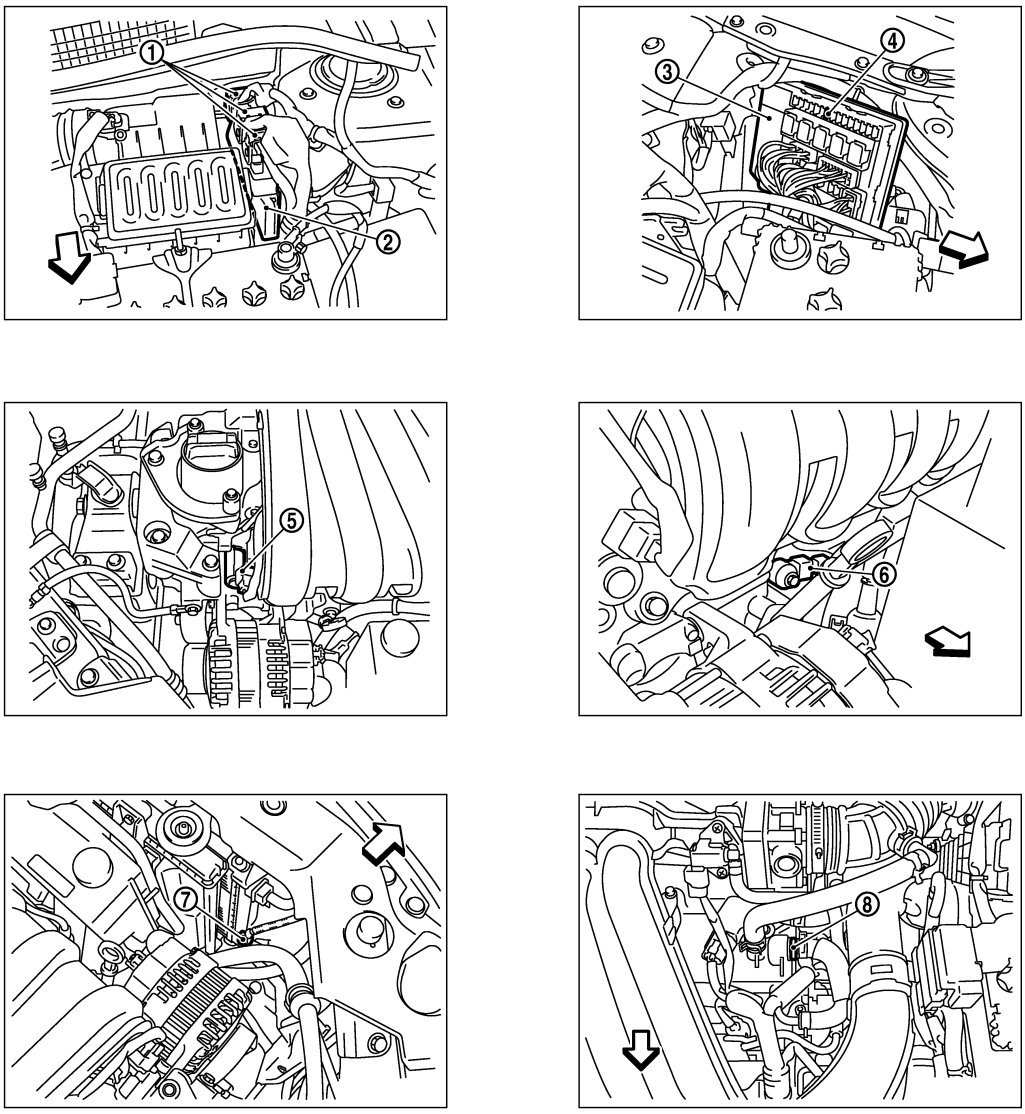
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Camshaft position sensor (PHASE)
5. Ignition coil (with power transistor)
6. Fuel injector
7. EVAP canister purge volume control solenoid valve

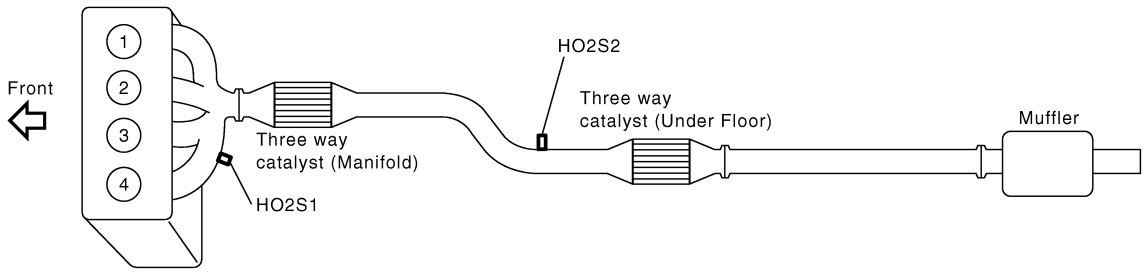
⇦ Vehicle front



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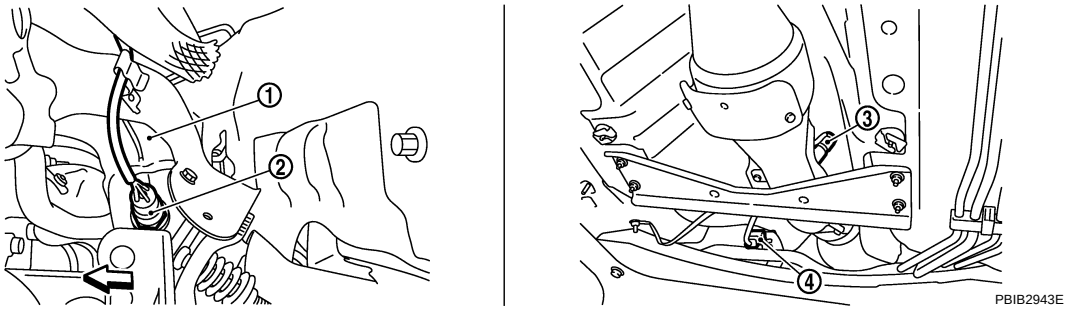
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

⇦ Vehicle front



No. of sensor
Location of a sensor in relation the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on

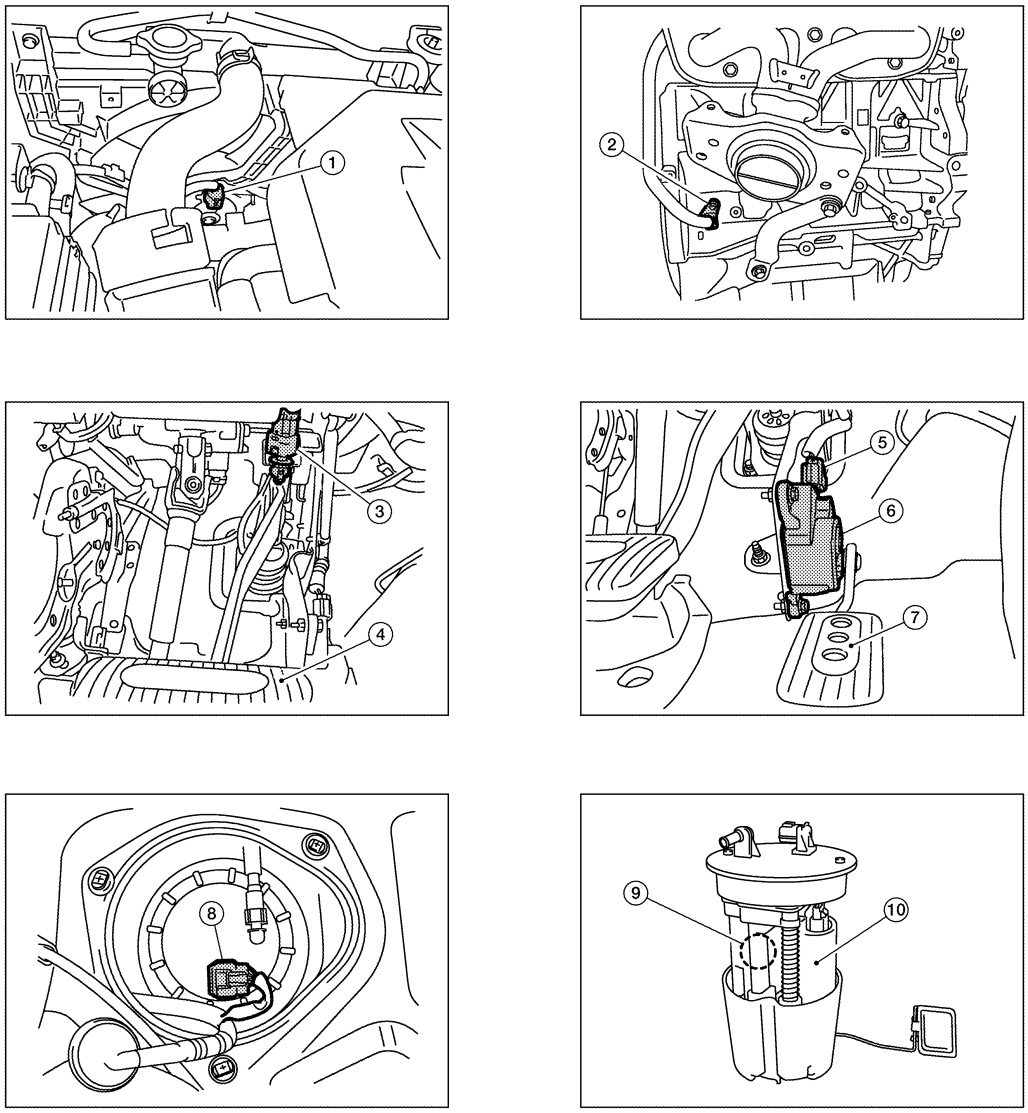
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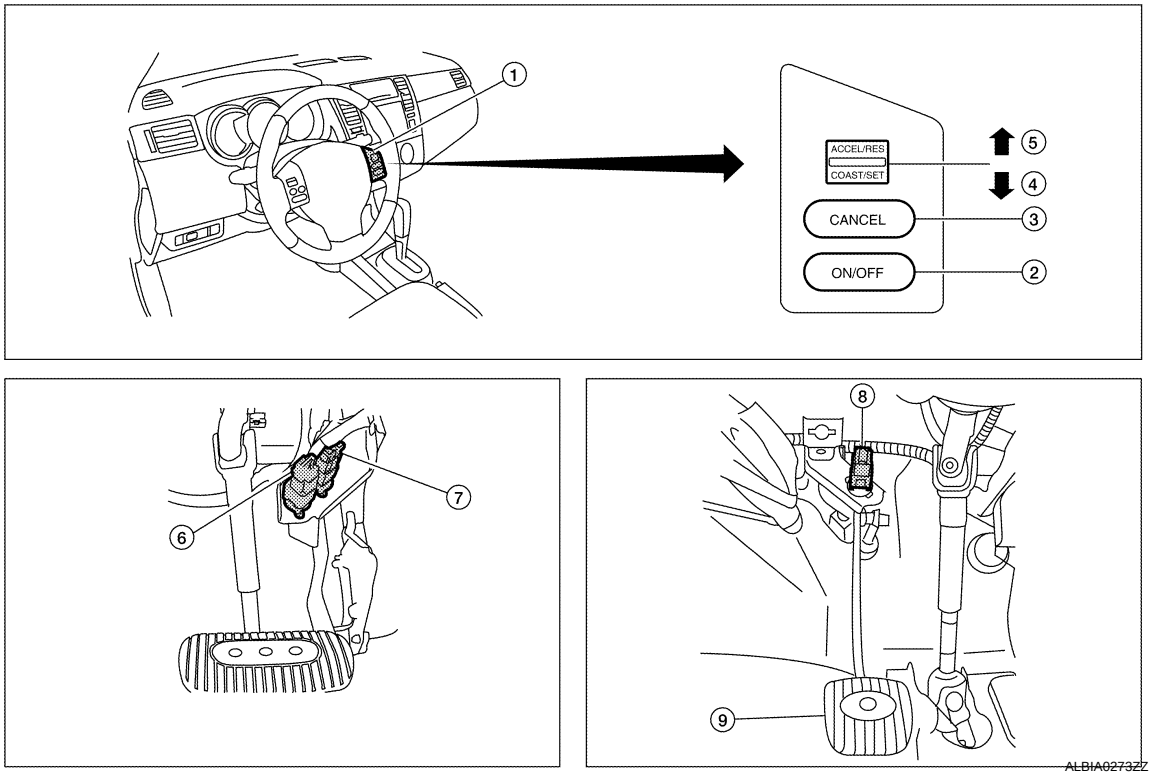
1. Exhaust manifold
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

⇦ Vehicle front



AWBIA0044ZZ

1. Cooling fan motor harness connector
2. Crankshaft position sensor
3. Stop lamp switch
4. Brake pedal
5. Accelerator pedal position sensor harness connector
6. Accelerator pedal position sensor
7. Accelerator pedal
8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
9. Fuel pressure regulator
10. Fuel pump



1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELERATE switch
6. ASCD brake switch
7. Stop lamp switch
8. ASCD clutch switch
9. Clutch pedal

Component Description

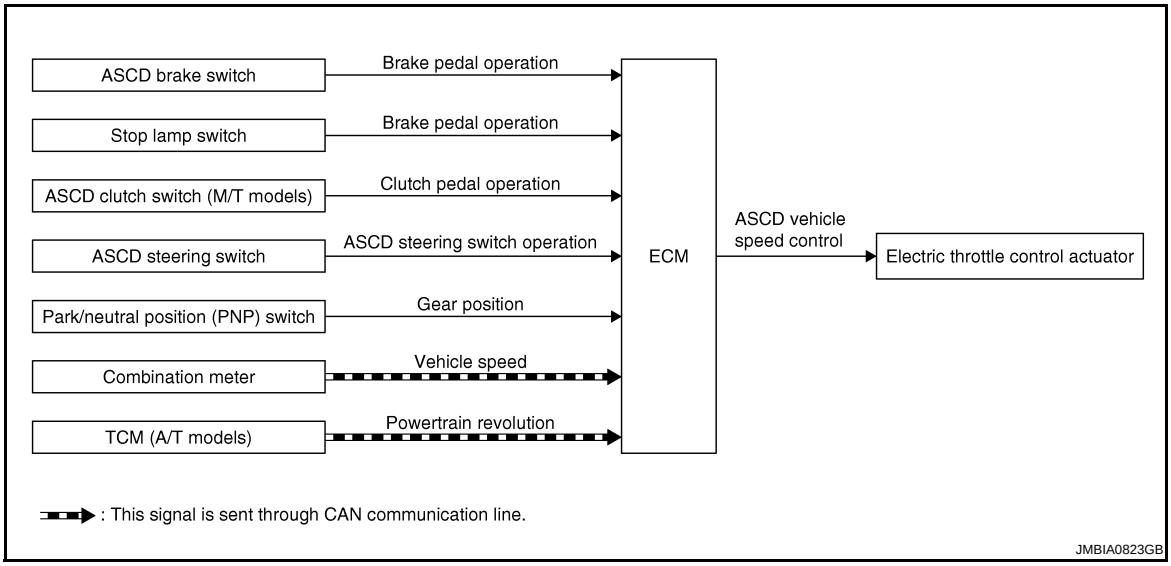
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Component	Reference
Accelerator pedal position sensor	EC-572, "Description"
Camshaft position sensor (PHASE)	EC-520, "Description"
Crankshaft position sensor (POS)	EC-516, "Description"
Engine coolant temperature sensor	EC-492, "Description"
Refrigerant pressure sensor	EC-631, "Description"
Vehicle speed sensor	EC-634, "Description"

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram

INFOID:0000000001693475



System Description

INFOID:0000000001693476

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			
ASCD clutch switch (M/T models)	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/neutral position switch	Gear position		
Combination meter	Vehicle speed*		
TCM (A/T 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 153 km/h (95 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 153 km/h (95 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 (A/T models).
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated

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

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

COAST OPERATION

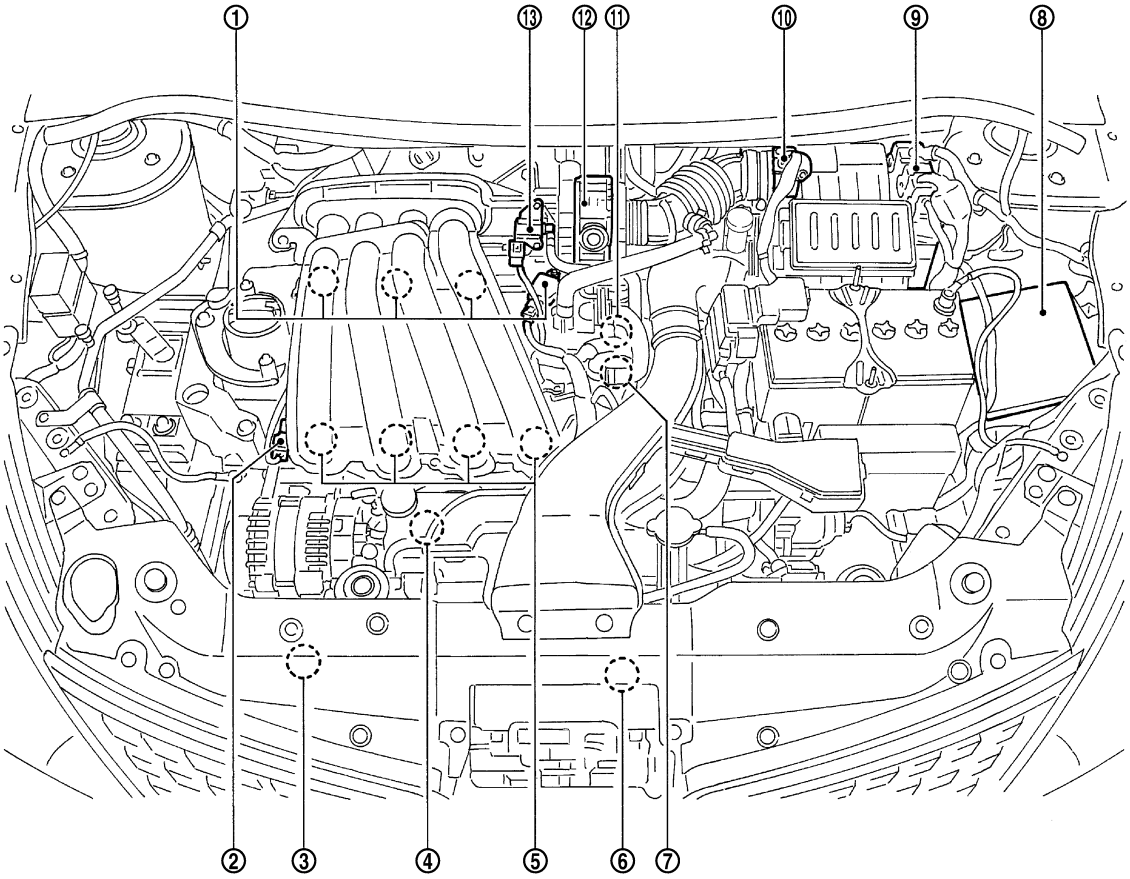
When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

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 (A/T models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 153km/h (95 MPH)

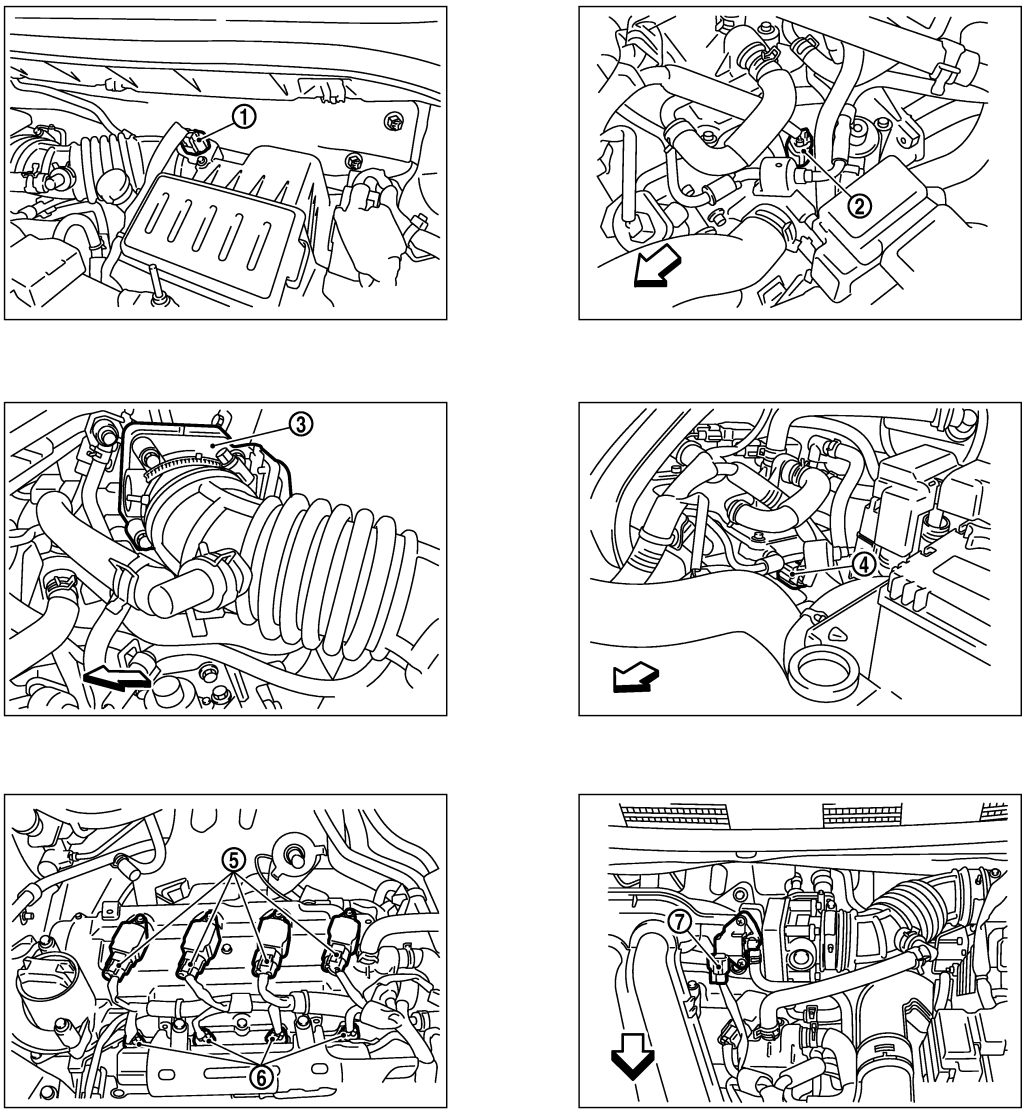
Component Parts Location

INFOID:0000000001693477



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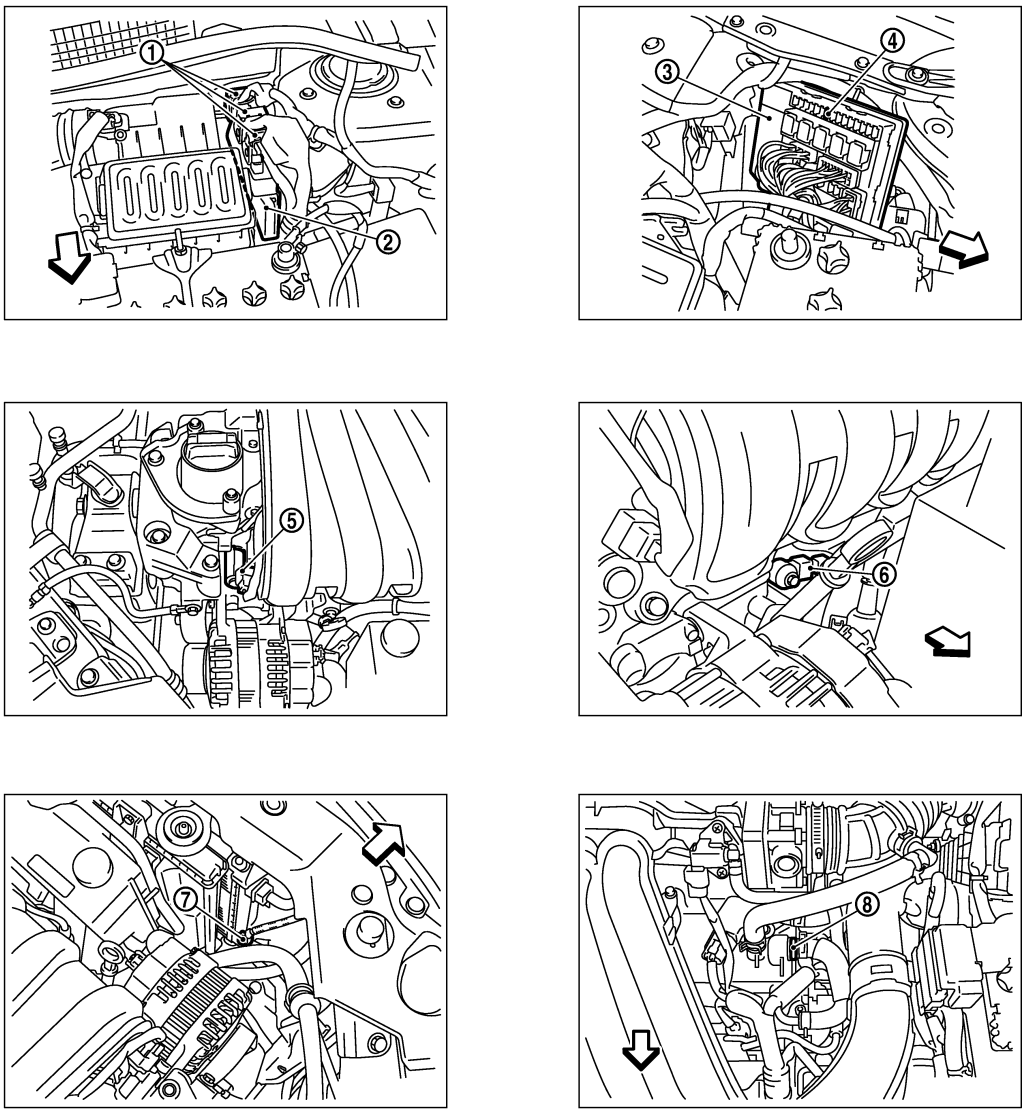
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



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1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Camshaft position sensor (PHASE)
5. Ignition coil (with power transistor)
6. Fuel injector
7. EVAP canister purge volume control solenoid valve

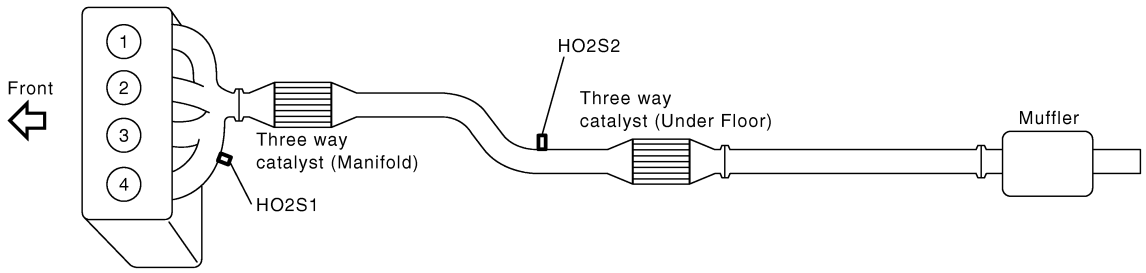
⇦ Vehicle front



PBIB2941E

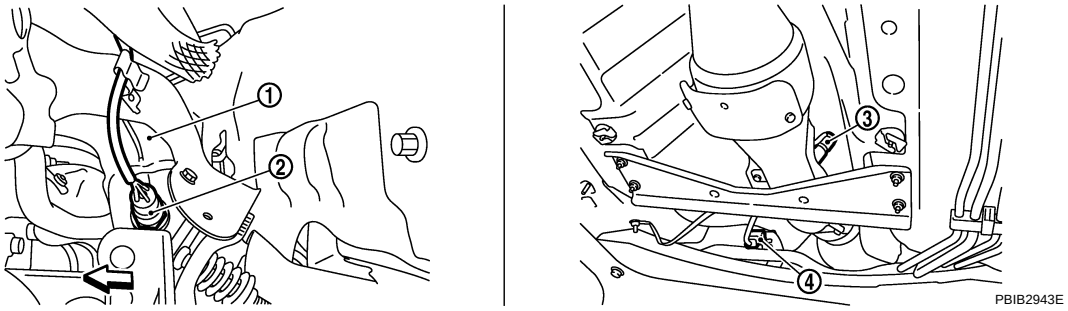
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

⇦ Vehicle front



No. of sensor
Location of a sensor in relation the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on

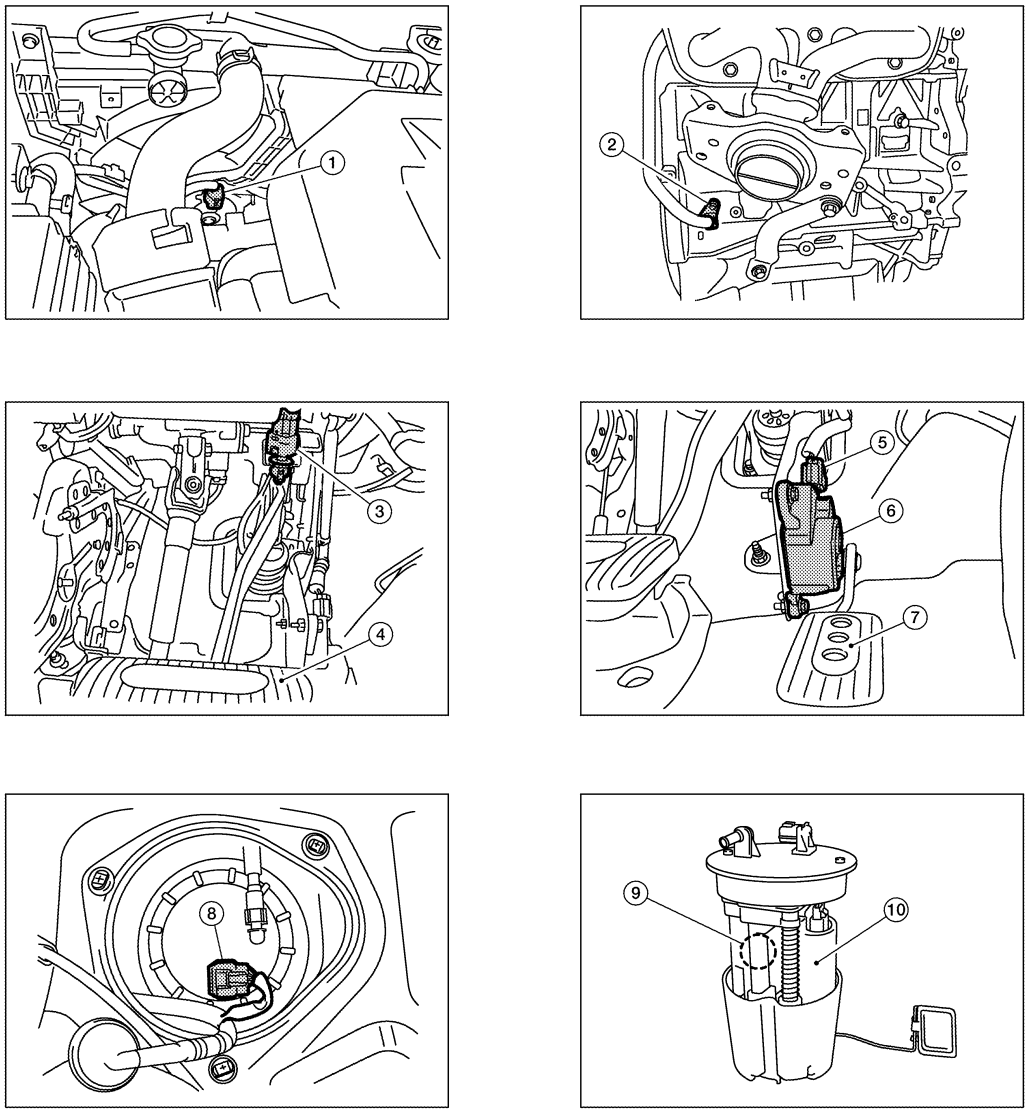
PBIB2942E



PBIB2943E

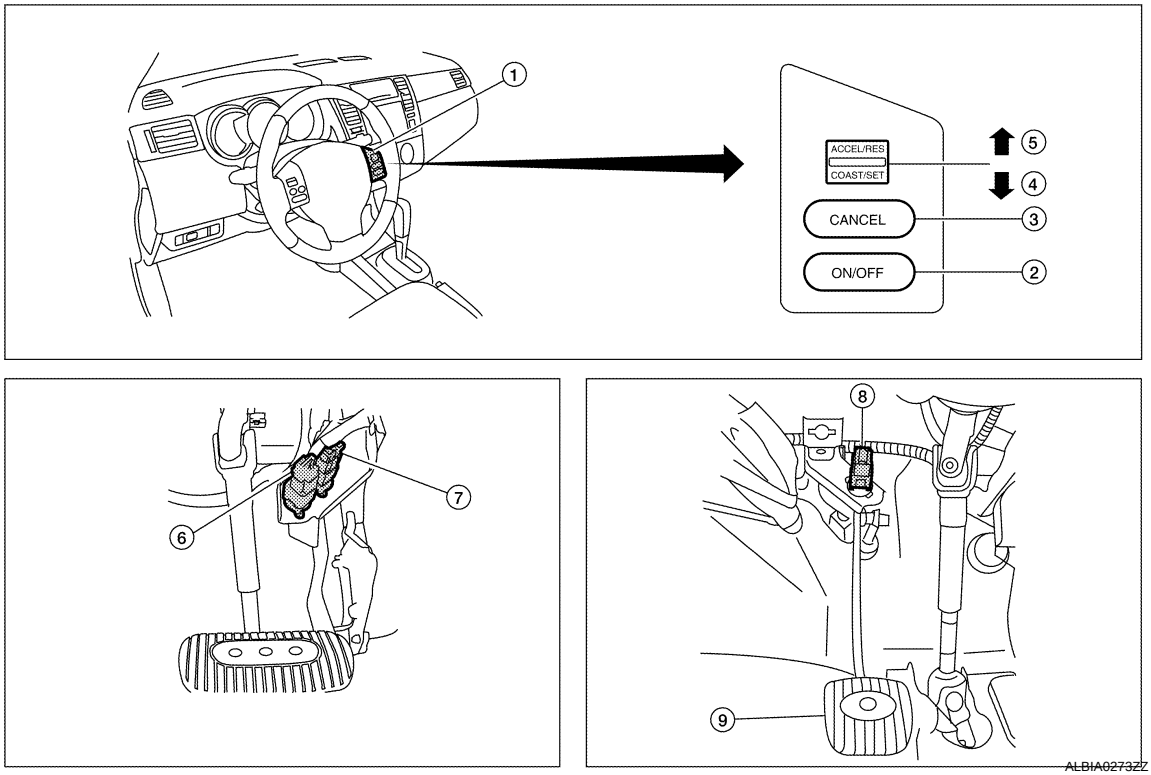
1. Exhaust manifold
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

⇦ Vehicle front



AWBIA0044ZZ

1. Cooling fan motor harness connector
2. Crankshaft position sensor
3. Stop lamp switch
4. Brake pedal
5. Accelerator pedal position sensor harness connector
6. Accelerator pedal position sensor
7. Accelerator pedal
8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
9. Fuel pressure regulator
10. Fuel pump



1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELERATE switch
6. ASCD brake switch
7. Stop lamp switch
8. ASCD clutch switch
9. Clutch pedal

Component Description

INFOID:0000000001693478

Component	Reference
ASCD steering switch	EC-553, "Description"
ASCD clutch switch	EC-556, "Description"
ASCD brake switch	EC-556, "Description"
ASCD indicator	EC-592, "Description"
Stop lamp switch	EC-569, "Description"
Electric throttle control actuator	EC-531, "Description"

CAN COMMUNICATION

System Description

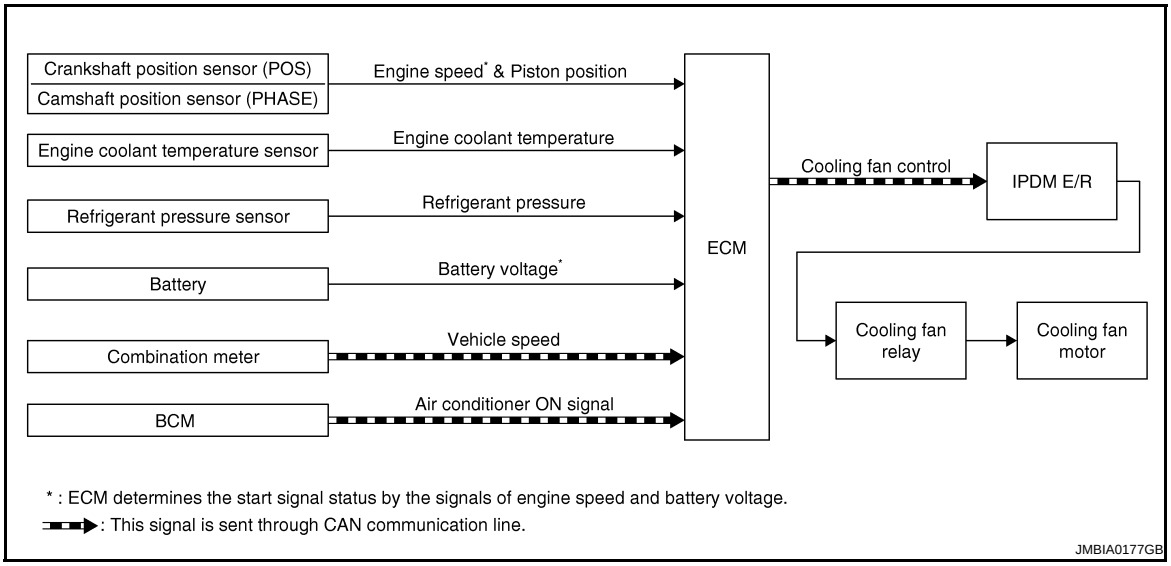
INFOID:0000000001693479

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-33, "CAN Communication Signal Chart", about CAN communication for detail.

COOLING FAN CONTROL

System Diagram

INFOID:0000000001693480



System Description

INFOID:0000000001693481

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.

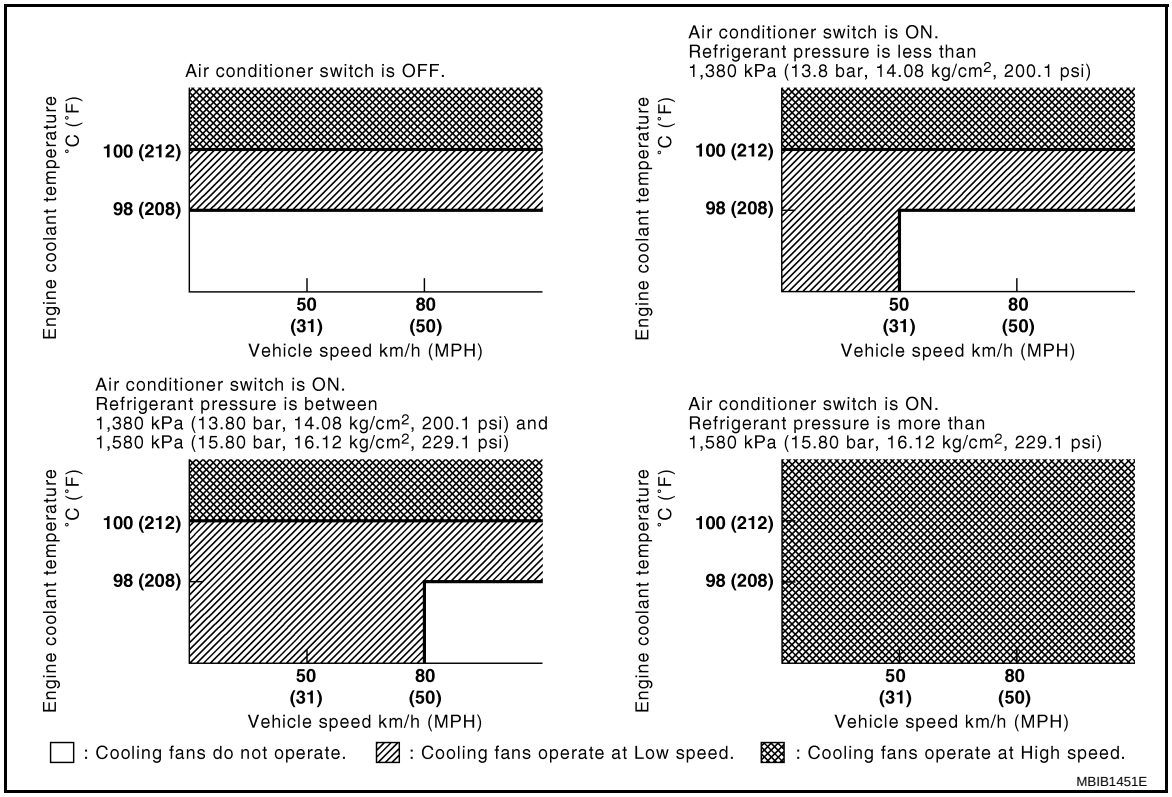
*2: This signal is sent to ECM through CAN communication line.

SYSTEM DESCRIPTION

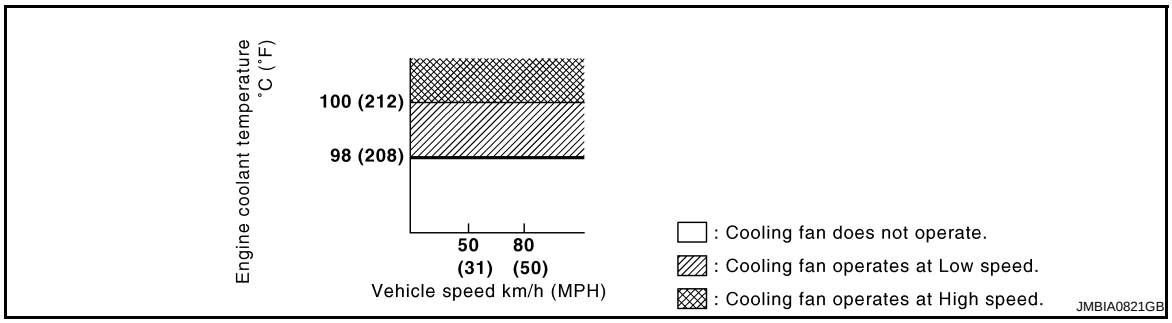
ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pressure, air conditioner ON signal. Then control system has 3-step control [HIGH/LOW/OFF].

Cooling Fan Operation

Models with A/C



Models without A/C



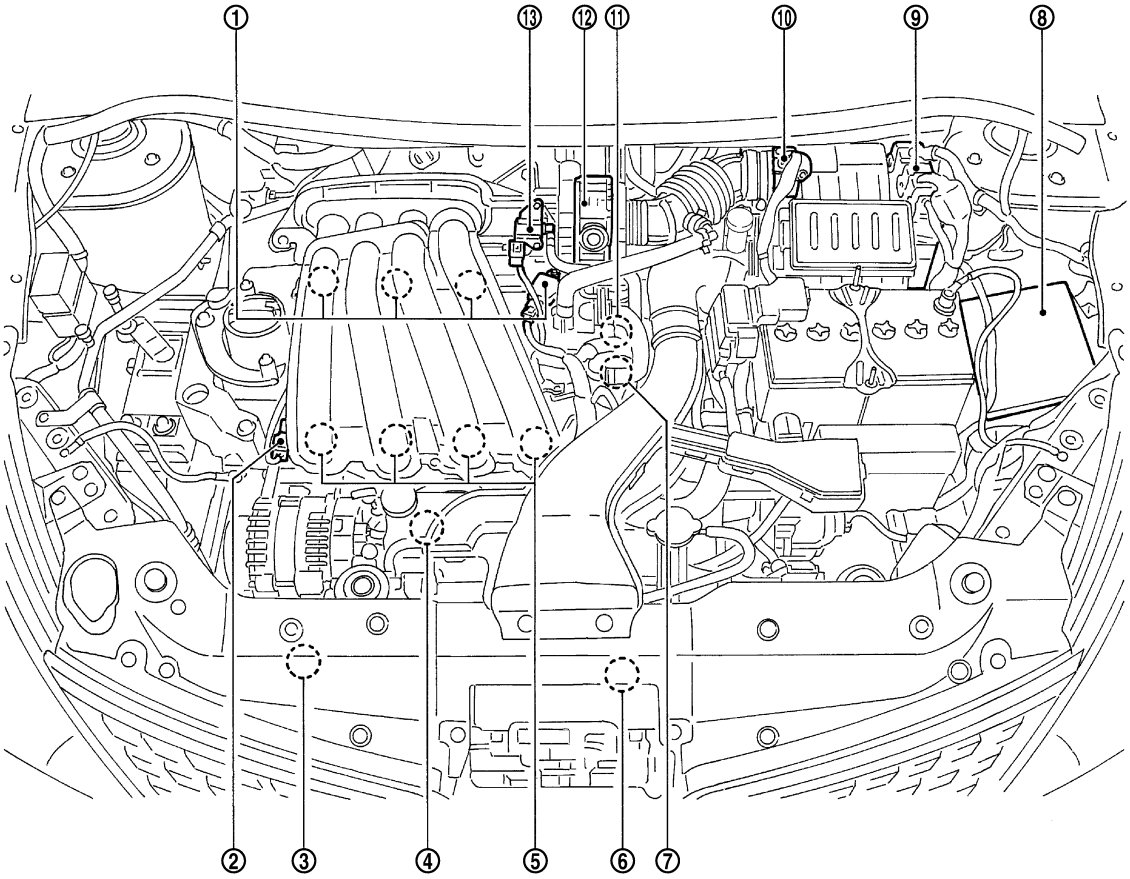
Cooling Fan Relay Operation

The ECM controls cooling fan relays through CAN communication line.

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

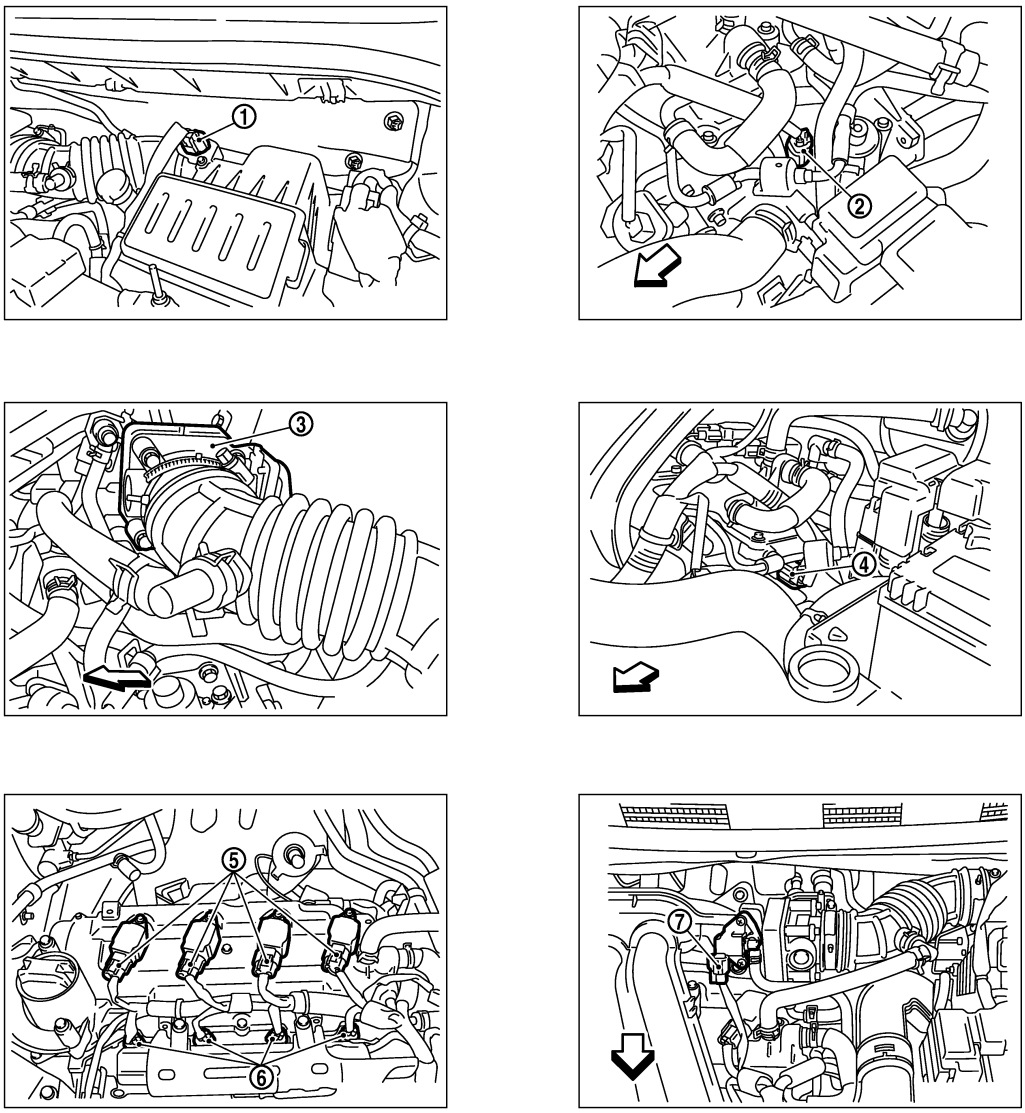
Component Parts Location

INFOID:0000000001693482



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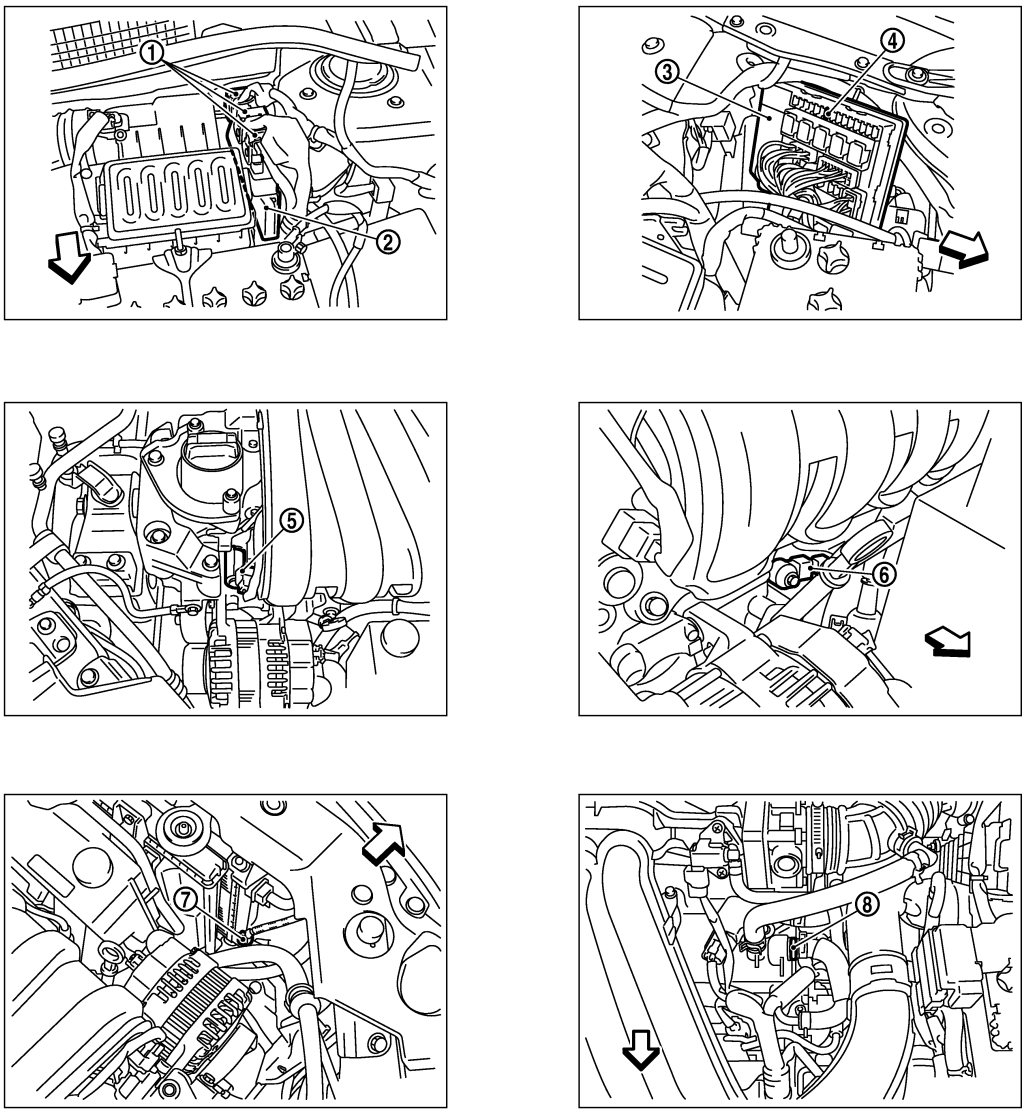
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Camshaft position sensor (PHASE)
5. Ignition coil (with power transistor)
6. Fuel injector
7. EVAP canister purge volume control solenoid valve

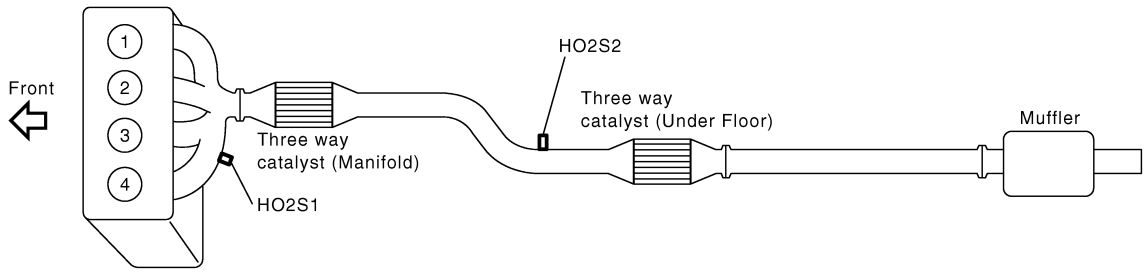
⇦ Vehicle front



PBIB2941E

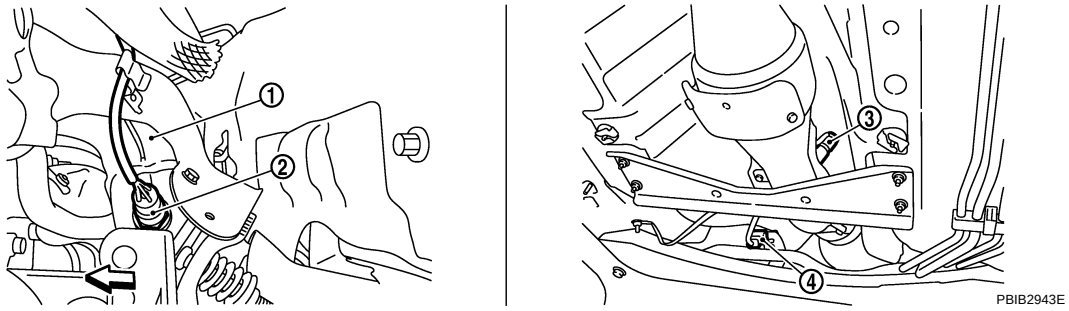
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

⇦ Vehicle front



No. of sensor
Location of a sensor in relation the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on

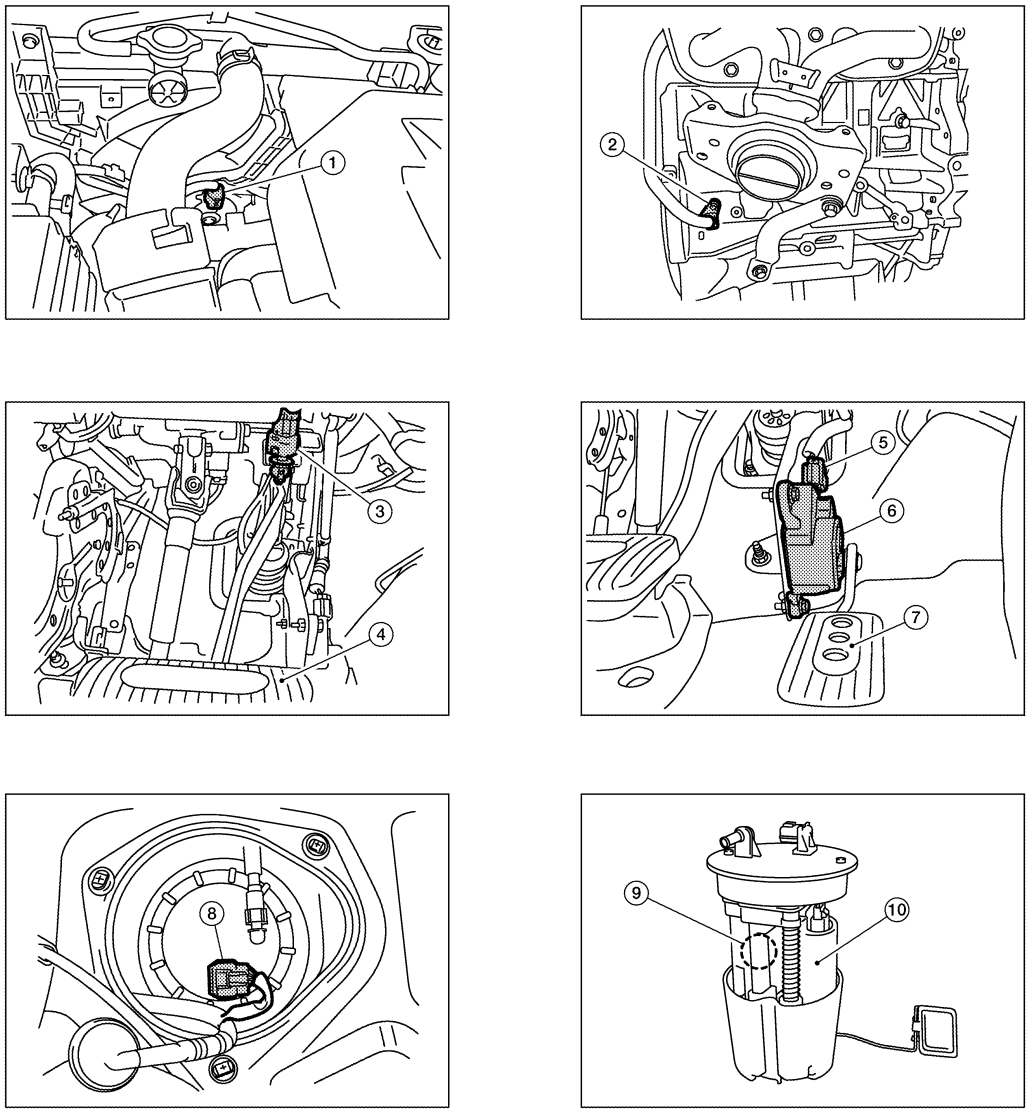
PBIB2942E



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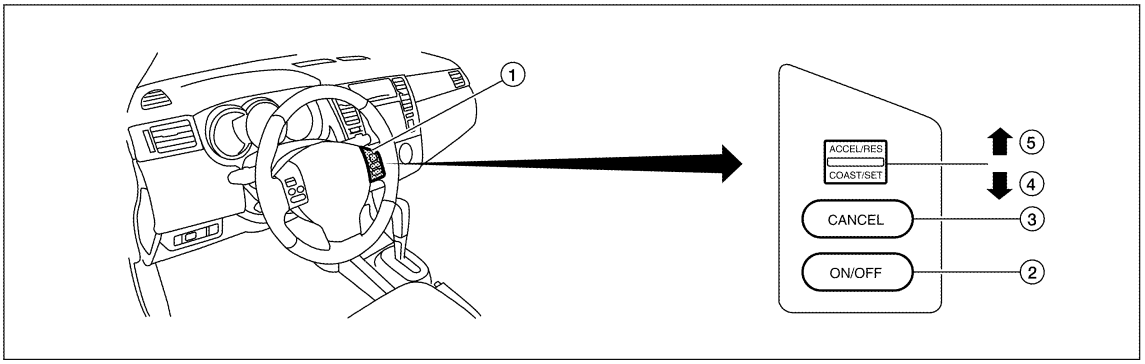
1. Exhaust manifold
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

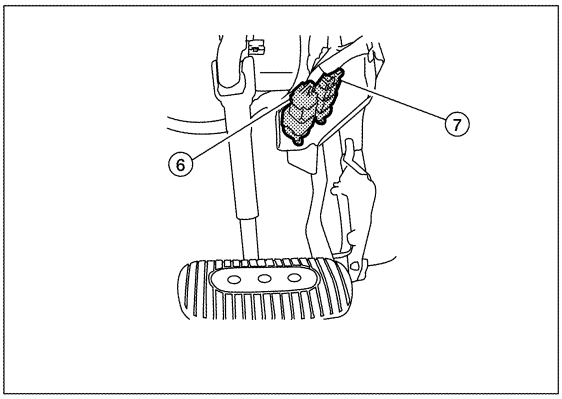
⇦ Vehicle front

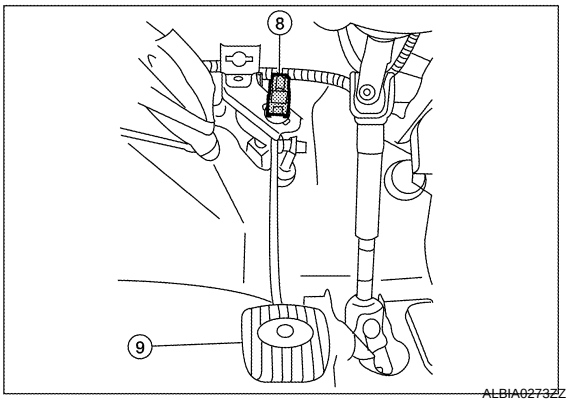


AWBIA0044ZZ

1. Cooling fan motor harness connector
2. Crankshaft position sensor
3. Stop lamp switch
4. Brake pedal
5. Accelerator pedal position sensor harness connector
6. Accelerator pedal position sensor
7. Accelerator pedal
8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
9. Fuel pressure regulator
10. Fuel pump







ALBIA0273ZZ

1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELERATE switch
6. ASCD brake switch
7. Stop lamp switch
8. ASCD clutch switch
9. Clutch pedal

Component Description

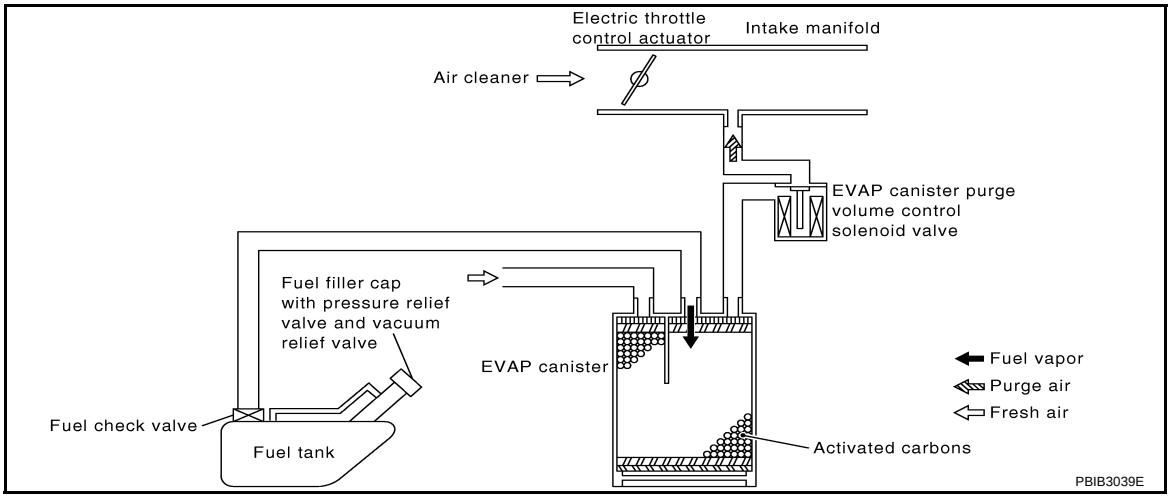
INFOID:0000000001693483

Component	Reference
Camshaft position sensor (PHASE)	EC-520, "Description"
Crankshaft position sensor (POS)	EC-516, "Description"
Cooling fan motor	EC-593, "Description"
Engine coolant temperature sensor	EC-492, "Description"
Refrigerant pressure sensor	EC-632, "Description"

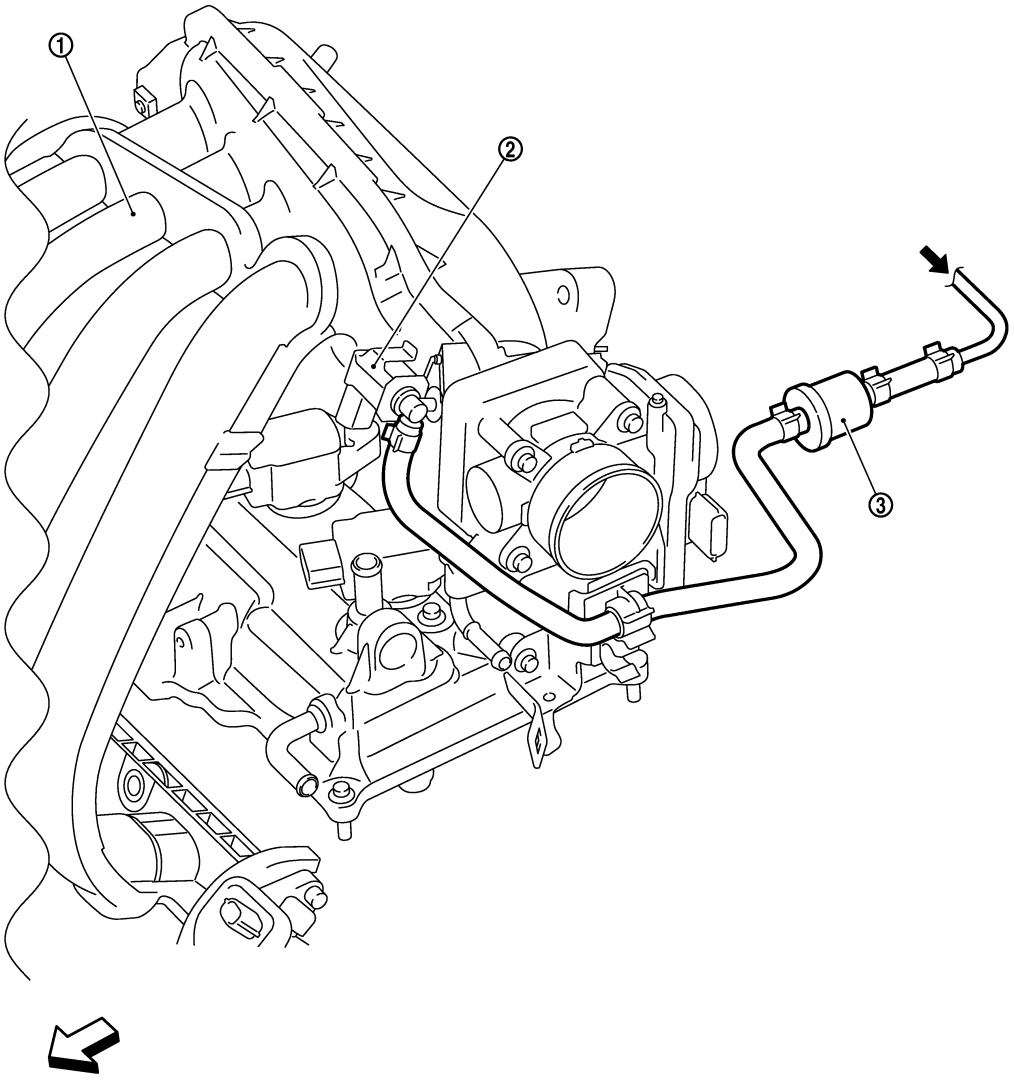
EVAPORATIVE EMISSION SYSTEM

System Diagram

INFOID:0000000001693484



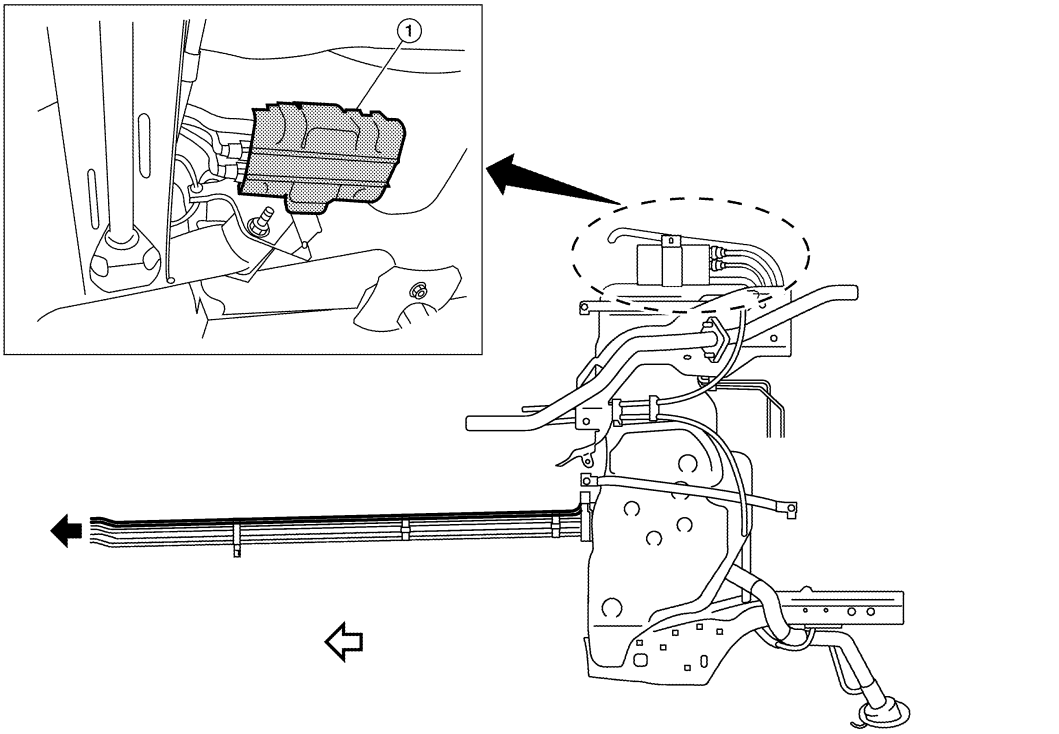
EVAPORATIVE EMISSION LINE DRAWING



PBIB2946E

1. Intake manifold collector
2. EVAP canister purge volume control solenoid valve
3. EVAP purge resonator

⇦: Vehicle front
⬅: From next figure



1. EVAP canister
⇦: Vehicle front ⬅: To previous figure

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

System Description

INFOID:0000000001693485

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		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Combination meter	Vehicle speed*2		

*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.

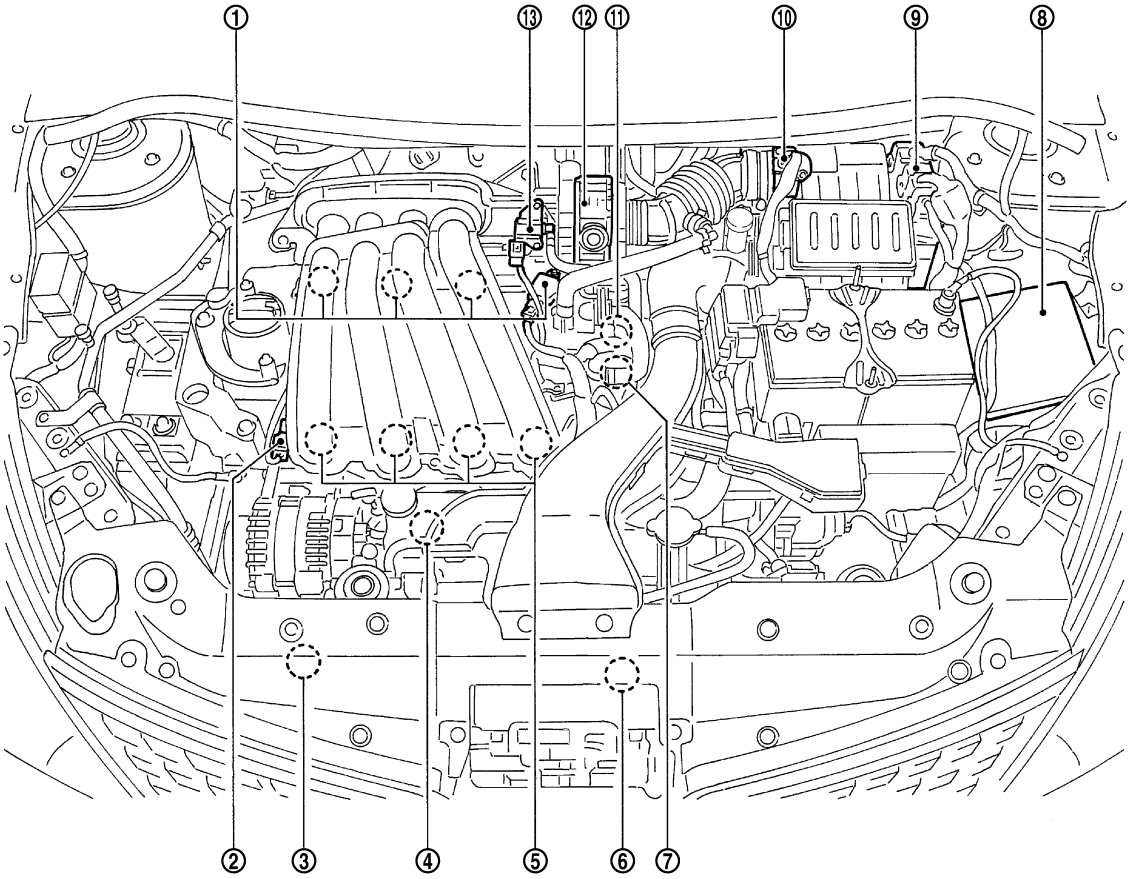
SYSTEM DESCRIPTION

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.

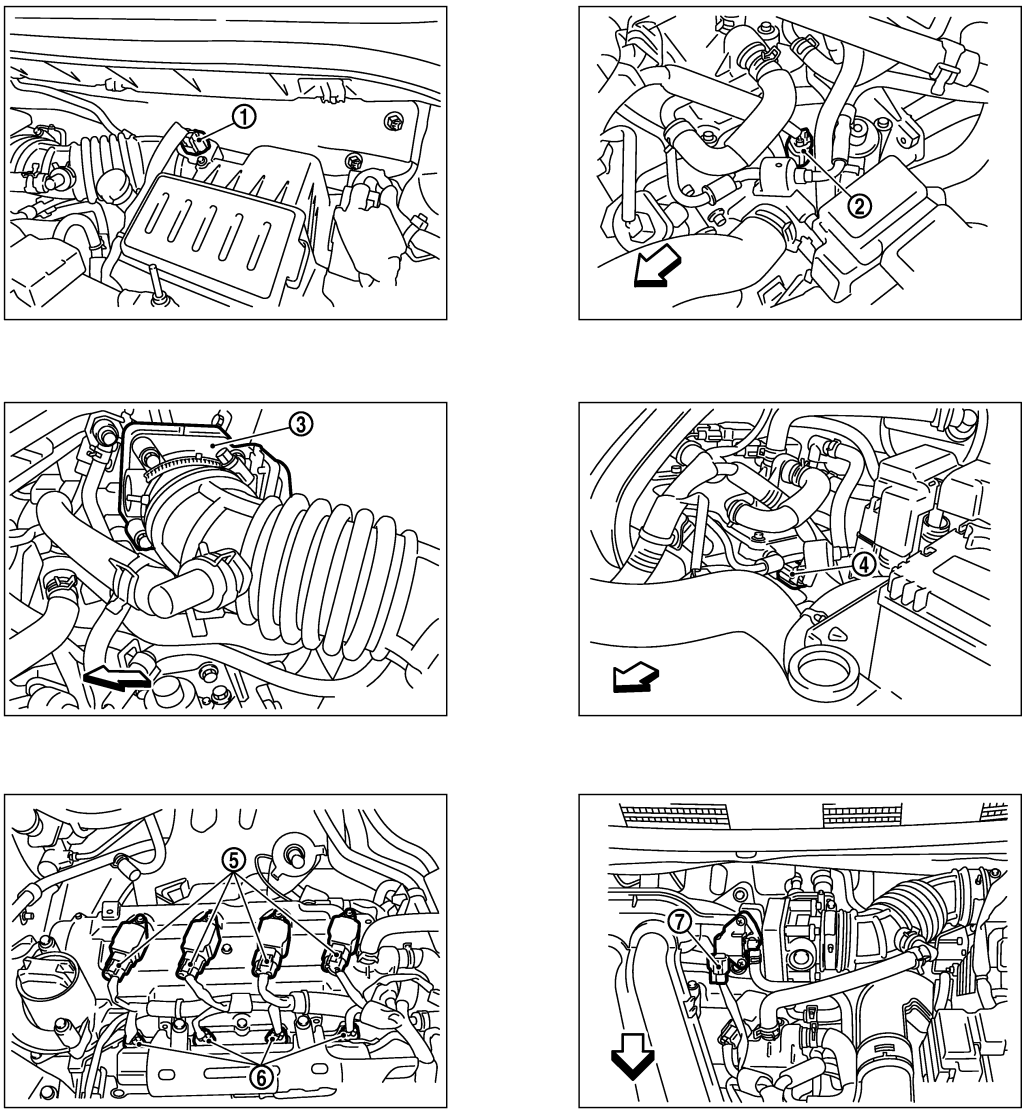
Component Parts Location

INFOID:0000000001693486



PBIB2939E

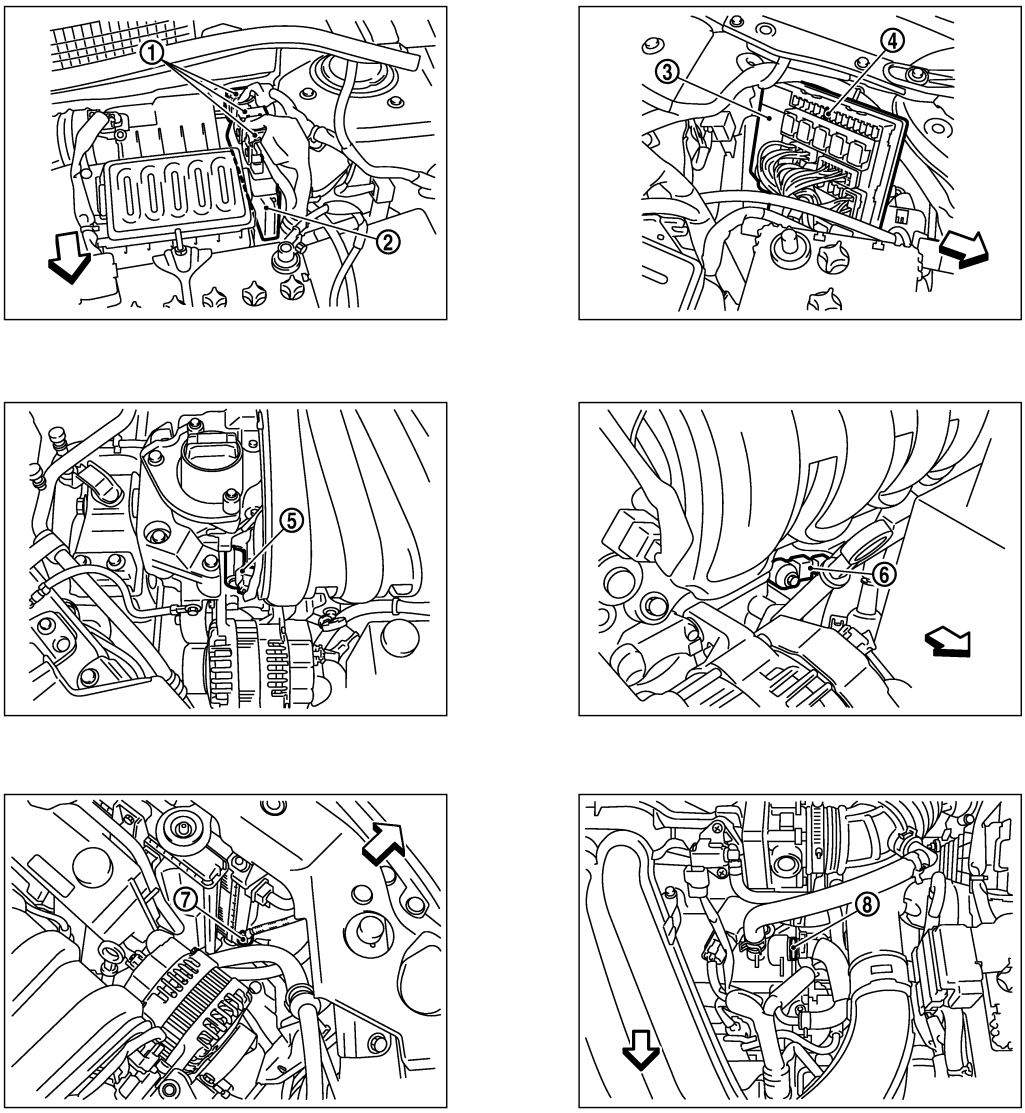
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Camshaft position sensor (PHASE)
5. Ignition coil (with power transistor)
6. Fuel injector
7. EVAP canister purge volume control solenoid valve

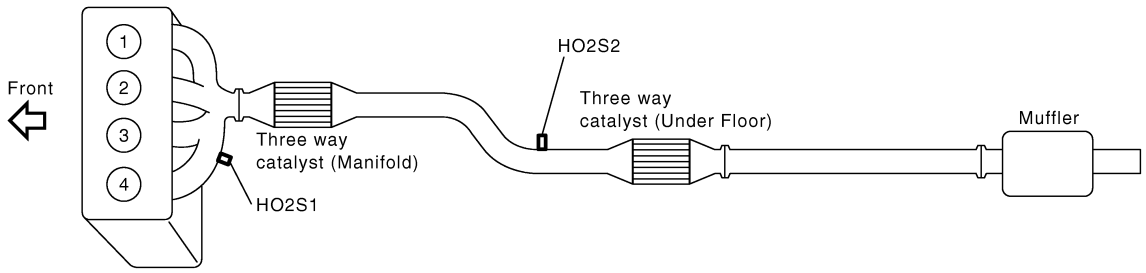
⇦ Vehicle front



PBIB2941E

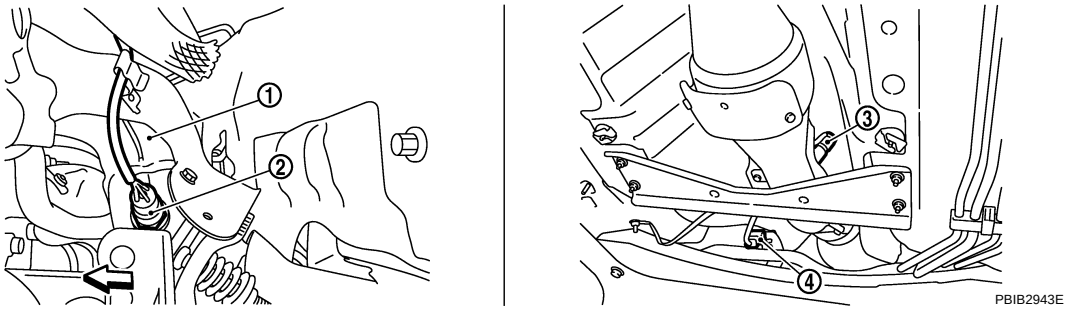
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

⇦ Vehicle front



No. of sensor
Location of a sensor in relation the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on

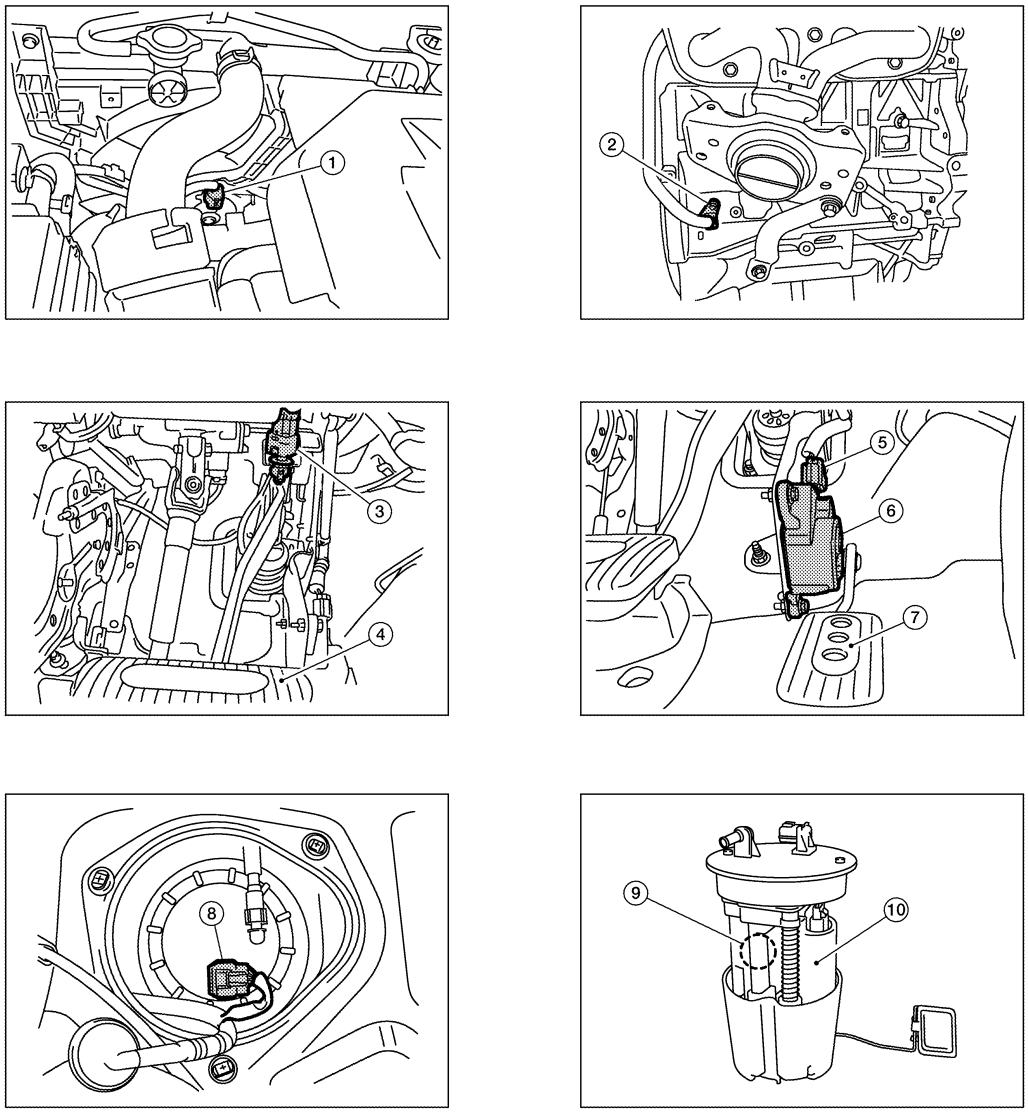
PBIB2942E



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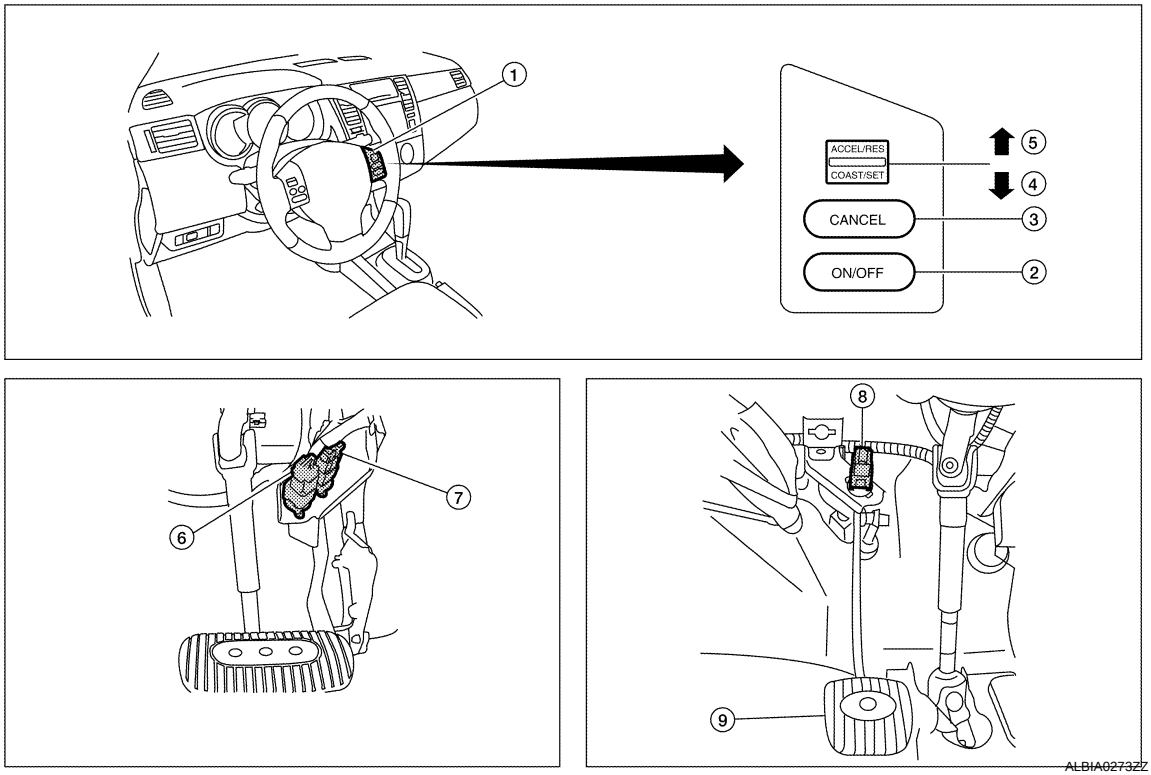
1. Exhaust manifold
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

⇦ Vehicle front



AWBIA0044ZZ

1. Cooling fan motor harness connector
2. Crankshaft position sensor
3. Stop lamp switch
4. Brake pedal
5. Accelerator pedal position sensor harness connector
6. Accelerator pedal position sensor
7. Accelerator pedal
8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
9. Fuel pressure regulator
10. Fuel pump



1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELERATE switch
6. ASCD brake switch
7. Stop lamp switch
8. ASCD clutch switch
9. Clutch pedal

Component Description

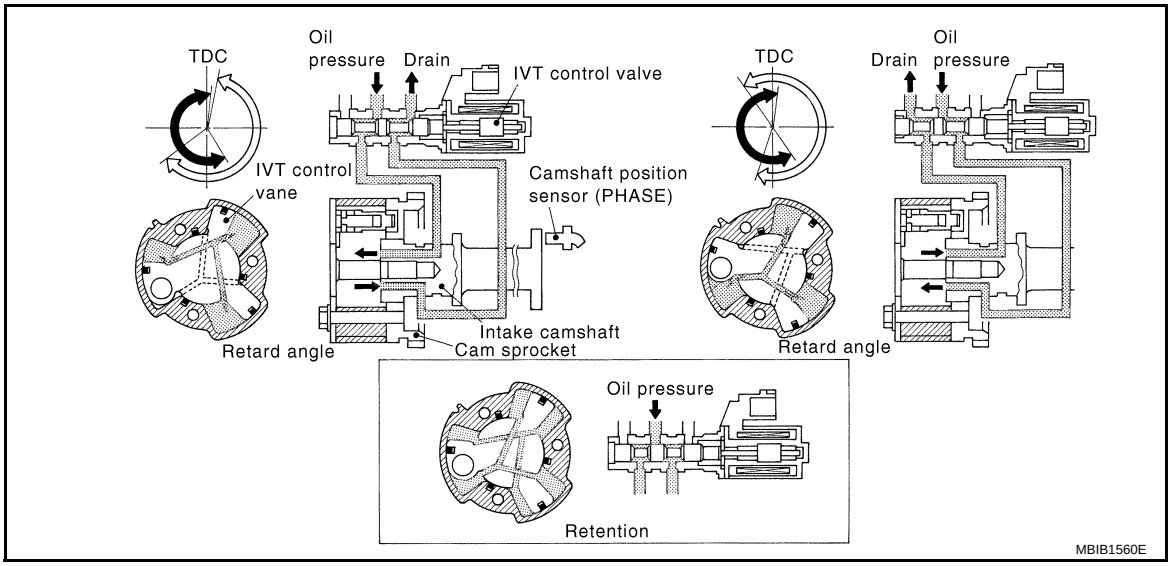
INFOID:0000000001693487

Component	Reference
Accelerator pedal position sensor	EC-572, "Description"
Camshaft position sensor (PHASE)	EC-520, "Description"
Crankshaft position sensor (POS)	EC-516, "Description"
Engine coolant temperature sensor	EC-492, "Description"
EVAP canister purge volume control solenoid valve	EC-528, "Description"
Heated oxygen sensor 1	EC-498, "Description"
Mass air flow sensor	EC-487, "Description"
Throttle position sensor	EC-495, "Description"
Vehicle speed sensor	EC-634, "Description"

INTAKE VALVE TIMING CONTROL

System Diagram

INFOID:0000000001693488



System Description

INFOID:0000000001693489

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		
Combination meter	Vehicle speed*		

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

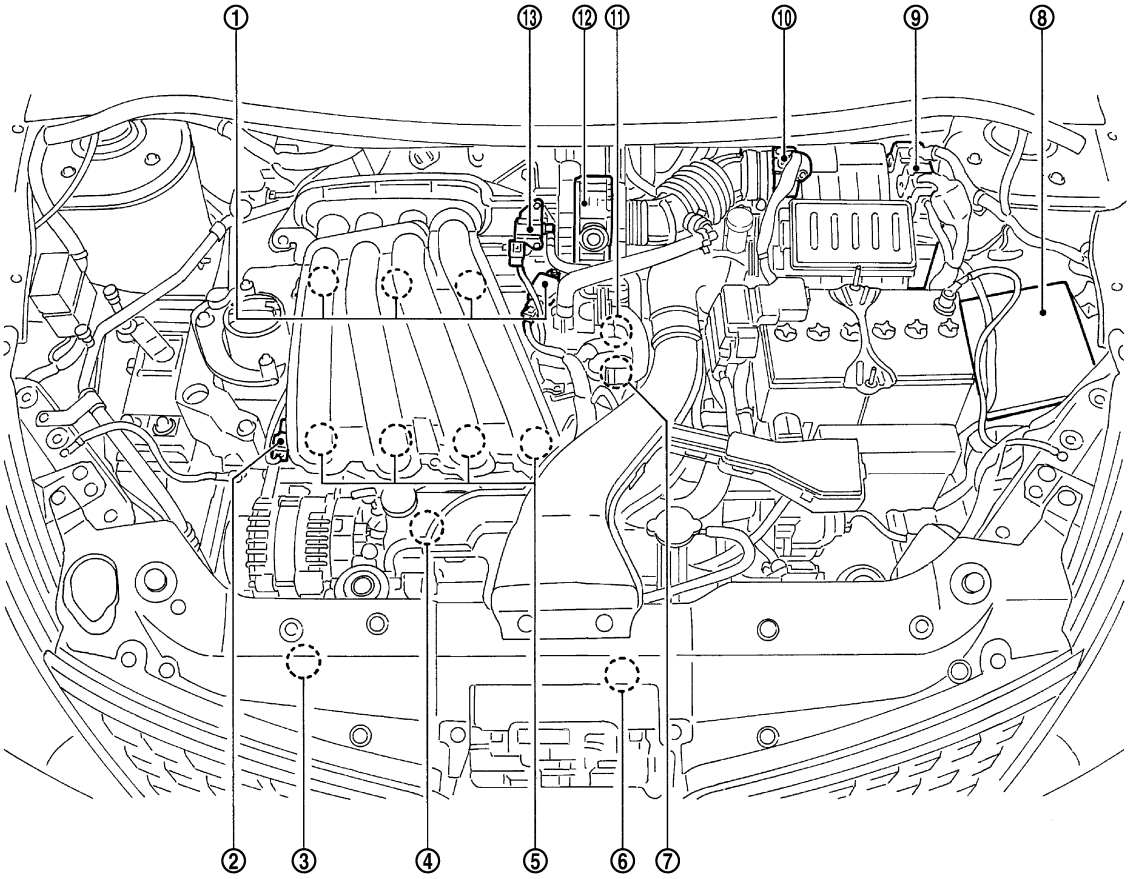
SYSTEM DESCRIPTION

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

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

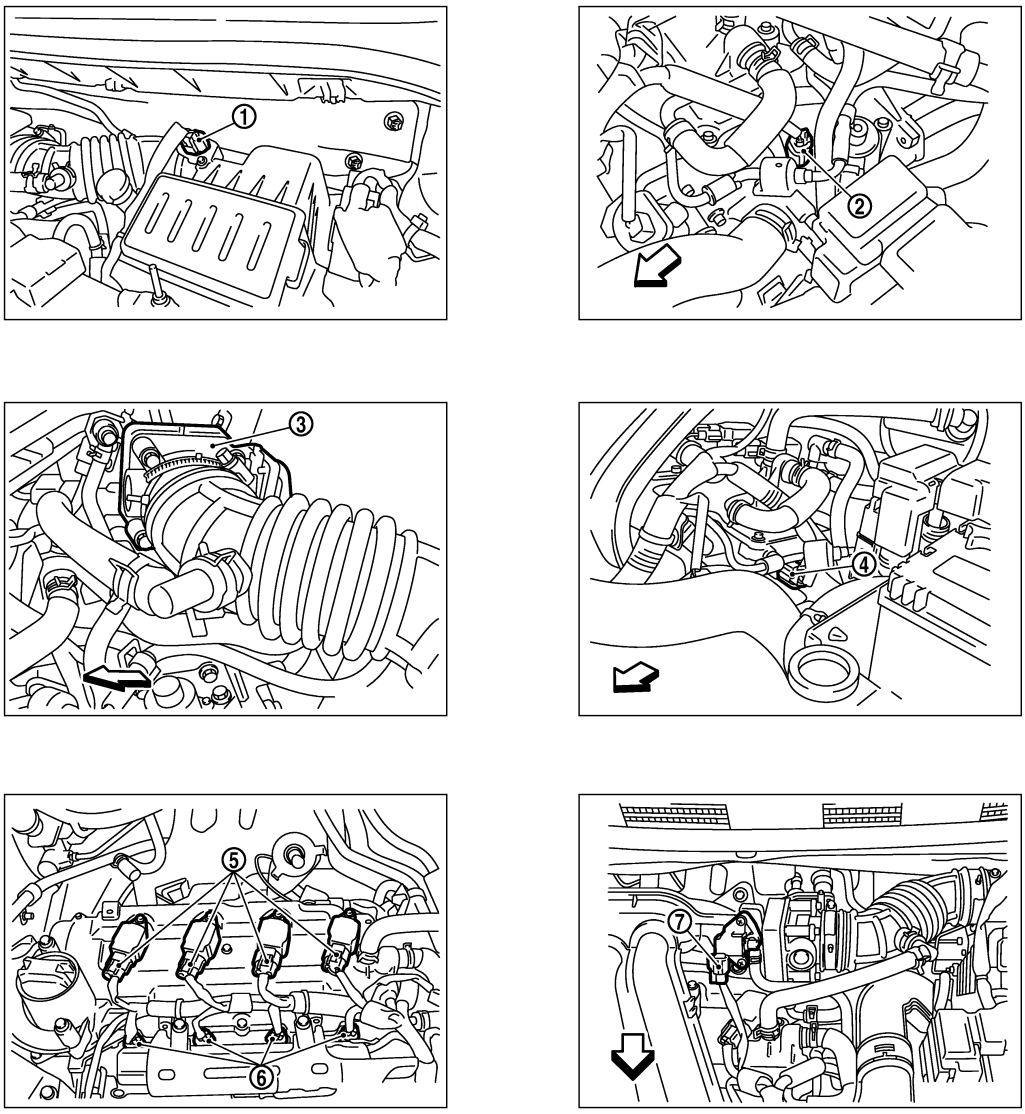
Component Parts Location

INFOID:0000000001693490



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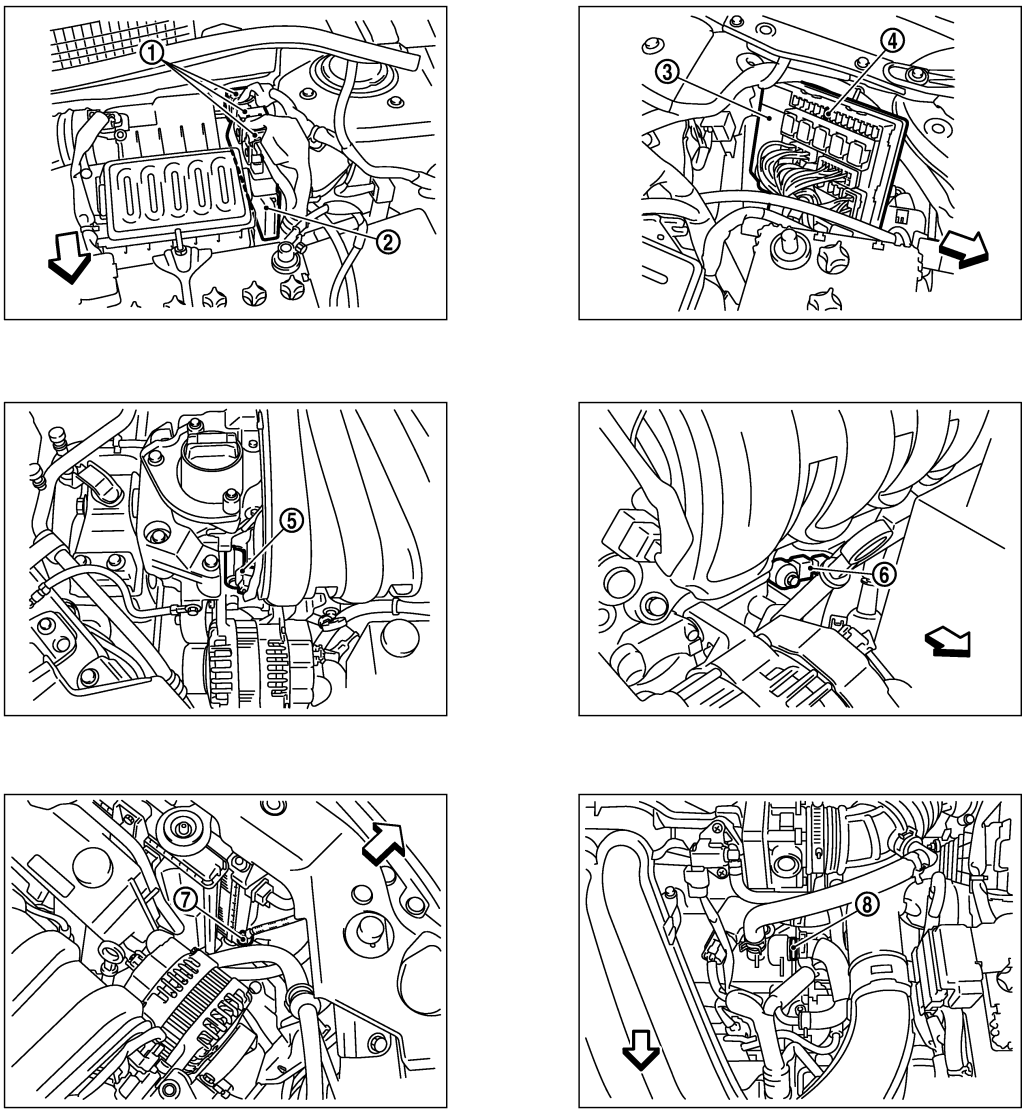
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator
4. Camshaft position sensor (PHASE)
5. Ignition coil (with power transistor)
6. Fuel injector
7. EVAP canister purge volume control solenoid valve

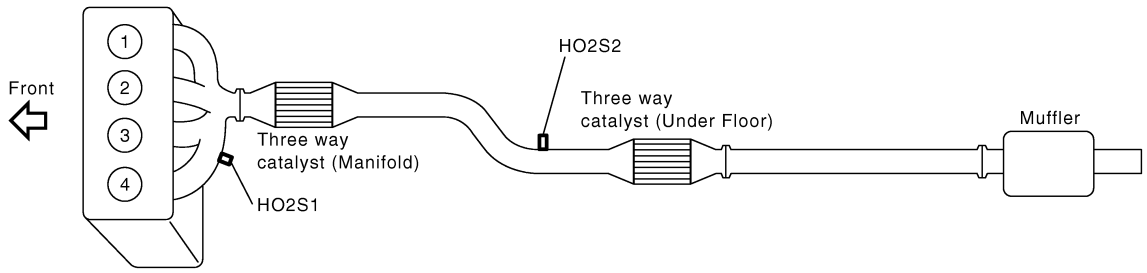
⇦ Vehicle front



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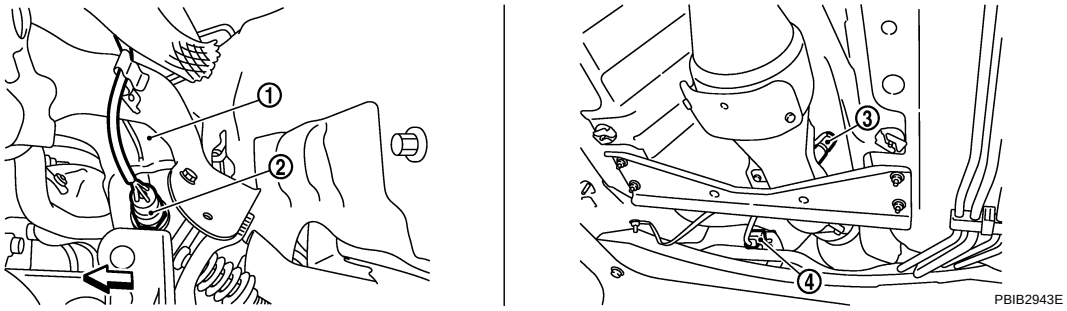
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

⇦ Vehicle front



No. of sensor
Location of a sensor in relation the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on

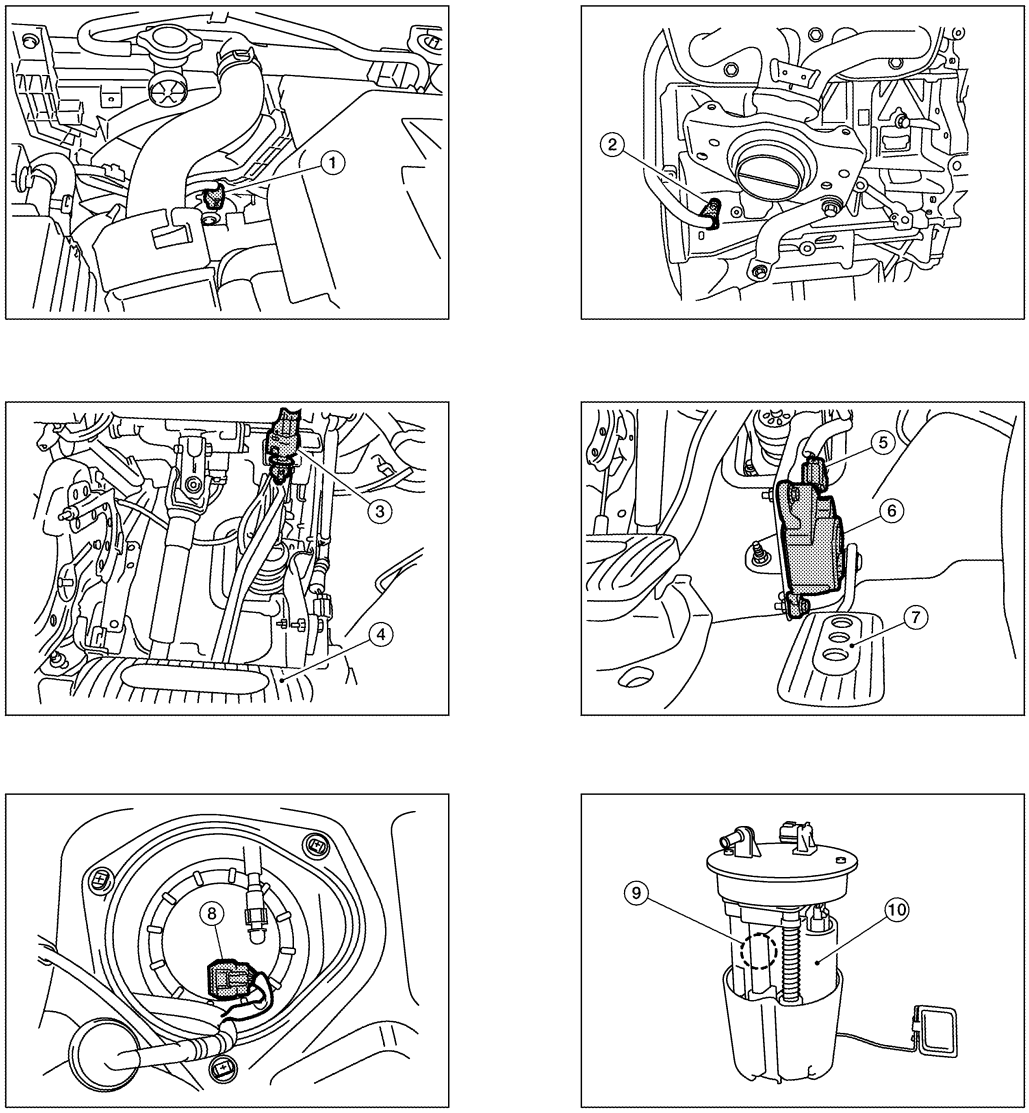
PBIB2942E



PBIB2943E

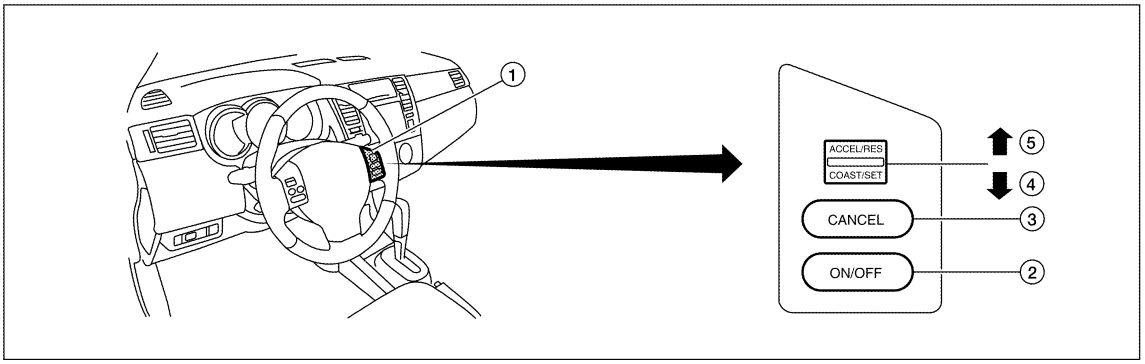
1. Exhaust manifold
2. Heated oxygen sensor 1
3. Heated oxygen sensor 2
4. Heated oxygen sensor 2 harness connector

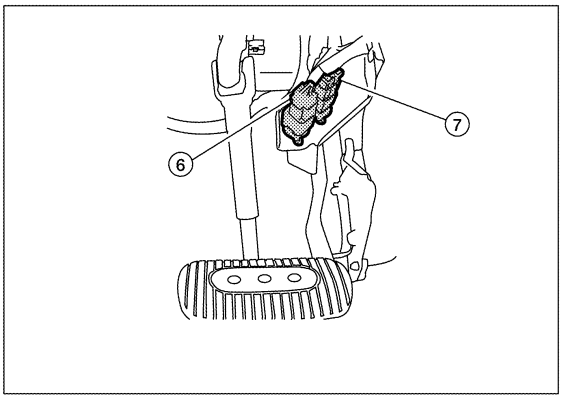
⇦ Vehicle front

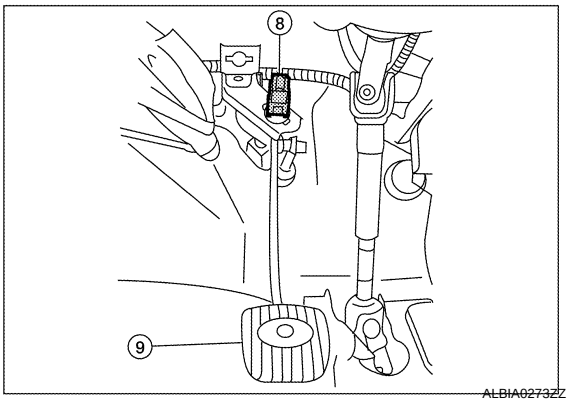


AWBIA0044ZZ

1. Cooling fan motor harness connector
2. Crankshaft position sensor
3. Stop lamp switch
4. Brake pedal
5. Accelerator pedal position sensor harness connector
6. Accelerator pedal position sensor
7. Accelerator pedal
8. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
9. Fuel pressure regulator
10. Fuel pump







ALBIA0273ZZ

1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELERATE switch
6. ASCD brake switch
7. Stop lamp switch
8. ASCD clutch switch
9. Clutch pedal

Component Description

INFOID:0000000001693491

Component	Reference
Camshaft position sensor (PHASE)	EC-520, "Description"
Crankshaft position sensor (POS)	EC-516, "Description"
Engine coolant temperature sensor	EC-492, "Description"
Intake valve timing control solenoid valve	EC-528, "Description"
Vehicle speed sensor	EC-634, "Description"

DIAGNOSIS SYSTEM (ECM)

Diagnosis Description

INFOID:0000000001693492

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

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 EC-665, "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.

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 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 EC-381, "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.
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 display the DTC in “SELF-DIAG RESULT” mode. Examples: P0340, P1148, 1706, 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, 1148, 1706, 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
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 TM-38, "Diagnosis Procedure without CONSULT-III". (The DTC in 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.**

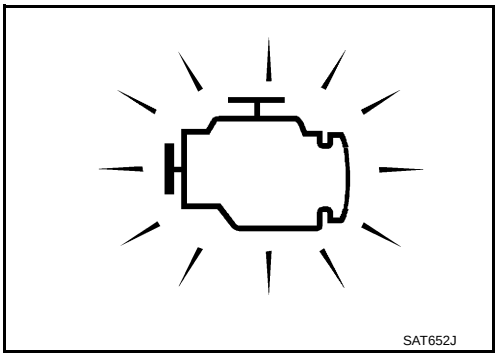
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

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.

MALFUNCTION INDICATOR (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 EC-630, "Component Function Check".
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 four 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. One trip detection diagnoses will light up the MI in the 1st trip.
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 	HEATED OXYGEN SENSOR 1 MONITOR	This function allows the fuel mixture condition (lean or rich), monitored by heated oxygen sensor 1, to be read.

MI Flashing Without DTC

If the ECM is in Diagnostic Test Mode II, MI may flash when engine is running. In this case, check ECM diagnostic test mode. How to switch the diagnostic test function modes, and details of the above functions are described later.

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

- Diagnostic trouble code
- 1st trip diagnostic trouble code
- Freeze frame data
- 1st trip freeze frame data

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:

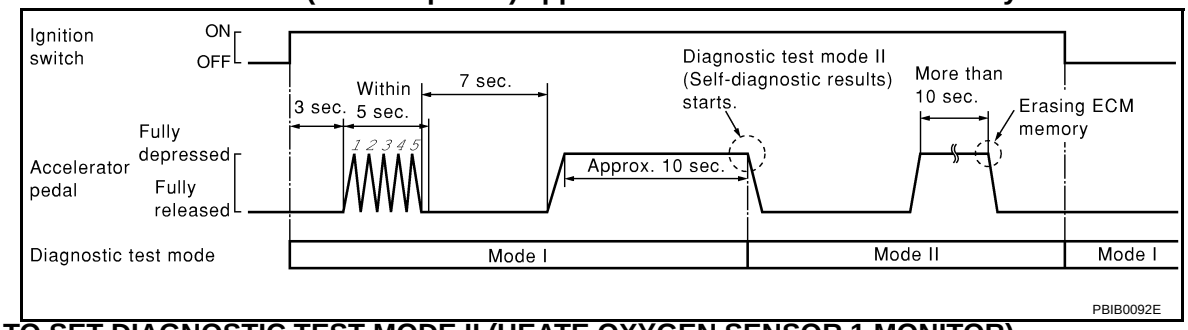
   Do not release the accelerator pedal for 10 seconds if MI may start blinking on the halfway of this 10 seconds. This blinking is displaying SRT status and is continued for another 10 seconds.

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 (HEATE OXYGEN SENSOR 1 MONITOR)

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 entered to Diagnostic Test Mode II (Heated oxygen sensor 1 monitor).

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.**

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 EC-630, "Component Function Check".

Diagnostic Test Mode I — Malfunction Warning

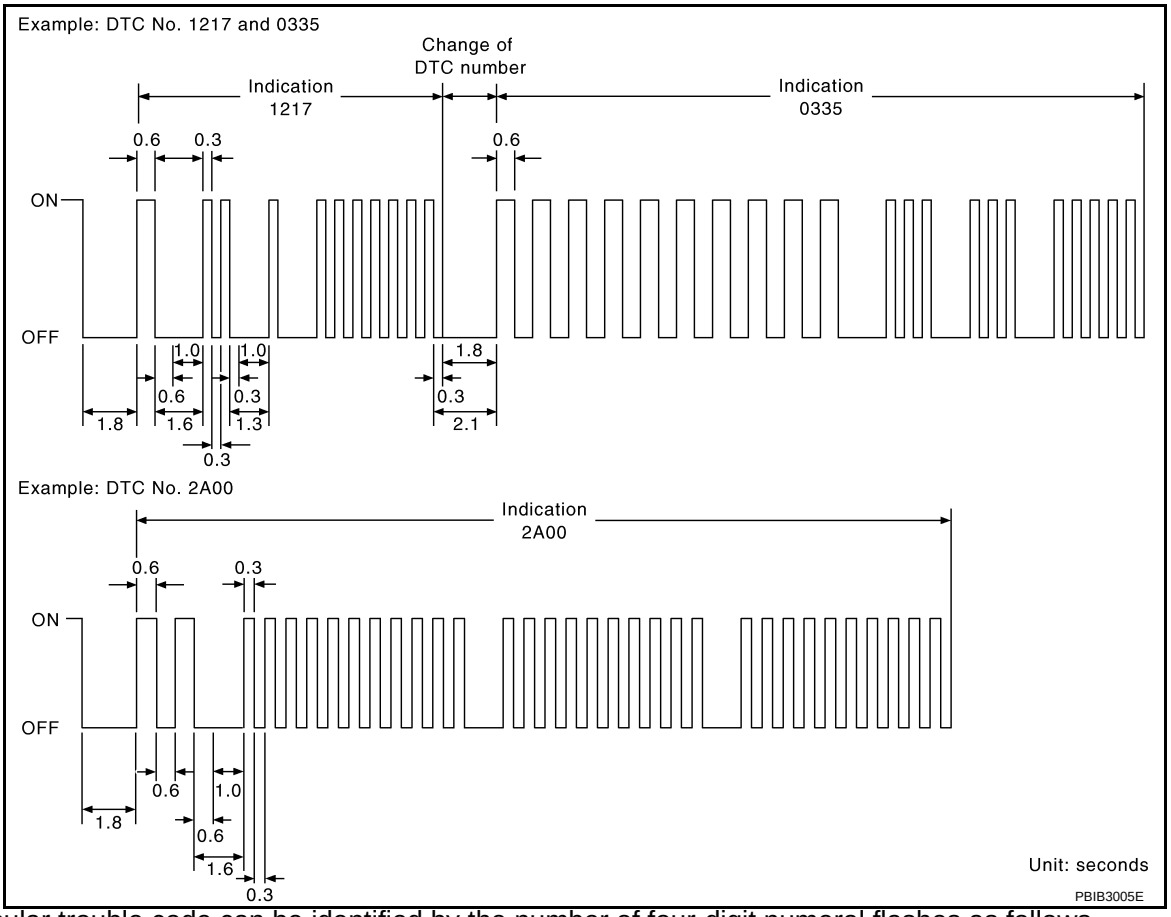
MI	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

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 dis-

played, 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 EC-667, "DTC Index")

Diagnostic Test Mode II — Heated oxygen sensor 1 monitor

In this mode, the MI displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor 1.

MI	Fuel mixture condition in the exhaust gas	Air fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop system

*: Maintains conditions just before switching to open loop.

To check the heated oxygen sensor 1 function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.
Nest run engine at about 2,000 rpm for about 2 minutes under no load conditions. Then make sure that the MI comes ON more than 5 times within 1 seconds with engine running at 2,000 rpm under no load.

CONSULT-III Function

INFOID:0000000001693493

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

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

Item			DIAGNOSTIC TEST MODE				
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	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		×	×	×	×
		Heated oxygen 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		×		×	
		EPS control unit				×	
		Battery voltage				×	
		Load signal				×	
		ASCD steering switch		×		×	
		ASCD brake switch		×		×	
		ASCD clutch 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		×		×	×
		Heated oxygen sensor 1 heater				×	
		Heated oxygen sensor 2 heater				×	
		Intake valve timing control solenoid valve		×		×	×

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 EC-457, "Diagnosis Description".

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	• THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	• THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing mixture ratio self-learning value
TARGET IDLE RPM ADJ*	• IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	• IDLE CONDITION	When adjusting target ignition timing

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

SELF-DIAG RESULTS MODE

Self Diagnostic Item
Regarding items of DTC and 1st trip DTC, refer to EC-667, "DTC Index".)

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	• The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to EC-667, "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.
INT MANI PRES [kPa]	• Always a certain value is displayed. • This item is not efficient for C11 models.

*: 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.
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.
HO2S1 (B1)	V	• The signal of the heated oxygen sensor 1 is displayed.	
HO2S2 (B1)	V	• The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S1 MNTR(B1)	RICH/LEAN	• Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control: RICH: means the mixture became ″rich″, and control is being affected toward a leaner mixture. LEAN: means the mixture became ″lean″, and control is being affected toward a rich mixture.	• After turning ON the ignition switch, ″RICH″ is displayed until air-fuel mixture ratio feedback control begins. • When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
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			
TP SEN 1-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.
TP SEN 2-B1			
INT/A TEMP SE	°C or °F	• The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
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.	

Monitored item	Unit	Description	Remarks
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.	
PW/ST SIGNAL	ON/OFF	• [ON/OFF] condition of the power steering system (determined by the signal sent from EPS control unit) is indicated.	
LOAD SIGNAL	ON/OFF	• Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW	ON/OFF	• Indicates [ON/OFF] condition from ignition switch signal.	
CLUTCH P/P SW	ON/OFF	• Indicates [ON/OFF] condition from the clutch 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.
PURG VOL C/V	%	• Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
INT/V TIM (B1)	°CA	• Indicates [°CA] of intake camshaft advance angle.	
INT/V SOL-B1	%	• The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. • The advance angle becomes larger as the value increases.	
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.	
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	
HO2S1 HTR (B1)	ON/OFF	• Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM according to the input signals.	

Monitored item	Unit	Description	Remarks
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	• Indicates the vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
IDL A/V LEARN	YET/CMPLT	• Display the condition of Idle Air Volume Learning YET: Idle air volume learning has not been performed yet. CMPLT: Idle air volume learning has already been performed successfully.	
TRVL AFTER MIL	km or mile	• Distance traveled while MI is activated.	
O2 SEN HTR DTY	%	• Heated oxygen 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.	
SET VHCL SPD	km/h or mph	• The preset vehicle speed is displayed.	
MAIN SW	ON/OFF	• Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW	ON/OFF	• Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW	ON/OFF	• Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.	
SET SW	ON/OFF	• Indicates [ON/OFF] condition from SET/COAST switch signal.	
BRAKE SW1	ON/OFF	• Indicates [ON/OFF] condition from ASCD brake switch or ASCD clutch switch signal.	
BRAKE SW2	ON/OFF	• Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT	NON/CUT	• Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
LO SPEED CUT	NON/CUT	• Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low, and ASCD operation is cut off.	
AT OD MONITOR	ON/OFF	• Indicates the [ON/OFF] condition of A/T O/D according to the input signal from the TCM.	
AT OD CANCEL	ON/OFF	• Indicates the [ON/OFF] condition of A/T O/D cancel to the input signal from the TCM.	
CRUISE LAMP	ON/OFF	• Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP	ON/OFF	• Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	

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 • Heated oxygen 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.	• Perform Idle Air Volume Learning.
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch OFF • Shift lever: P or N (A/T), 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
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

*: 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:0000000001693221

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:0000000001693222

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 (0.983 - 1.043 bar, 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
- A/T models: After the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” 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 EC-385, "BASIC INSPECTION : Special Repair Requirement".
2. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode with CONSULT-III.
3. Make sure that monitor items are within the SP value.

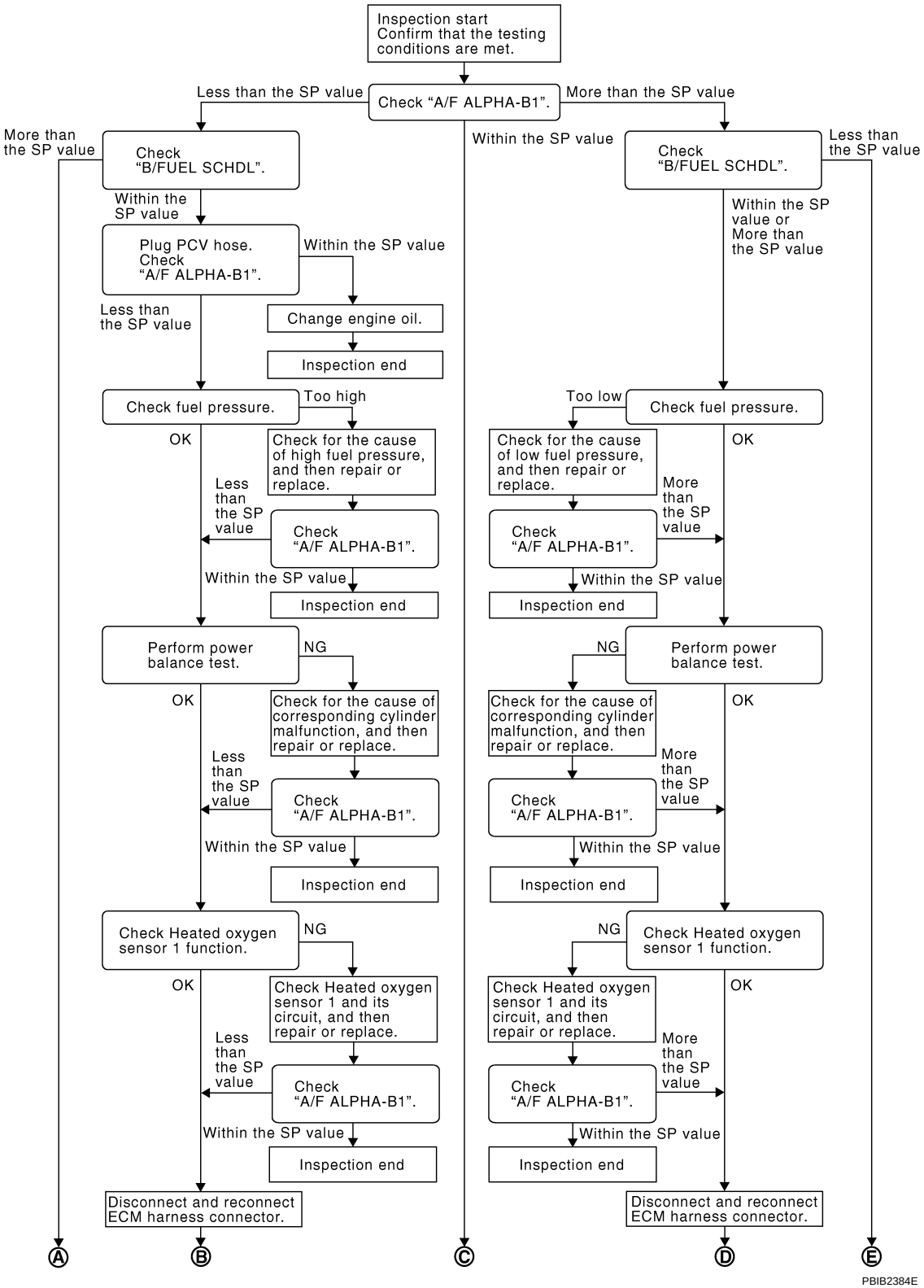
Is the inspection result normal?

YES >> END
NO >> Go to EC-470, "Diagnosis Procedure".

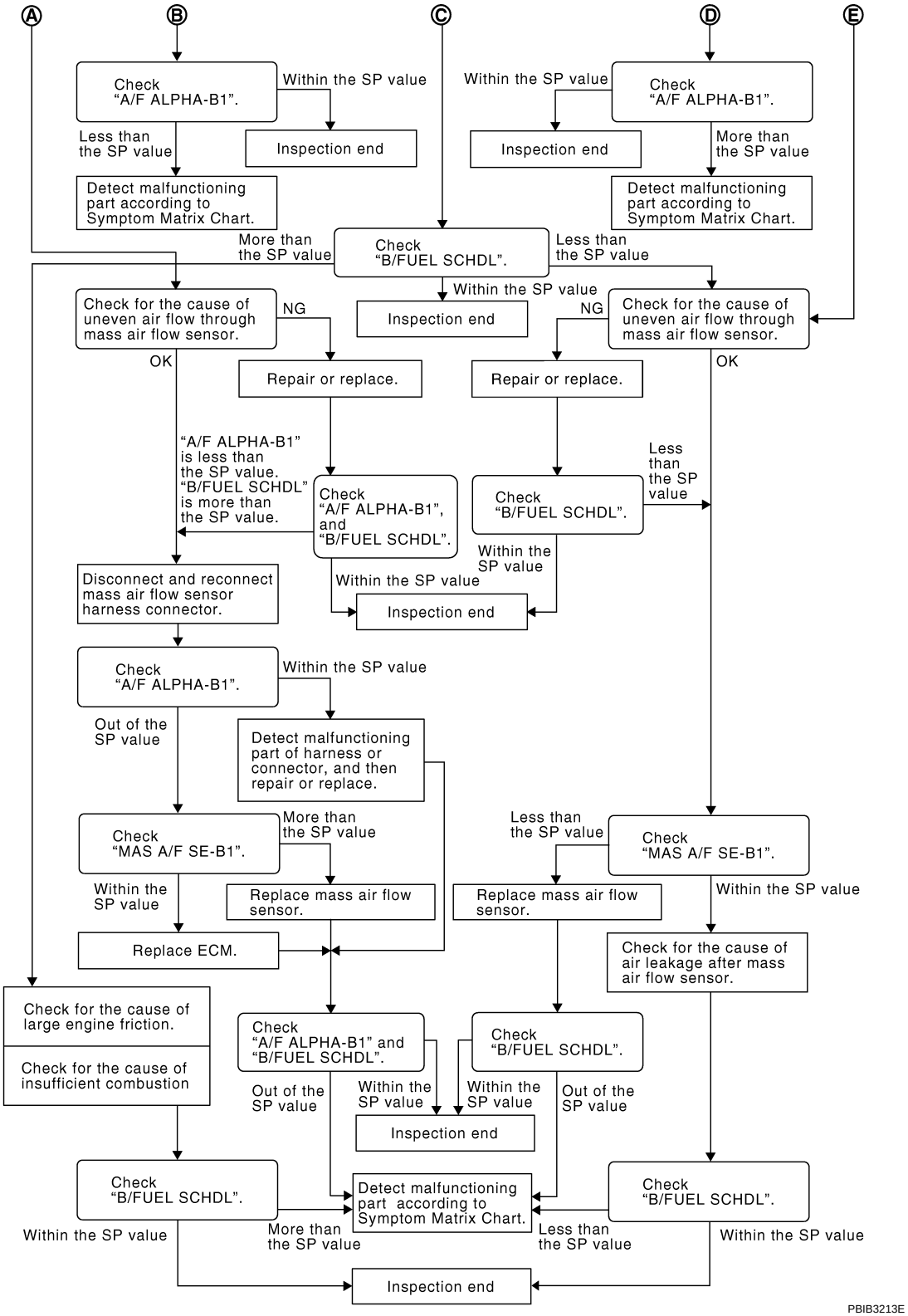
Diagnosis Procedure

INFOID:0000000001693223

OVERALL SEQUENCE



PBIB2384E



DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1"

With CONSULT-III

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-469, "Component Function Check".
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the 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 EC-681, "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 EC-625, "Component Function Check".)
2. Fuel injector and its circuit (Refer to EC-602, "Component Function Check".)
3. Intake air leakage
4. Low compression pressure (Refer to EM-24, "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 HEATED OXYGEN SENSOR 1 FUNCTION

1. Run engine at about 2,000 rpm for about 2minutes under no load.
2. Select “HO2S MNTR (B1)”, in “DATA MONITOR” mode.
3. Running engine at 2,000 rpm under no load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.

1 time : RICH → LEAN → RICH
2 times : RICH → LEAN → RICH → LEAN → RICH

Is the inspection result more than 5 times during 10 seconds?

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

13. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT

Check heated oxygen sensor 1 and its circuit, refer to.

>> 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 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 EC-670, "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 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 EC-487, "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 EC-388, "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 EC-670, "Symptom Table".

30. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-670, "Symptom Table".

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000001693224

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 E15. Refer to Ground Inspection in GI-58, "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 harness connector terminals as follows.

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
E16	93	F10	10	Battery voltage
			11	
		E16	108	

Is the inspection result normal?

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

4.DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No. 55)
- Harness for open or short between ECM and fuse

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

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

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

ECM		Ground	Continuity
Connector	Terminal		
F10	10	Ground	Existed
	11		
E16	108		

3. Also check harness for short to power.

Is the inspection result normal?

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

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F8, E8
- 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		
E43	3	Ground	Battery voltage

Is the inspection result normal?

YES >> Go to EC-625, "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 harness connector terminals as follows.

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
E16	105	E16	108	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 11.

9. CHECK ECM POWER SUPPLY CIRCUIT-IV

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

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F10	32	E16	108	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 11.

10. CHECK ECM POWER SUPPLY CIRCUIT-V

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

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E16	105	E43	4	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 power in harness or connectors.

11. CHECK ECM POWER SUPPLY CIRCUIT-VI

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

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F10	32	E43	7	Existed

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

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

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

13. CHECK 20A FUSE

1. Disconnect 20A fuse (No. 53) 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 E15, E24. Refer to Ground Inspection in GI-58, "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		
F10	10	Ground	Existed
	11		
E16	108		

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 F8, E8
- 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-55, "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:0000000001693225

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:0000000001693226

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 1st trip DTC.

Is 1st trip DTC detected?

YES >> EC-481, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693227

Go to LAN-22, "Trouble Diagnosis Flow Chart".

U1010 CONTROL UNIT (CAN)

Description

INFOID:0000000001693228

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:0000000001693229

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 EC-482, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693230

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 EC-482, "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 EC-482, "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 EC-388, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

P0011 IVT CONTROL

DTC Logic

INFOID:0000000001693231

DTC DETECTION LOGIC

NOTE:
If DTC P0011 is displayed with DTC P1111, first perform the trouble diagnosis for EC-528, "DTC 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.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.

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

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

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

ENG SPEED	1,200 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 4.2 msec
Shift lever	P or N position (A/T) Neutral position (M/T)

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

Is 1st trip DTC detected?

YES >> Go to EC-484, "Diagnosis Procedure"
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT-III

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

ENG SPEED	2,000 - 3,175 rpm (A constant rotation is maintained.)
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 EC-484, "Diagnosis Procedure"
NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-484, "Component Function Check".

NOTE:
Use component function check to check the overall function of intake valve timing control system. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-484, "Diagnosis Procedure".

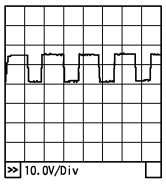
Component Function Check

INFOID:0000000001700121

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 let it idle.
4. Check the voltage between ECM harness connector and ground under the following condition.

Connector	ECM Terminal	Ground	Condition	Voltage signal
F11	73 (IVT control solenoid valve)	Ground	At idle	BATTERY VOLTAGE (11 - 14V)
			Engine speed: 2,000 rpm	7-10V*  PBIA4937J

*: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-484, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001693232

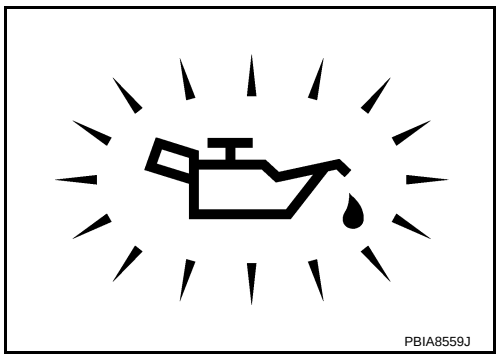
1. CHECK OIL PRESSURE WARNING LAMP

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-6, "Inspection".
NO >> GO TO 2.



2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-486, "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 EC-519, "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 EC-522, "Component Inspection".

Is the inspection result normal?

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

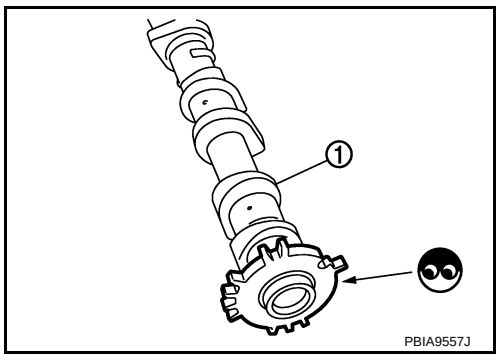
5. CHECK CAMSHAFT (INTAKE)

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-50, "Removal and Installation".
NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to LU-6, "Inspection".

Is the inspection result normal?

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

8. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001693233

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.

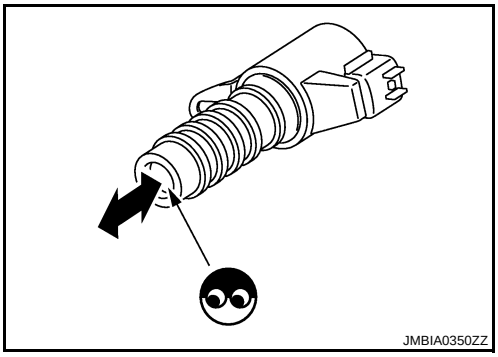
Terminals	Resistance [at 20°C (68°F)]
1 and 2	6.7 - 7.7 Ω
1 or 2 and ground	∞ Ω (Continuity should not exist)

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?

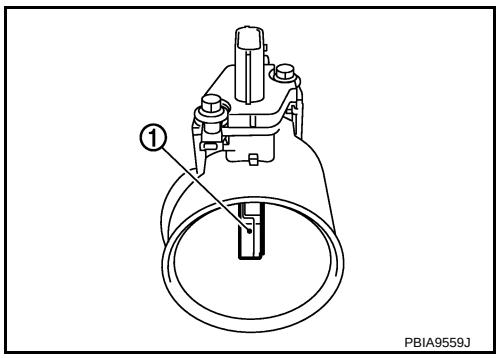
YES >> INSPECTION END
NO >> Replace intake valve timing control solenoid valve.

P0102, P0103 MAF SENSOR

Description

INFOID:0000000001693234

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:0000000001693235

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
P0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

Which DTC is detected?

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

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

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

Is DTC detected?

YES >> Go to EC-488, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-I

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

Is DTC detected?

YES >> Go to EC-488, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-II

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

Is DTC detected?

YES >> Go to EC-488, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693236

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 E15. Refer to Ground Inspection in GI-58, "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		
F31	2	Ground	Battery voltage

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 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	
F31	3	F11	52	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

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

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	4	F11	45	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 MASS AIR FLOW SENSOR

Refer to EC-489, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace mass air flow sensor.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001693237

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.)	1.0 - 1.3V
	Idle to about 4,000 rpm	1.0 - 1.3V 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
Connector	Terminal	Connector	Terminal		
F11	45 (MAF sensor)	F11	52	Ignition switch ON (Engine stopped.)	Approx. 0.4V
				Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3V
				Idle to about 4,000 rpm	1.0 - 1.3V 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.)	1.0 - 1.3V
	Idle to about 4,000 rpm	1.0 - 1.3V 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		
F11	45 (MAF sensor)	F11	52	Ignition switch ON (Engine stopped.)	Approx. 0.4V
				Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3V
				Idle to about 4,000 rpm	1.0 - 1.3V 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.)	1.0 - 1.3V
	Idle to about 4,000 rpm	1.0 - 1.3V 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		
F11	45 (MAF sensor)	F11	52	Ignition switch ON (Engine stopped.)	Approx. 0.4V
				Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.3V
				Idle to about 4,000 rpm	1.0 - 1.3V 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?

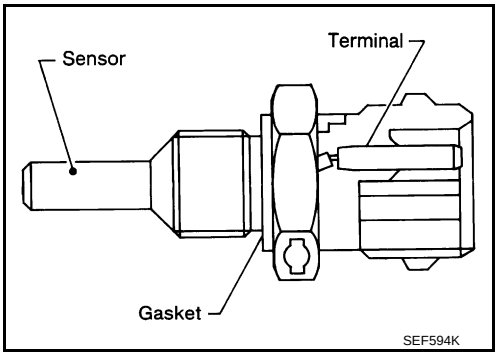
YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor.

P0117, P0118 ECT SENSOR

Description

INFOID:0000000001693242

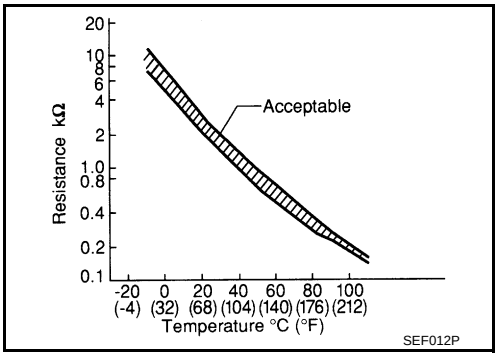
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 38 (Engine coolant temperature sensor) and 44.



DTC Logic

INFOID:0000000001693243

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

Is DTC detected?

YES >> Go to EC-493, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693244

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
F6	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	
F6	2	F11	44	Existed

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

Is the inspection result normal?

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

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-493, "Component Inspection".

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

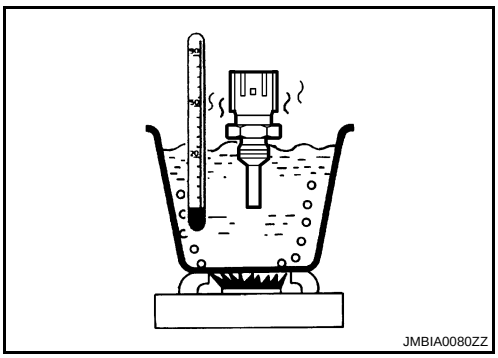
Component Inspection

INFOID:0000000001693245

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)	2.1 - 2.9 kΩ
		50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

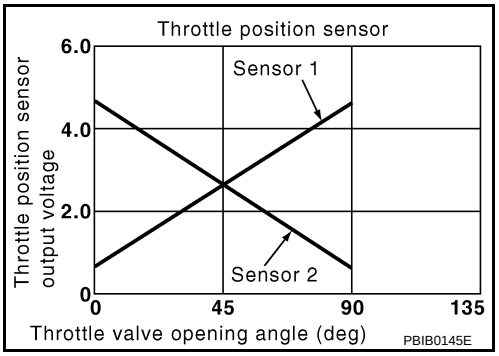
YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor.

P0122, P0123 TP SENSOR

Description

INFOID:0000000001693246

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:0000000001693247

DTC DETECTION LOGIC

NOTE:
If DTC P0122 or P0123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-551, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	• Harness or connectors (TP sensor 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 2)
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 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to EC-495, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693248

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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

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		
F7	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 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	
F7	4	F11	36	Existed

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

Is the inspection result normal?

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

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

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	3	F11	34	Existed

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

Is the inspection result normal?

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

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-497, "Component Inspection".

Is the inspection result normal?

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

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-497, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001693249

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-390, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to D (A/T), 1st (M/T) position.
6. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
F11	33 (TP sensor 1 signal)	F11	36	Accelerator pedal	Fully released	More than 0.36V
					Fully depressed	Less than 4.75V
	34 (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 EC-497, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001693250

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-390, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-390, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

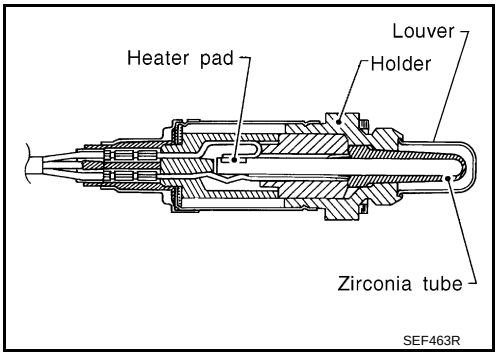
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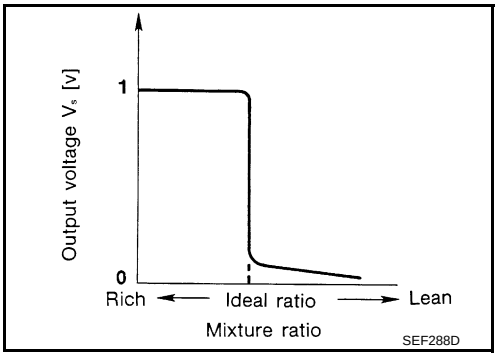
P0132 HO2S1

Description

INFOID:0000000001693251

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



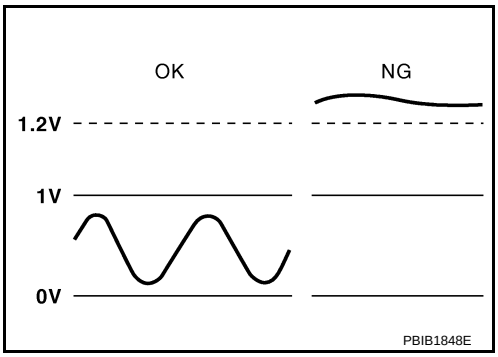


DTC Logic

INFOID:0000000001693252

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 is not inordinately high.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	heated oxygen sensor 1 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen 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.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for 2 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC is detected?

YES >> Go to EC-499, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693253

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1. Refer to EM-159, "Removal and Installation".

>> GO TO 3.

3.CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	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 HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	4	F11	49	existed

2. Check harness continuity between HO2S1 harness connector or ECM harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F12	4	F11	49	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 HO2S1 CONNECTOR FOR WATER

Check heated oxygen sensor 1 connector for water.

Is the inspection result normal?

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

6.CHECK HEATED OXYGEN SENSOR 1

Refer to EC-500, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace heated oxygen sensor 1.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001693254

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

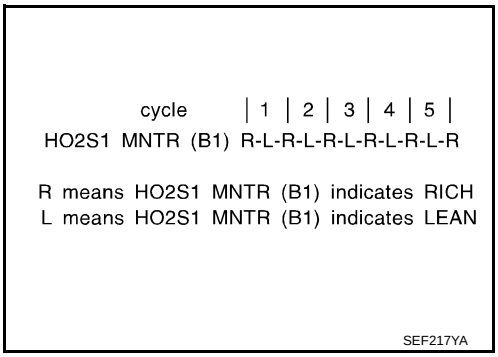
YES >> GO TO 2.
NO >> GO TO 3.

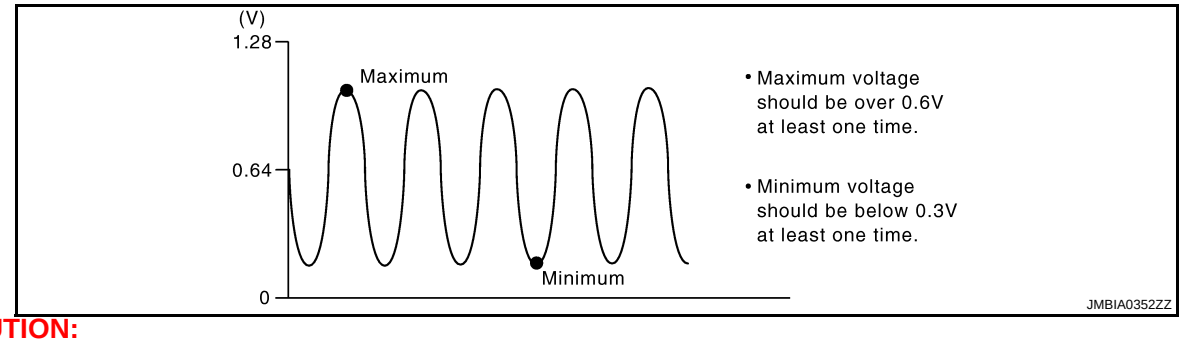
2.CHECK HEATED OXYGEN SENSOR 1

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.
6. Check the following.

- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.





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.**

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector terminals as foloows under the following condition.

ECM		ground		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

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.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

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.**

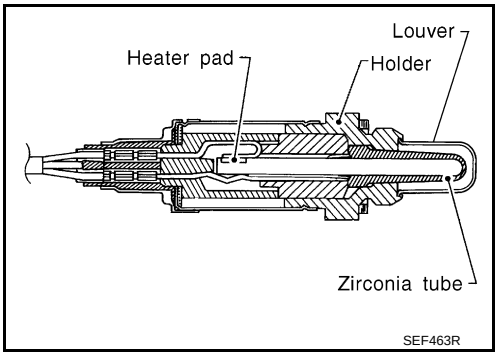
>> INSPECTION END

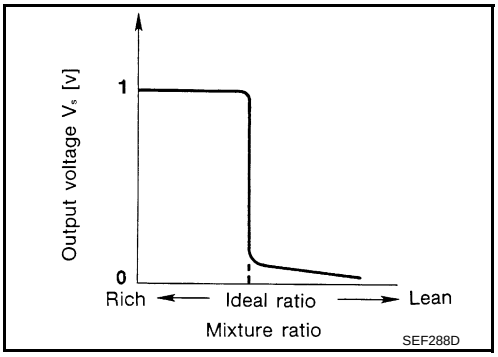
P0134 HO2S1

Description

INFOID:0000000001693259

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



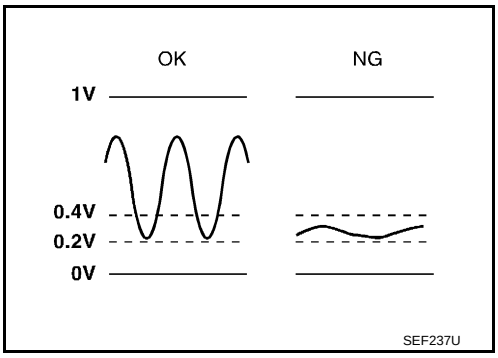


DTC Logic

INFOID:0000000001693260

DTC DETECTION LOGIC

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 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
P0134 0134	Heated oxygen sensor 1 circuit no activity detected	The voltage from the sensor is constantly approx. 0.3V.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen 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 3.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P0134” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.
   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 40 to 50 seconds.)
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	1,300 - 3,500 rpm
VHCL SPEED SE	More than 80 km/h (50 MPH)
B/FUEL SCHDL	3 - 15 msec
Shift lever	Suitable position

If “TESTING” is not displayed after 5 minutes, retry from step 2.

7. Touch “SELF-DIAG RESULTS”.

Which displayed on COUSULT-III screen?

OK >> INSPECTION END.
NG >> Go to EC-503, "Diagnosis Procedure".

3. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM harness connector terminals as follows.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Engine speed held at 2,000 rpm constant under no load.	• The voltage dose not remain in the range of 0.2 to 0.4.

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-503, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001693261

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.

2. Disconnect ECM harness connector.
3. Check harness continuity between ECM harness connector and HO2S1 harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	56	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 HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	4	F11	49	Existed

2. Check harness continuity between ECM harness connector or HO2S1 harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F12	4	F11	49	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 HEATED OXYGEN SENSOR 1

Refer to EC-504, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace heated oxygen sensor 1.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001693262

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 1

With CONSULT-III

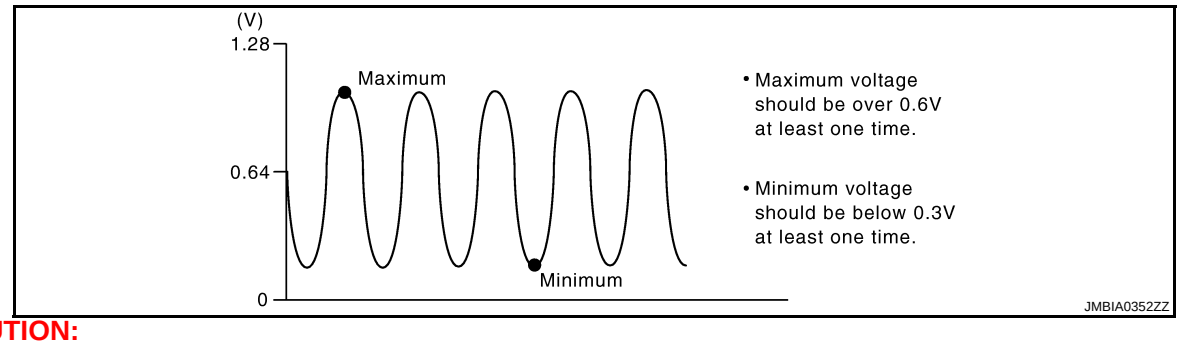
1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.

6. Check the following.
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R				

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA



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.**

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	E11	56	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

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.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.
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.**

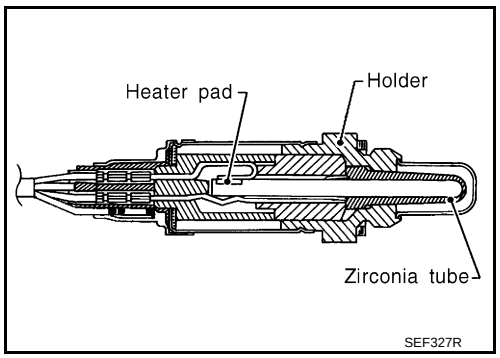
>> INSPECTION END

P0138 HO2S2

Description

INFOID:0000000001693267

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 heated oxygen 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.

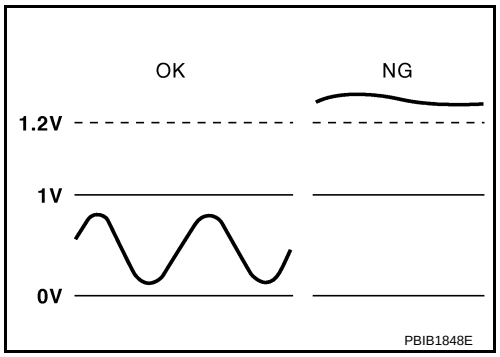


DTC Logic

INFOID:0000000001693268

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time.
To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high 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	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

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 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 2 minutes.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-508, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693269

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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	
F13	1	F11	59	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	
F13	4	F11	50	Existed

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

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F13	4	F11	50	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 EC-509, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001693270

1. INSPECTION START

Do you have CONSULT-III?

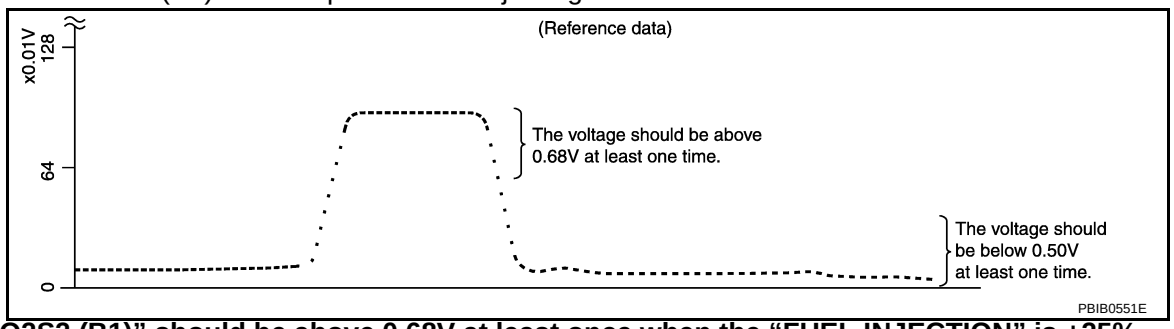
Do you have CONSULT-III?

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 0.50V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

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

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	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 0.50V at least once during this procedure.

Is the inspection result normal?

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

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	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 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	Coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Always drive vehicle at a safe speed.

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.**

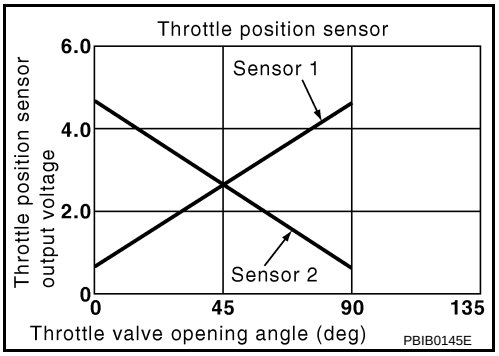
>> INSPECTION END

P0222, P0223 TP SENSOR

Description

INFOID:0000000001693284

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:0000000001693285

DTC DETECTION LOGIC

NOTE:
If DTC P0222 or P0223 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-551, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	• Harness or connectors (TP sensor 1 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1)
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 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to EC-511, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693286

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
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		
F7	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 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	
F7	4	F11	36	Existed

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

Is the inspection result normal?

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

4.CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	2	F11	33	Existed

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

Is the inspection result normal?

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

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-513, "Component Inspection".

Is the inspection result normal?

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

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-513, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001693287

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-390, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to D (A/T), 1st (M/T) position.
6. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
F11	33 (TP sensor 1 signal)	F11	36	Accelerator pedal	Fully released	More than 0.36V
					Fully depressed	Less than 4.75V
	34 (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 EC-513, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001693288

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-390, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-390, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P0327, P0328 KS

Description

INFOID:0000000001693291

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:0000000001693292

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
P0328	Knock 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.

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 run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-514, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693293

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect knock sensor harness connector and disconnect ECM harness connector.
2. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F14	2	F11	40	Existed

3. 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 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	
F14	1	F11	37	Existed

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

Is the inspection result normal?

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

4. CHECK KNOCK SENSOR

Refer to EC-515, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace knock sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001693294

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 [at 20°C (68°F)]
1 and 2	Approx. 532 - 588 kΩ

CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

Is the inspection result normal?

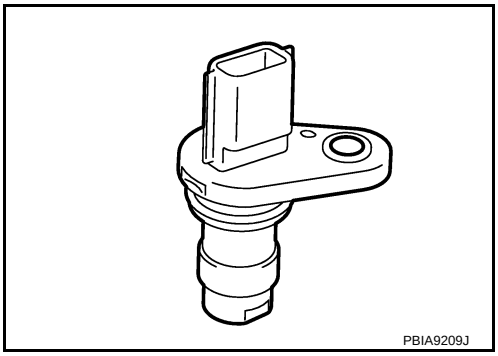
YES >> INSPECTION END
NO >> Replace knock sensor.

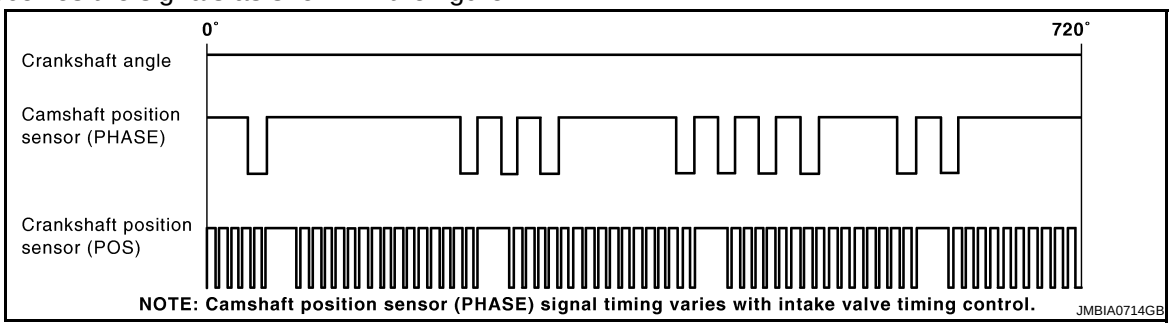
P0335 CKP SENSOR (POS)

Description

INFOID:0000000001693295

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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DTC Logic

INFOID:0000000001693296

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (POS) circuit	• The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	• Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Refrigerant pressure sensor circuit is shorted.) (Accelerator pedal position sensor 2 circuit is shorted.) • Crankshaft position sensor (POS) • Refrigerant pressure sensor • Accelerator pedal position sensor (APPS 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 EC-517, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693297

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
F15	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 OFF.
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	
F15	1	F11	75	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
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
E16	102	APP sensor 2	E12 (LHD models) M204 (RHD models)	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 REFRIGERANT PRESSURE SENSOR

Refer to EC-632, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace refrigerant pressure sensor.

6. CHECK APP SENSOR

Refer to EC-579, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 7.

7. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-389, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

8. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F15	2	F11	62	Existed

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F15	3	F11	61	Existed

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

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-519, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

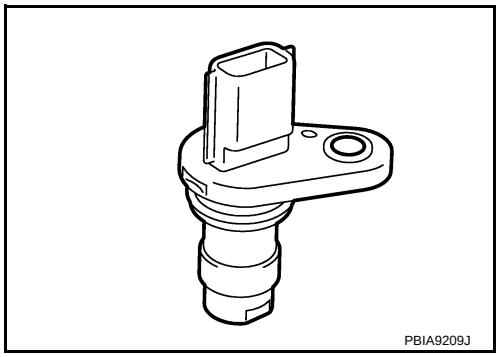
INFOID:0000000001693298

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).


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2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as follows.

Terminals (Polarity)	Resistance [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞ Ω
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

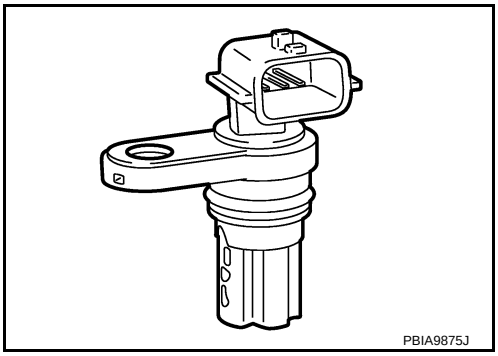
YES >> INSPECTION END
NO >> Replace crankshaft position sensor (POS).

P0340 CMP SENSOR (PHASE)

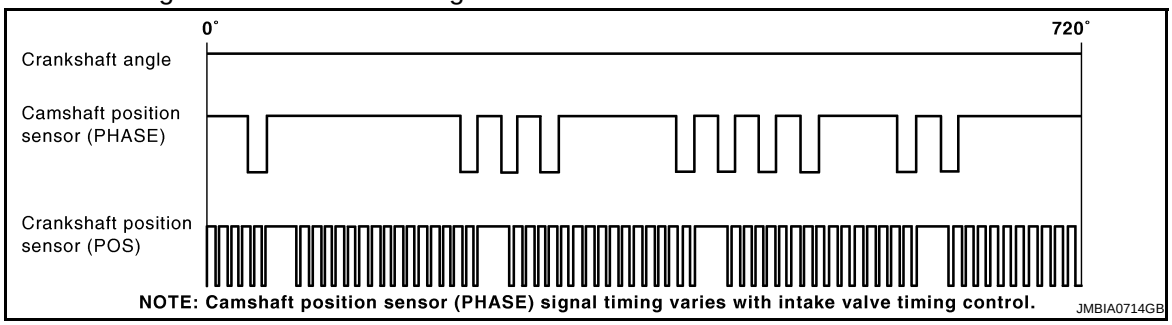
Description

INFOID:0000000001693299

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.


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Due to the changing magnetic field, the voltage from the sensor changes.
ECM receives the signals as shown in the figure.



DTC Logic

INFOID:0000000001693300

DTC DETECTION LOGIC

NOTE:
If DTC P0340 is displayed with DTC P1129, first perform the trouble diagnosis for DTC P1129. Refer to EC-551, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340	Camshaft position sensor (PHASE) circuit	• The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. • The cylinder No. signal is not sent to ECM during engine running. • The cylinder No. signal is not in the normal pattern during engine running.	• Harness or connectors (The sensor circuit is open or shorted) • Camshaft position sensor (PHASE) • Camshaft (INT) • Starter motor • Starting system circuit • Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-521, "Diagnosis Procedure".
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-521, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693301

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 E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CMP sensor (PHASE) harness connector and ground.

CMP sensor (PHASE)		Ground	Voltage
Connector	Terminal		
F21	1	Ground	Approx. 5V

Is the inspection result normal?

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

4. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F21	2	F11	63	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 CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F21	3	F11	65	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-522, "Component Inspection".

Is the inspection result normal?

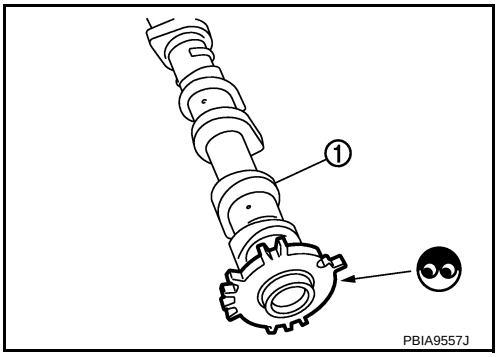
YES >> GO TO 7.
NO >> Replace camshaft position sensor (PHASE).

7.CHECK CAMSHAFT (INT)

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

Is the inspection result normal?

YES >> GO TO 8.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



8.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

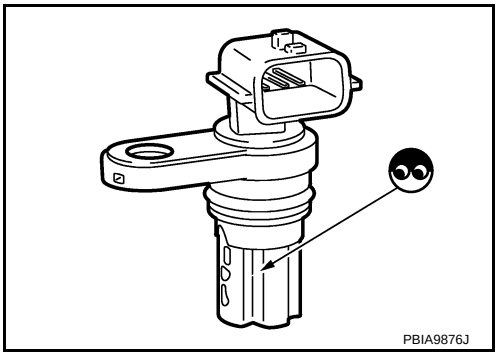
INFOID:0000000001693302

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 [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞ Ω
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

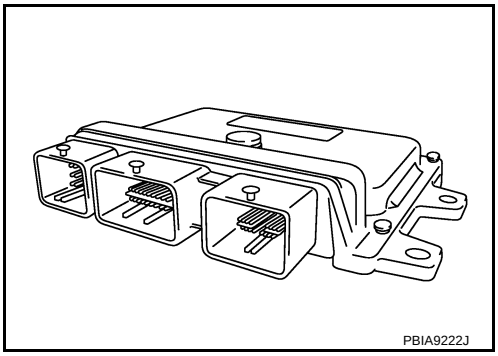
YES >> INSPECTION END
NO >> Replace camshaft position sensor (PHASE).

P0605 ECM

Description

INFOID:0000000001693314

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:0000000001693315

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 EC-525, "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. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-525, "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 10 seconds, and then turn ON.
3. Repeat step 2 for 32 times.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-525, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693316

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 EC-524, "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 EC-524, "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 EC-388, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

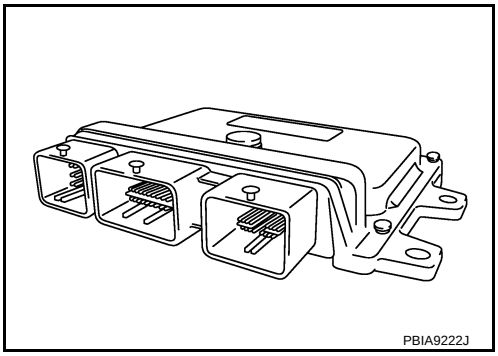
>> INSPECTION END

P1065 ECM

Description

INFOID:0000000001693317

ECM has the memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the Idle Air Volume Learning value memory, etc. even when the ignition switch is turned OFF.


PBIA9222J

DTC Logic

INFOID:0000000001693318

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1065	Engine control module	ECM back-up RAM system does not function properly.	• 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 and wait at least 1 second.
2. Start engine and let it idle for 1 second.
3. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
4. Repeat steps 2 and 3 for four times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-526, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693319

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 EC-526, "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 EC-526, "DTC Logic".

Is the 1st trip DTC P1065 displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to EC-388, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

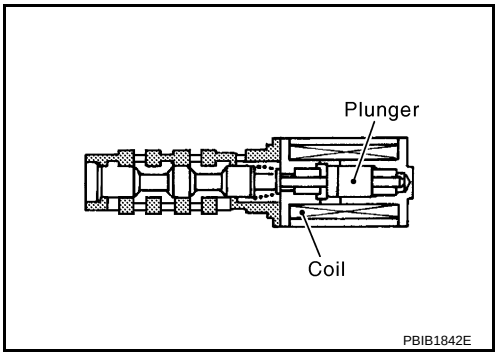
>> INSPECTION END

P1111 IVT CONTROL SOLENOID VALVE

Description

INFOID:0000000001693320

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:0000000001693321

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 EC-528, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693322

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		
F23	1	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 E8, F8
- 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	
F23	2	F11	73	Existed

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

Is the inspection result normal?

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

4.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-529, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001693323

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.

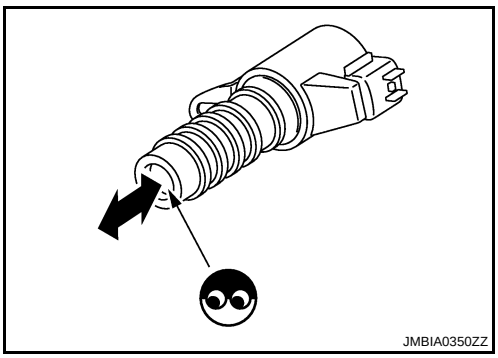
2. Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

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.

P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

INFOID:0000000001693324

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:0000000001693325

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121	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.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND B

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D (A/T), 1st (M/T) position and wait at least 3 seconds.
3. Set shift lever to P or N (A/T), Neutral (M/T) position.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Set shift lever to D (A/T), 1st (M/T) position and wait at least 3 seconds.
7. Set shift lever to P or N (A/T), Neutral (M/T) position.
8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
9. Check DTC.

Is DTC detected?

YES >> Go to EC-531, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D (A/T), 1st (M/T) position and wait at least 3 seconds.
3. Set shift lever to P or N (A/T), Neutral (M/T) position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.

Is DTC detected?

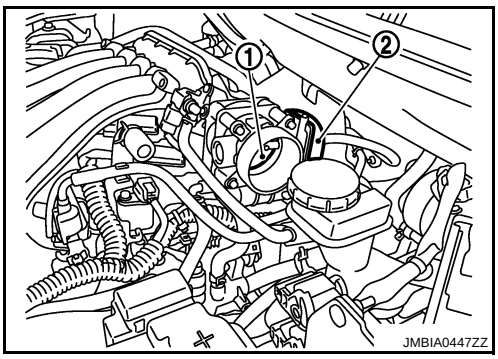
YES >> Go to EC-531, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693326

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-532, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001693327

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-390, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-390, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

P1122 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:0000000001693328

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:0000000001693329

DTC DETECTION LOGIC

NOTE:
If DTC P1122 is displayed with DTC P1121 or P1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-537, "DTC Logic" or EC-531, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122	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 11V when engine is running.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-533, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693330

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F10	2	F16	108	Ignition switch OFF	Approx. 0V
				Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 3.

3.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

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

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F10	15	E16	108	Battery voltage

Is the inspection result normal?

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

4.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

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

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E46	46	F10	15	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 E8, F8
- Harness for open or short between ECM and IPDM E/R

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

6.CHECK FUSE

1. Disconnect 15A fuse (No. 52) from IPDM E/R.
2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace 15A fuse.

7.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-III

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

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E43	8	F10	2	Existed

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

Is the inspection result normal?

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

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

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

9. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

10. 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	
F7	5	F10	1	Not existed
			4	Existed
	6		1	Existed
			4	Not existed

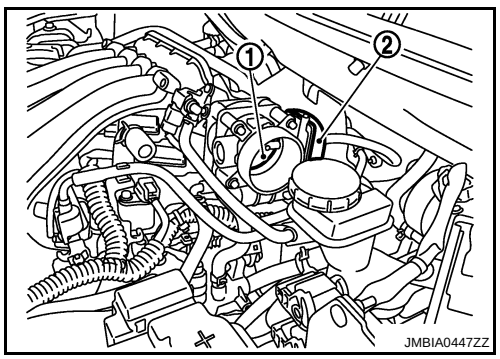
5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. 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

Is the inspection result normal?

YES >> GO TO 12.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

12. CHECK THROTTLE CONTROL MOTOR

Refer to EC-536, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 14.

13. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair or replace harness or connectors.

14. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunction electric throttle control actuator.
2. Go to EC-536, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000001693331

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
5 and 6	Approx. 1 - 15 Ω [at 25 °C (77°F)]

Is the inspection result normal?

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

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-536, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001693332

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-390, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-390, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

P1124, P1126 THROTTLE CONTROL MOTOR RELAY

Description

INFOID:0000000001693333

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:0000000001693334

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124	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
P1126	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?

P1126 >> GO TO 2.
P1124 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1126

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-537, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1124

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

Is DTC detected?

YES >> Go to EC-537, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693335

1.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

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

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F10	15	E16	108	Battery voltage

Is the inspection result normal?

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

2.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

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

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E46	46	F10	15	Existed

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

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

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

4.CHECK FUSE

1. Disconnect 15A fuse (No. 52) from IPDM E/R.
2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace 15A fuse.

5.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F10	2	E16	108	Ignition switch OFF	Approx. 0V
				Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 6.

6.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	
E43	8	F10	2	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 E8, F8
- Harness for open or short between ECM and IPDM E/R

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

8. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

P1128 THROTTLE CONTROL MOTOR

Description

INFOID:0000000001693336

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:0000000001693337

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1128	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	• Harness or connectors (Throttle control motor circuit is shorted.) • Electric throttle control actuator (Throttle control motor)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-540, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693338

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect electric throttle control actuator harness connector.
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	
F7	5	F10	1	Not existed
			4	Existed
	6		1	Existed
			4	Not existed

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

Is the inspection result normal?

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

3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-541, "Component Inspection".

Is the inspection result normal?

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

4.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

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

5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-541, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000001693339

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
5 and 6	Approx. 1 - 15 Ω [at 25 °C (77°F)]

Is the inspection result normal?

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

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-541, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001693340

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-390, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-390, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

P1212 TCS COMMUNICATION LINE

Description

INFOID:0000000001693359

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:0000000001693360

DTC DETECTION LOGIC

NOTE:
- **If DTC P1212 is displayed with DTC U1000 U1001, first perform the trouble diagnosis for DTC U1000 U1001. Refer to EC-481, "DTC Logic".**
- **If DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-482, "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 10.5V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Go to EC-542, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693361

Go to BRC-86, "Work Flow".

P1217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000001693362

DTC DETECTION LOGIC

NOTE:

- **If DTC P1217 is displayed with DTC U1000 U1001, first perform the trouble diagnosis for DTC U1000 U1001. Refer to EC-481, "DTC Logic".**
- **If DTC P1217 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-482, "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 relay-1, -2, -3) • Cooling fan motor • Radiator hose • Radiator • Radiator cap • Reservoir tank • Water pump • Thermostat

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to CO-11, "Inspection". Also, replace the engine oil. Refer to LU-7, "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-20, "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 EC-543, "Component Function Check".

NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-544, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001693363

1.PERFORM COMPONENT FUNCTION CHECK-I

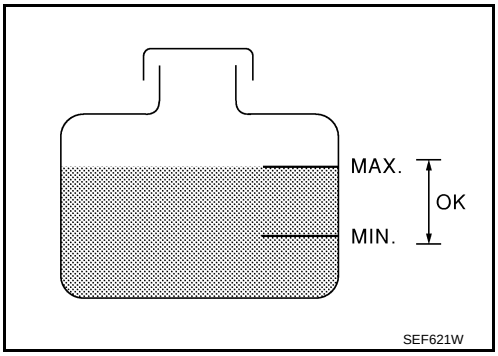
WARNING:

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 EC-544, "Diagnosis Procedure".
NO >> GO TO 2.



2.PERFORM COMPONENT FUNCTION CHECK-II

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

YES >> Go to EC-544, "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 motor operate at each speed (LOW/HI).

Without CONSULT-III
Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PCS-10, "Diagnosis Description".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-544, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001693364

1.INSPECTION START

Do you have CONSULT-III?

Yes or No

Yes >> GO TO 2.
No-1 >> With A/C models: GO TO 4.
No-2 >> Without A/C models: GO TO 5

2.CHECK COOLING FAN LOW SPEED OPERATION

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 fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check cooling fan control circuit. Refer to EC-593, "Diagnosis Procedure".

3.CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-III
1. Touch “HIGH” on the CONSULT-III screen.
2. Make sure that cooling fan operates at higher speed than low speed.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check cooling fan control circuit. Refer to EC-593, "Diagnosis Procedure".

4. CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT-III

1. Start engine and let it idle.
2. Turn air conditioner switch ON.
3. Turn blower fan switch ON.
4. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check cooling fan speed control circuit. Refer to EC-593, "Diagnosis Procedure".

5. CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT-III

1. Perfom IPDM E/R auto active test and check cooling fan motor operation. Refer to PCS-10, "Diagnosis Description".
2. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check cooling fan speed control circuit. Refer to EC-593, "Diagnosis Procedure"

6. CHECK COOLING FAN HIGH SPEED OPERATION.

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 >> GO TO 7.
NO >> Check cooling fan speed control circuit. Refer to EC-593, "Diagnosis Procedure".

7. CHECK COOLING SYSTEM FOR LEAK

Check cooling system for leak. Refer to CO-11, "Inspection".

Is leakage detected?

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

8. DETECT MALFUNCTIONING PART

Check the following for leak. Refer to CO-11, "Inspection".

- Hose
- Radiator
- Water pump
- Reservoir tank

>> Repair or replace.

9. CHECK RESERVOIR TANK CAP

Check radiator cap. Refer to CO-14, "Checking Radiator Cap".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace radiator cap.

10. CHECK THERMOSTAT

Check thermostat.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace thermostat.

11. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor.

Is the inspection result normal?

OK >> GO TO 12.
NG >> Replace engine coolant temperature sensor.

12. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, check the following.

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	MA-20, "SAE Viscosity Number"
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-11, "Inspection"
	4	• Reservoir tank cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 bar, 0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	CO-14, "Checking Radiator Cap"
ON*2	5	• Coolant leaks	• Visual	No leaks	CO-11, "Inspection"
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	CO-22, "Removal and Installation"
ON*1	7	• Cooling fan motor	• CONSULT-III	Operating	EC-543, "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-11, "Inspection"
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	CO-11, "Inspection"
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-80, "Removal and Installation"
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	EM-108, "Inspection"

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to CO-6, "Troubleshooting Chart".

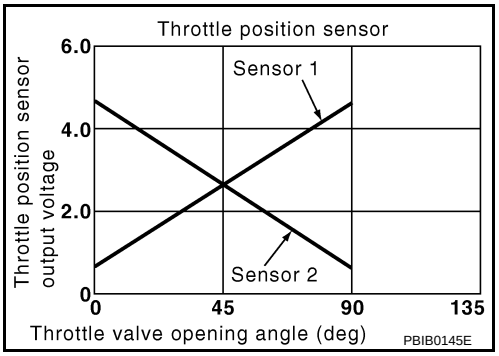
>> INSPECTION END

P1225 TP SENSOR

Description

INFOID:0000000001693365

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:0000000001693366

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 EC-547, "Diagnosis Procedure".
NO >> INSPECTION END

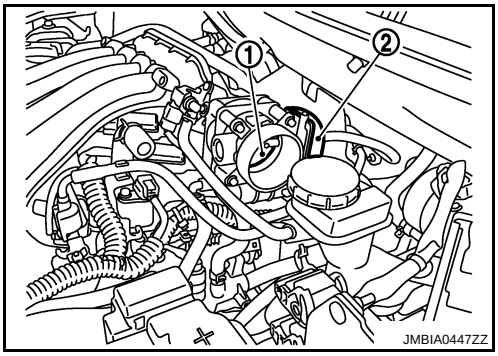
Diagnosis Procedure

INFOID:0000000001693367

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-548, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001693368

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-390, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-390, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

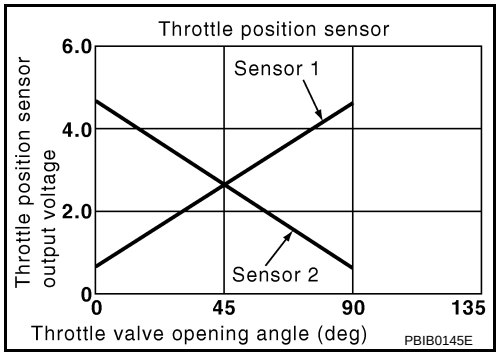
>> END

P1226 TP SENSOR

Description

INFOID:0000000001693369

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:0000000001693370

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF, wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 2 and 3 for 32 times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-549, "Diagnosis Procedure".
NO >> INSPECTION END

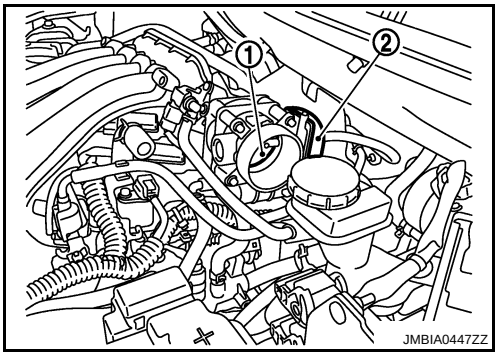
Diagnosis Procedure

INFOID:0000000001693371

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-548, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001693372

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-390, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-390, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

P1229 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000001693373

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	• Harness or connectors (APP sensor 1 circuit is shorted.) (TP sensor circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] • Accelerator pedal position sensor (APPS 1) • Throttle position sensor • Camshaft position sensor (PHASE)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to EC-551, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693374

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E12 (LHD models) M204 (RHD models)	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUITS

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

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F11	72	Electric throttle control actuator	F7	1
	78	CMP sensor (PHASE)	F21	1
E16	106	APP sensor	E12 (LHD models) M204 (RHD models)	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 COMSHAFT POSITION SENSOR

Refer to EC-522, "Component Inspection".

Is the inspection result normal?

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

5.CHECK TP SENSOR

Refer to EC-582, "Component Inspection".

Is the inspection result normal?

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

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-582, "Component Inspection".

>> INSPECTION END

7.CHECK APP SENSOR

Refer to EC-574, "Component Inspection".

Is the inspection result normal?

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

8.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-389, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

9.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

P1564 ASCD STEERING SWITCH

Description

INFOID:0000000001693375

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.
Refer to EC-424, "System Diagram" for the ASCD function.

DTC Logic

INFOID:0000000001693376

DTC DETECTION LOGIC

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-524, "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 EC-553, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693377

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-III
1. Turn ignition switch ON.

2. Select “MAIN SW”, “CANCEL SW”, “RESUME/ACC SW” and “SET SW” in “DATA MONITOR” mode with CONSULT-III.
3. Check each item indication under the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF
RESUME/ACC SW	RESUME/ACCELERATE switch	Pressed	ON
		Released	OFF
SET SW	SET/COAST switch	Pressed	ON
		Released	OFF

Without CONSULT-III
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
E16	94 (ASCD steering switch signal)	E16	95	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 M30.
4. Check the continuity between combinarion switch and ECM harness connector.

Combination switch	ECM		Continuity
Terminal	Connector	Terminal	
15	E16	95	Existed

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

Is the inspection result normal?

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

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- 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	
14	E16	94	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 M69, E7
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

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

7. CHECK ASCD STEERING SWITCH

Refer to EC-555, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001693378

1. CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector.
2. Check the continuity between combination switch harness connector terminals under following conditions.

Combination meter		Condition	Resistance
Connector	Terminals		
M30	14 and 15	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:0000000001693379

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-424, "System Diagram" for the ASCD function.

DTC Logic

INFOID:0000000001693380

DTC DETECTION LOGIC

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-524, "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.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.

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 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-I

With CONSULT-III

1. Start engine.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Press MAIN switch and make sure that CRUISE indicator is displayed in combination meter.
4. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:

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

VHCL SPEED SE	More than 30 km/h (19 mph)
Shift lever	Suitable position

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-558, "Diagnosis Procedure".
NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-II

With CONSULT-III

1. Drive the vehicle for at least 5 consecutive seconds under the following conditions.
CAUTION:
Always drive vehicle at a safe speed.
NOTE:
This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than 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 EC-558, "Diagnosis Procedure".
NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

Perform component check. Refer to
Use component function check to check the overall function of the ASCD brake circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-558, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001705131

1. PERFORM COMPONENT FUNCTION CHECK-I

Without CONSSULT-III

1. Turn ignition switch ON.
2. Check voltage between ECM harness connector and ground.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E16	100 (ASCD brake switch signal)	E16	108	Brake pedal and/or clutch pedal	Slightly depressed	Approx. 0V
				Brake pedal and clutch pedal	Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-558, "Diagnosis Procedure".

2.PERFORM COMPONENT FUNCTION CHECK-II

Without CONSSULT-III

Check voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	99 (Stop lamp switch signal)	Ground	Brake pedal and clutch pedal	Slightly depressed	Approx. 0V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-558, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001700236

1.CHECK OVERALL FUNCTION-I

With CONSULT-III

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BRAKE SW1” indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal and/or clutch pedal	Slightly depressed	OFF
	Brake pedal and clutch pedal	Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminal as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E16	100 (ASCD brake switch signal)	E16	108	Brake pedal and/or clutch pedal	Slightly depressed	Approx. 0V
				Brake pedal and clutch pedal	Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO-1 >> A/T models: GO TO 3.
NO-1 >> M/T models: GO TO 8.

2.CHECK OVERALL FUNCTION-II

With CONSULT-III

Select “BRAKE SW2” and check indication in “DATA MONITOR” mode.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal	Slightly depressed	ON
		Fully released	OFF

Without CONSULT-III

Check the voltage between ECM harness connector terminal as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E16	99 (Stop lamp switch signal)	E108	108	Brake pedal	Slightly depressed	Battery voltage
					Fully released	Approx. 0V

Is the inspection result normal?

YES >> GO TO 21.
NO >> GO TO 16.

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		
E36 (LHD models) M205 (RHD models)	1	Ground	Battery voltage

Is the inspection result normal?

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

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, M69 (LHD models)
- Harness connectors M25, M201 (RHD models)
- 10A fuse (No.2)
- Harness for open or short between ASCD brake switch and fuse

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

5. CHECK ASCD 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	
E36 (LHD models) M205 (RHD models)	2	E16	100	Existed

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

Is the inspection result normal?

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

6. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector M25, M201, M69, E7 (RHD models)
- Harness for open or short between ASCD brake switch and ECM

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

7. CHECK ASCD BRAKE SWITCH

Refer to EC-562, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 21.
NO >> Replace ASCD brake switch.

8. 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				
E35 (LHD models) M206 (RHD models)	1	Ground	Brake pedal	Slightly depressed	Approx. 0
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 9.

9. 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		
E36 (LHD models) M205 (RHD models)	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector E7, M69 (LHD models)
- Junction block connector M25, M201 (RHD models)
- 10A fuse (No.2)
- Harness for open or short between ASCD brake switch and fuse

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

11. 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	
E36 (LHD models) M205 (RHD models)	2	E35 (LHD models) M206 (RHD models)	1	Existed

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

Is the inspection result normal?

YES >> GO TO 12.

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

12. CHECK ASCD BRAKE SWITCH

Refer to EC-562, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 21.
NO >> Replace ASCD brake switch.

13. 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	
E16	100	E35 (LHD models) M206 (RHD models)	2	Existed

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

Is the inspection result normal?

YES >> GO TO 15.
NO >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector M25, M201, M69, E7 (RHD models)
- Harness for open or short between ASCD brake switch and ECM

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

15. CHECK ASCD CLUTCH SWITCH

Refer to EC-563, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 21.
NO >> Replace ASCD clutch switch.

16. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E13 (LHD models)) M203 (RHD models)	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 18.
NO >> GO TO 17.

17. DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No.7)
- Harness for open or short between stop lamp switch and battery

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

18.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	
E16	99	E13 (LHD models) M203 (RHD models)	2	Existed

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

Is the inspection result normal?

YES >> GO TO 20.
NG >> GO TO 19.

19.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.

20.CHECK STOP LAMP SWITCH

Refer to EC-563, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 21.
NO >> Replace stop lamp switch.

21.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000001693382

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-6, "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:0000000001693383

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, "On-vehicle 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:0000000001693384

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-6, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

P1574 ASCD VEHICLE SPEED SENSOR

Description

INFOID:0000000001693385

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-424, "System Diagram" for ASCD functions.

DTC Logic

INFOID:0000000001693386

DTC DETECTION LOGIC

NOTE:

- **If DTC P1574 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-481, "DTC Logic".**
- **If DTC P1574 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-482, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-524, "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 • 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.
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 EC-564, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693387

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-32, "OBD Diagnostic Trouble Code (DTC)".

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-25, "CONSULT-III Function (ABS)" (with ABS) or BRC-105, "CONSULT-III Function (ABS)" (with ABS/TCS/ESP).

Is the inspection result normal?

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

3. CHECK COMBINATION METER

Check combination meter function.
Refer to MWI-22, "CONSULT-III Function (METER/M&A)".

>> INSPECTION END

P1706 PNP SWITCH

Description

INFOID:0000000001693388

When the shift lever position is P or N (A/T) Neutral (M/T) position, park/neutral position (PNP) switch is ON. ECM detects the position because the continuity of the line (the ON signal) exists.

DTC Logic

INFOID:0000000001693389

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
P or N position (A/T) Neutral position (M/T)	ON
Except above position	OFF

Is the inspection result normal?

YES >> GO TO 4.
NO >> Go to EC-567, "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	1,500 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	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 EC-567, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-567, "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 EC-567, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001693390

1.PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminal as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
F11	69 (PNP switch signal)	E16	108	Shift lever	P or N (A/T) Neutral (M/T)	Approx. 0V
					Except above	BATTERY VOLTAGE

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-567, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001693391

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		
F24 (M/T)	2	Ground	Battery voltage
F25 (A/T)	1		

Is the inspection result normal?

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

2.DTECTED MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- 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

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	
F24 (M/T)	3	F11	69	Existed
F25 (A/T)	2			

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.

4. CHECK PNP SWITCH

Refer to TM-621, "PARK/NEUTRAL POSITION (PNP) SWITCH : Component Inspection" (M/T) or TM-46, "Component Inspection" (A/T).

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace PNP switch.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

P1805 BRAKE SWITCH

Description

INFOID:0000000001693392

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:0000000001693393

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 EC-569, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693394

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 the inspection result normal?

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		
E13 (LHD models) M203 (RHD models)	1	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 M69, E7 (LHD models)
- Harness connectors M201, M25 (RHD models)
- Harness for open or short between stop lamp switch and fuse

>> 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	
E16	99	E13 (LHD models) M203 (RHD models)	2	Existed

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 connectors M201, M25, M69, E7 (RHD models)
- Harness for open or short between ECM and stop lamp switch

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

6.CHECK STOP LAMP SWITCH

Refer to EC-570, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Stop Lamp Switch)

INFOID:0000000001693395

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-6, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

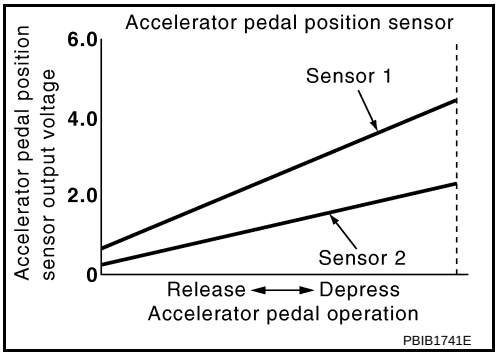
YES >> INSPECTION END
NO >> Replace stop lamp switch.

P2122, P2123 APP SENSOR

Description

INFOID:0000000001693396

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:0000000001693397

DTC DETECTION LOGIC

NOTE:
If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-551, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	• Harness or connectors (APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)
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 EC-572, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693398

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
E12 (LHD models) M204 (RHD models)	4	Ground	Approx. 5V

Is the inspection result normal?

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

3.DETECT MALFUNCTIONGN PART

Check the following.
- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

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

4.CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12 (LHD models) M204 (RHD models)	2	E16	111	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 MALFUNCTIONGN PART

Check the following.
- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

>> 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	
E12 (LHD models) M204 (RHD models)	3	E16	110	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 MALFUNCTIONGN PART

Check the following.
- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

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

8.CHECK APP SENSOR

Refer to EC-574, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-574, "Special Repair Requirement".

>> INSPECTION END

10.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001693399

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			
E16	110 (APP sensor 1 signal)	E16	111	Accelerator pedal	Fully released	0.6 - 0.9V
					Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)		104		Fully released	0.3 - 0.6V
					Fully depressed	1.95 - 2.4V

Is the inspection result normal?

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

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-574, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001693400

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-389, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-390, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-390, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

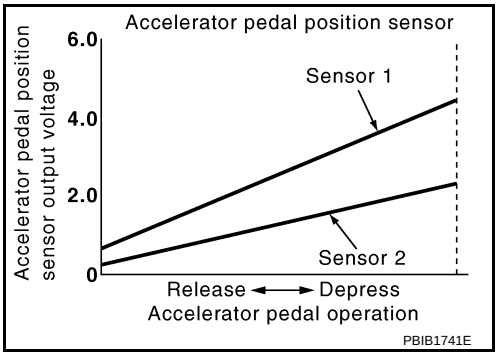
>> END

P2127, P2128 APP SENSOR

Description

INFOID:0000000001693401

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:0000000001693402

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.] (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor
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 EC-576, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693403

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
E12 (LHD models) M204 (RHD)	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	
E12 (LHD models) M204 (RHD models)	5	E16	102	Existed

Is the inspection result normal?

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

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

>> Repair open circuit or short to ground or short 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	Item	Connector	Terminal
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
E16	102	APP sensor	E12 (LHD models) M204 (RHD models)	5

Is the inspection result normal?

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

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

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

7.CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-519, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-632, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 14.
NO >> Replace malfunctioning component.

8.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	
E12 (LHD models) M204 (RHD models)	1	E16	104	Existed

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

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9.DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

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

10.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12 (LHD models) M204 (RHD models)	6	E16	103	Existed

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

Is the inspection result normal?

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

11.DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E7, M69, M25, M201.
- Harness for open or short between ECM and APP sensor.

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

12.CHECK APP SENSOR

Refer to EC-579, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.
NO >> GO TO 13.

13. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-579, "Special Repair Requirement".

>> INSPECTION END

14. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001693404

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

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

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E16	110 (APP sensor 1 signal)	E16	111	Accelerator pedal	Fully released	0.6 - 0.9V
					Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)		104		Fully released	0.3 - 0.6V
					Fully depressed	1.95 - 2.4V

Is the inspection result normal?

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

2. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-579, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001693405

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-389, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-390, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-390, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

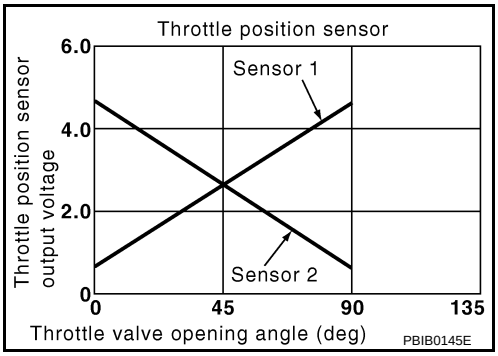
>> END

P2135 TP SENSOR

Description

INFOID:0000000001693406

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:0000000001693407

DTC DETECTION LOGIC

NOTE:
If DTC P2135 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-551, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	• Harness or connector (TP sensor 1 and 2 circuit is open or shorted.) • 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 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 EC-580, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693408

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
F7	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	
F7	1	F11	72	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit.

4. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	4	F11	36	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 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	
F7	2	F11	33	Existed
	3		34	

2. 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

Refer to EC-582, "Component Inspection".

Is the inspection result normal?

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

7. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. EC-582, "Special Repair Requirement"

>> INSPECTION END

8. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001693409

1. CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-582, "Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to D (A/T), 1st (M/T) position.
6. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
F11	33 (TP sensor 1 signal)	F11	36	Accelerator pedal	Fully released	More than 0.36V
					Fully depressed	Less than 4.75V
	34 (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 EC-582, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001693410

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-390, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-390, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

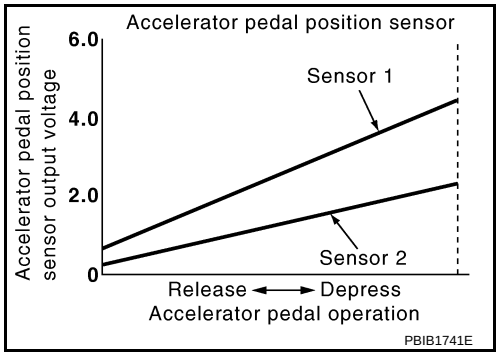
>> END

P2138 APP SENSOR

Description

INFOID:0000000001693411

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:0000000001693412

DTC DETECTION LOGIC

NOTE:
If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-551, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal position sensor circuit range/ performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	• Harness or connector (APP sensor 1 and 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2) • Crankshaft position sensor (POS) • 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 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to EC-583, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001693413

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
E12 (LHD models) M204 (RHD models)	4	Ground	Approx. 5V

Is the inspection result normal?

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

3.DETECT MALFUNCTINING PART

- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

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

4.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		
E12 (LHD models) M204 (RHD models)	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 5.

5.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12 (LHD models) M204 (RHD models)	5	E16	102	Existed

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO6.

6.DETECT MALFUNCTINING PART

- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

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

7. 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	Item	Connector	Terminal
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
E16	102	APP sensor	E12 (LHD models) M204 (RHD models)	5

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair short to ground or short to power in harness or connectors.

8. CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-519, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-632, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace malfunctioning component.

9. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
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	
E12 (LHD models) M204 (RHD models)	2	E16	111	Existed
	1		104	

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 shot to power in harness or connectors.

10. DETECT MALFUNCTINING PART

- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

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

11. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12 (LHD models) M204 (RHD models)	3	E16	110	Existed
	6		103	

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

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 12.

12.DETECT MALFUNCTINING PART

- Harness or connectors E7, M69, M25, M201 (RHD models).
- Harness for open or short between ECM and APP sensor.

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

13.CHECK APP SENSOR

Refer to EC-586, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> GO TO 14.

14.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-586, "Special Repair Requirement".

>> INSPECTION END

15.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001693414

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			
E16	110 (APP sensor 1 signal)	E16	111	Accelerator pedal	Fully released	0.6 - 0.9V
					Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)		104		Fully released	0.3 - 0.6V
					Fully depressed	1.95 - 2.4V

Is the inspection result normal?

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

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-586, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001693415

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-389, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-390, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-390, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

ASCD BRAKE SWITCH

Description

INFOID:0000000001693416

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-424, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000001693417

1.CHECK FOR ASCD BRAKE SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BRAKE SW1” indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal and/or clutch pedal	Slightly depressed	OFF
	Brake pedal and clutch pedal	Fully released	ON

Without CONSULT-III

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

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	100 (ASCD brake switch signal)	Ground	Brake pedal and/or clutch pedal	Slightly depressed	Approx. 0V
			Brake pedal and clutch pedal	Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-588, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001693418

1.CHECK OVERALL FUNCTION-I

Check which type of transmission the vehicle is equipped with.

Is the inspection result normal?

A/T >> 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		
E36 (LHD models) M205 (RHD models)	1	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 M69, E7 (LHD models)
- Harness connectors M25, M201 (RHD models)
- 10A fuse (No. 2)
- Harness for open or short between ASCD brake switch and fuse

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

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	
E36 (LHD models) M205 (RHD models)	2	E16	100	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 EC-591, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD brake switch.

6. CHECK ASCD CLUCH SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD cluch switch harness connector.
3. Turn ignition switch ON.
4. Check the continuity between ASCD cluch switch harness connector and ground.

ASCD cluch switch		Ground	Condition		Voltage (V)
Connector	Terminal				
E35 (LHD models) M206 (RHD models)	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		
E36 (LHD models) M205 (RHD models)	1	Ground	Battery voltage

Is the inspection result normal?

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

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness connector M69,E7 (LHD models)
- Harness connector M25,M201 (RHD models)
- 10A fuse (No. 2)
- Harness for open or short between ASCD brake switch and fuse

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

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	
E36 (LHD models) M205 (RHD models)	2	E35 (LHD models) M206 (RHD models)	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 EC-591, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD brake switch.

11. CHECK ASCD CLUCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

ASCD cluch switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E35 (LHD models) M206 (RHD models)	2	E16	100	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 EC-591, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000001693419

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-6, "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:0000000001693420

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, "On-vehicle 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:0000000001693421

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.
CRUISE lamp illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.
SET lamp illuminates when following conditions are met.
- CRUISE lamp is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET lamp remains lit during ASCD control.
Refer to EC-424, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000001693422

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 144 km/h (89 MPH)	• ASCD: Operating	ON
		• ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-592, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001693423

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 EC-481, "DTC Logic".

2.CHECK COMBINATION METER OPERATION

Refer to MWI-22, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check combination meter circuit. Refer to MWI-4, "METER SYSTEM : System Diagram".

3.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

COOLING FAN

Description

INFOID:0000000001693424

Cooling fan operates at each speed when the current flows in the cooling fan motor as follows.
Refer to EC-433, "System Diagram" for cooling fan operation.

Component Function Check

INFOID:0000000001693425

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. Refer to EC-593, "Diagnosis Procedure".

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. Perform IPDM E/R auto active test and check cooling fan motors operation.
2. Make sure that cooling fan operates at high speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Check cooling fan high speed control circuit. Refer to EC-593, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001693426

1.CHECK POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the voltage between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Continuity
Connector	Terminal		
E44	22	Ground	Existed

Is the inspection result normal?

YES-2 >> With A/C models: GO TO 3.
YES-2 >> Without A/C models: GO TO 5.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

- 50A fusible link (letter J) (with A/C models)
- 40A fusible link (letter J) (without A/C models)
- Harness for open or short between IPDM E/R and battery

>> Repair or replace malfunctioning part.

3.CHECK COOLING FAN MOTORS CIRCUIT FOR OPEN AND SHORT

1. Disconnect cooling fan motor harness connector.
2. Check the continuity between IPDM E/R harness connector and cooling fan motor harness connector.

IPDM E/R		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E44	24	E3	1	Existed
E45	30			

3. Check the continuity between cooling fan motor harness connector or IPDM E/R harness connector and ground.

Cooling fan motor		IPDM E/R		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E3	2	E46	59	Ground	Existed
			39		

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

Is the inspection result normal?

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

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground
- Harness for open or short between IPDM E/R and ground
- Resistor E5

>> Repair or replace malfunctioning part.

5.CHECK COOLING FAN MOTORS CIRCUIT FOR OPEN AND SHORT

1. Disconnect cooling fan motor harness connector.
2. Check the continuity between IPDM E/R harness connector and cooling fan motor harness connector.

IPDM E/R		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E44	23	E3	1	Existed
	24		2	
E45	30		3	

3. Check the continuity between cooling fan motor harness connector or IPDM E/R harness connector and ground.

Cooling fan motor		IPDM E/R		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E3	4	E46	59	Ground	Existed
			39		

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

Is the inspection result normal?

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

6.DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground
- Harness for open or short between IPDM E/R and ground

>> Repair or replace malfunctioning part.

7.CHECK GROUND CONNECTION

Check ground connection E24. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

8.CHECK COOLING FAN MOTOR

Refer to EC-595, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace malfunctioning cooling fan motor.

9.CHECK INTERMITTENT INCIDENT

Perform GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connector.

Component Inspection

INFOID:0000000001693427

1.CHECK OVERALL FUNCTION

Check if the vehicle is equipped with an air conditioner.

Is it equipped with an air conditioner?

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

2.CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector.
3. Supply cooling fan motor terminals with battery voltage and check operation.

Terminals		Operation
(+)	(–)	
1	2	Cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan motor.

3.CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector.
3. Supply cooling fan motor terminals with battery voltage and check operation.

Terminals		Operation
(+)	(–)	
1	4	Cooling fan operates at low speed.
2	3	
1 and 2	3 and 4	Cooling fan operates at high speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan motor.

ELECTRICAL LOAD SIGNAL

Description

INFOID:0000000001693428

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:0000000001693429

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 EC-597, "Diagnosis Procedure".

2.CHECK LIGHTING SWITCH FUNCTION

Check “LOAD SIGNAL” indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Lighting switch	ON at 2nd position	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.
NO >> Go to EC-597, "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 EC-597, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001693430

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-597, "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-6, "System Diagram".

>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Refer to EXL-10, "System Diagram" (XENON TYPE) or EXL-8, "System Diagram" (HALOGEN TYPE).

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Refer to HAC-118, "System Description" (without NAVI system) or HAC-232, "System Description" (with NAVI system).

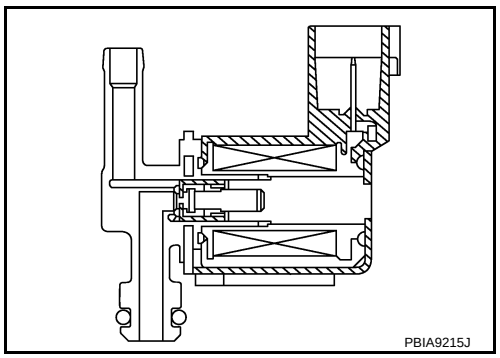
>> INSPECTION END

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:0000000001697487

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.



Component Function Check

INFOID:0000000001697488

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE FUNCTION

With CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect the EVAP purge hose from EVAP canister purge volume control solenoid valve (EVAP canister side).
3. Start engine and let it idle.
4. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode wit CONSULT-III.
5. Touch “Qu” and “Qd” on CONSULT-III screen to adjust “PURG VOL CONT/V” and check vacuum existence under the following conditions.

PURG VOL CONT/V	Vacuum
100%	Existed
0 %	Not existed

Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect the EVAP purge hose from EVAP canister purge volume control solenoid valve (EVAP canister side).
3. Start engine and let it idle for at least 100 seconds.
4. Check vacuum existence under the following conditions.

Condition	Vacuum
At idle	Not existed
About 2,000 rpm	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-599, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001697489

1. CHECK EVAP CANISTER

Refer to EC-683, "Inspection".

Is the inspection result normal?

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

2. 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 4.
NO >> GO TO 3.

3.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.

4.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	F7	9	Existed

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

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 5.
YES-2 >> Without CONSULT-III: GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

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

6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-601, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace EVAP canister purge volume control solenoid valve.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

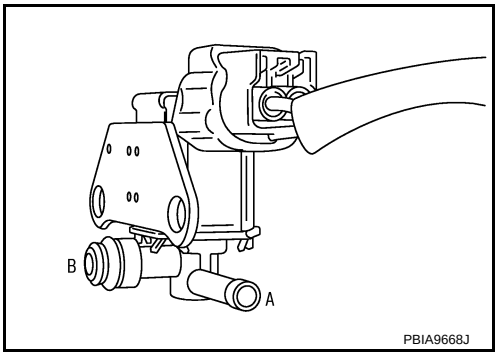
Component Inspection

INFOID:0000000001697490

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?

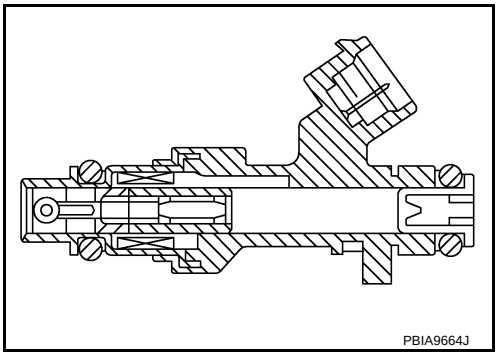
YES >> INSPECTION END
NO >> Replace EVAP canister purge volume control solenoid valve

FUEL INJECTOR

Description

INFOID:0000000001693431

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.


PBIA9664J

Component Function Check

INFOID:0000000001693432

1. INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.
NO >> Go to EC-602, "Diagnosis Procedure".

2. CHECK FUEL INJECTOR FUNCTION

With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

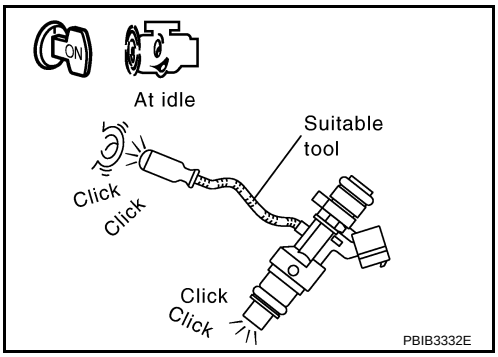
Without CONSULT-III

1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-602, "Diagnosis Procedure".



PBIB3332E

Diagnosis Procedure

INFOID:0000000001693433

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.

Fuel injector			Ground	Voltage
Cylinder	Connector	Terminal		
1	F17	1	Ground	Battery voltage
2	F18	1		
3	F19	1		
4	F20	1		

Is the inspection result normal?

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

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F8, E8
- 10A fuse (No. 55)
- 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.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F17	2	F10	31	Existed
2	F18	2		30	
3	F19	2		29	
4	F20	2		25	

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

Is the inspection result normal?

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

4.CHECK FUEL INJECTOR

Refer to EC-603, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning fuel injector.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001693434

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 [at 10 - 60°C (50 - 140°F)]
1 and 2	11.1 - 14.5Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector.

FUEL PUMP

Description

INFOID:0000000001693435

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 in 1.5 seconds.
Except as shown above	Stops.

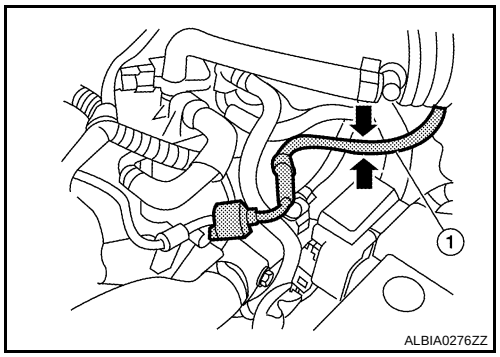
Component Function Check

INFOID:0000000001693436

1.CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.



Is the inspection result normal?

YES >> INSPECTION END
NO >> EC-605, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001693437

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 terminals as follows.

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F10	23	E16	108	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.
3. Check the continuity between IPDM E/R harness connector and ECM harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F10	23	E46	47	Existed

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.DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E8, F8.
- Harness for open or short to ground and short power.

>> Repair harness or connectors.

4.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect “fuel level sensor unit and fuel pump” harness connector.
4. Turn ignition switch ON.
5. Check voltage between “fuel level sensor unit and fuel pump” harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage
Connector	Terminal		
B40	1	Ground	Battery voltage should exist 1 second after ignition switch is turn ON.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 5.

5.CHECK 10A FUSE

1. Turn ignition switch OFF.
2. Disconnect 15A fuse (No. 48) from IPDM E/R.
3. Check 15A fuse.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace fuse.

6.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between IPDM E/R harness connector and “fuel level sensor unit and fuel pump” harness connector.

IPDM E/R		Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E45	36	B40	1	Existed

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

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, M69, M12, B1.
- Harness for open or short between IPDM E/R and “fuel level sensor unit and fuel pump”

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

8. CHECK FUEL PUMP GROUND CIRCUIT

1. 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 9.
NO >> Repair open circuit or short to power in harness or connectors.

9. CHECK FUEL PUMP

Refer to EC-607, "Component Inspection (Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace fuel pump.

10. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

Component Inspection (Fuel Pump)

INFOID:0000000001693438

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?

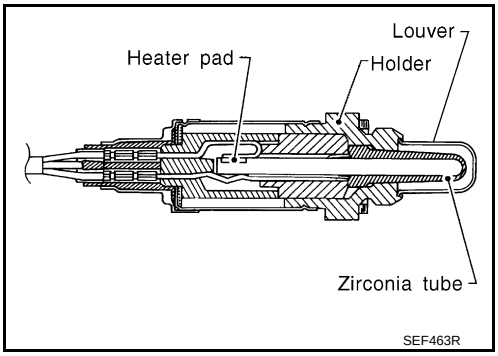
YES >> INSPECTION END
NO >> Replace “fuel level sensor unit and fuel pump”.

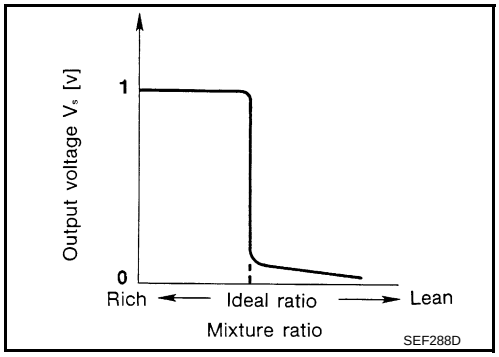
HO2S1

Description

INFOID:0000000001697491

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





Component Function Check

INFOID:0000000001697492

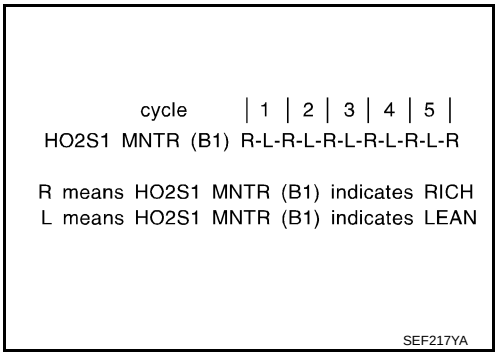
1. CHECK HEATED OXYGEN SENSOR 1 FUNCTION

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “HO2S1 MNITOR (B1)” in ”DATA MONITOR” mode with CONSULT-III.
3. Keep the engine speed at 2,000 rpm under no load, and make sure that the monitors fluctuates between LEAN and RICH more than five times in 10 seconds.

1 times: RICH →LEAN → RICH

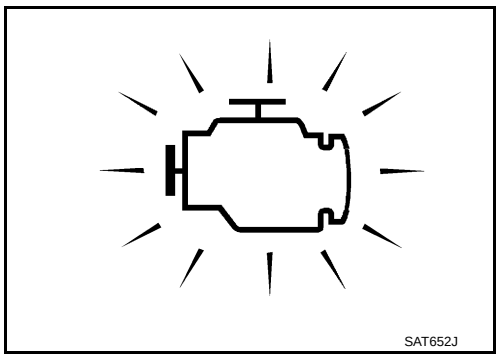
2 times: RICH → LEAN → RICH → LEAN → RICH



Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Set ECM in Diagnostic test mode - II (Heated oxygen sensor 1 monitor).

4. Keep the engine speed at 2,000 rpm under no load, and make sure that the MI comes ON more than five times in 10 seconds.



Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-609, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001697493

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.RETIGHTEN HEATED OXYGEN SENSOR 1

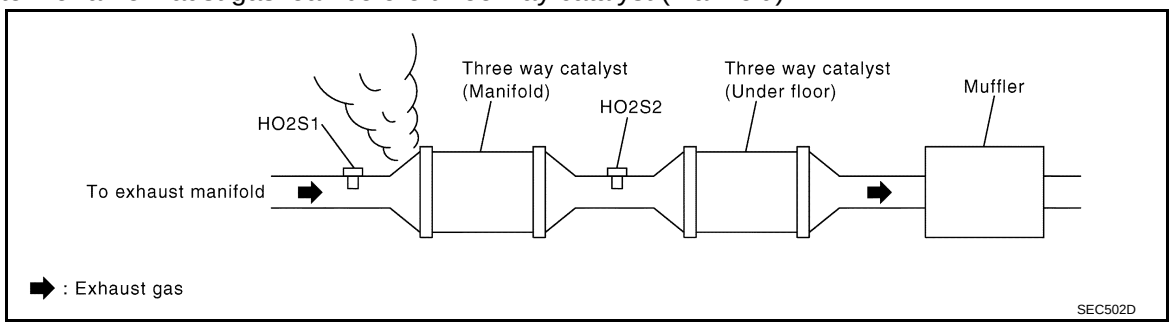
Loosen and retighten the heated oxygen sensor 1.

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.CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	56	existed

5. 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 HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	56	Existed

2. Check the continuity between HO2S1 harness connector or ECM harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F30	4	F8	49	Ground	Not 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 MASS AIR FLOW SENSOR

Check mass air flow sensor.
Refer to EC-489, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace mass air flow sensor.

8.CHECK PCV VALVE

Refer to EC-631, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace PCV valve.

9.CHECK HEATED OXYGEN SENSOR 1

Perform EC-611, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace heated oxygen sensor 1.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001697494

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 1

With CONSULT-III

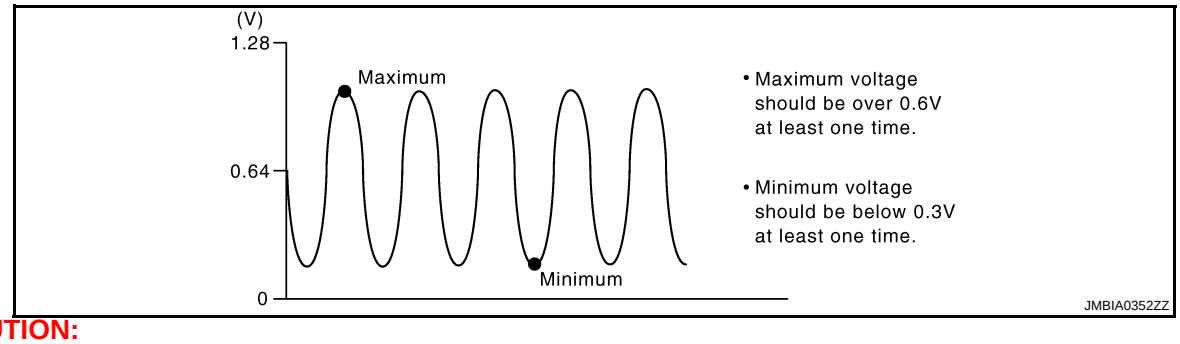
1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.
6. Check the following.

- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R				

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA



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.**

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector and ground under the following condition.

ECM		ground	Condition	Voltage
Connector	Terminal			
F8	49 (HO2S1 signal)	Ground	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

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.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

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

HO2S1 HEATER

Description

INFOID:0000000001697495

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
Mass air flow sensor	Amount of intake air		

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

OPERATION

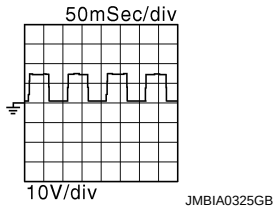
Engine speed rpm	Heated oxygen sensor 1 heater
Above 3,600	OFF
Below 3,600 rpm after the following conditions are met. • Engine: After warming up	ON

Component Function Check

INFOID:0000000001697496

1.CHECK HEATED OXYGEN SENSOR 2 HEATER FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Set tester prove between ECM harness connection and ground.
4. Start engine and let it idle.
5. Check the voltage under the following conditions.Verify that the oscilloscope screen shows the signal waves as shown below.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F7	3 (HO2S1 HEATER signal)	Ground	At idle	Approximately 7.0★  JMBIA0325GB
			Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-613, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001697497

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Disconnect HO2S1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between HO2S1 harness connector and ground.

HO2S1		Ground	Voltage
Connector	Terminal		
F30	2	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F123, E6
- 10A fuse (No. 56)
- Harness for open or short between HO2S1 and fuse

>> Repair or replace harness or connectors.

4.CHECK HO2S1 HEATER OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	3	F7	3	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 HO2S1 HEATER

Refer to EC-615, "Component Inspection".

Is the inspection result normal?

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

6.REPLACE HEATED OXYGEN SENSOR 1

Replace Heated oxygen sensor 1.

CAUTION:
- **Discard any heated oxygen sensor 1 which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor 1, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Perform GI-55, "Intermittent Incident".

>> Repair or replace.

Component Inspection

INFOID:0000000001697498

1. CHECK HEATED OXYGEN SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Check resistance between HO2S1 terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
2 and 3	3.4 - 4.4 Ω
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 1

Replace heated oxygen 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.**

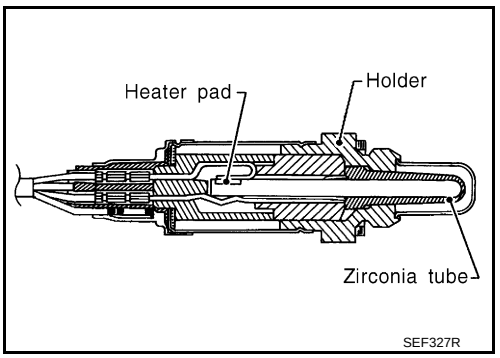
>> INSPECTION END

HO2S2

Description

INFOID:0000000001697499

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 heated oxygen 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.



Component Function Check

INFOID:0000000001697500

1.PERFORM COMPONENT FUNCTION CHECK-I

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			
F8	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage does not remain in the range of 0.2 - 0.4V.

Is the inspection result normal?

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

2.PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage does not remain in the range of 0.2 - 0.4V.

Is the inspection result normal?

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

3.PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage
Connector	Terminal			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in 3rd gear position	The voltage does not remain in the range of 0.2 - 0.4V.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-617, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001697501

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-58, "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. 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	
F42	1	F13	35	Existed

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

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

- Harness or connectors F121, E7
- Harness for open or short between HO2S2 and ECM.

>> 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	
F42	4	F13	33	Existed

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

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F42	4	F13	33	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART

- Harness or connectors F121, E7
- Harness for open or short between HO2S2 and ECM.

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

6. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-618, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001697502

1. INSPECTION START

Do you have CONSULT-III?

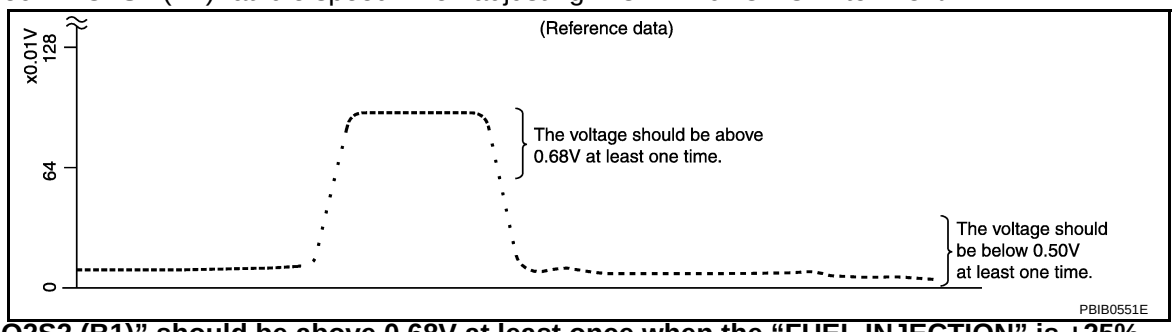
Do you have CONSULT-III?

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 0.50V 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			
F8	50 (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 0.50V 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			
F8	50 (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 0.50V 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			
F8	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in 4th gear position	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V 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

HO2S2 HEATER

Description

INFOID:0000000001697503

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

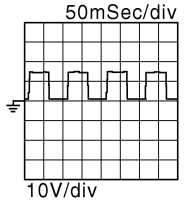
Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,900	OFF
Below 3,900 rpm after the following conditions are met. • Engine: After warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

Component Function Check

INFOID:0000000001697504

1. CHECK HEATED OXYGEN SENSOR 2 HRATER FUNCTION

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 let it idle.
4. Check the voltage between ECM harness connector and ground under the following condition.

ECM		Ground	Condition	Voltage signal
Connector	Terminal			
F7	5 (HO2S2 heater signal)	Ground	At idle	Approx. 10V★  JMBIA0325GB
			Engine speed: Above 3,900 rpm	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-620, "Diagnosis Procedure"

Diagnosis Procedure

INFOID:0000000001697505

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-58, "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 HO2S2 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between HO2S2 harness connector and ground.

HO2S2		Ground	Voltage
Connector	Terminal		
E58	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 E11
- 10A fuse (No. 56)
- 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	
E58	3	F7	5	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 F121, E7
- Harness for open or short between heated oxygen sensor 2 and ECM

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

6. CHECK HO2S2 HEATER

Refer to EC-622, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001697506

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 [at 25°C (77°F)]
2 and 3	3.3 - 4.4 Ω
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.**

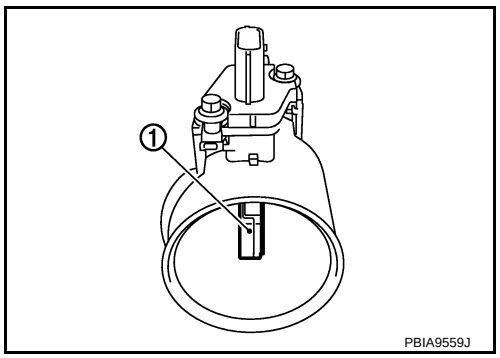
>> INSPECTION END

IAT SENSOR

Description

INFOID:0000000001697507

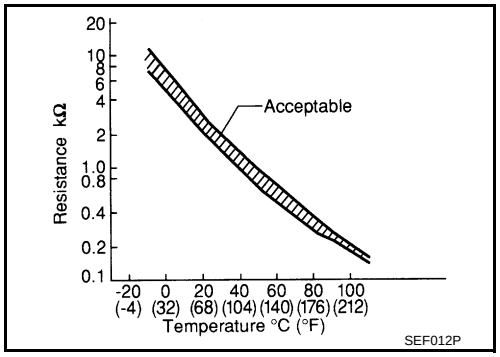
The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response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



<Reference data>

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

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



CAUTION:

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

Component Function Check

INFOID:0000000001697508

1.CHECK INTAKE AIR TEMPERATURE SENSOR FUNCTION

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

ECM		Ground	Voltage
Connector	Terminal		
F8	46	Ground	Approx. 0 - 4.8V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-623, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001697509

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21. Refer to Ground Inspection in GI-58, "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	F8	55	Existed

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

Is the inspection result normal?

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

4.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-624, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001697510

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
1 and 2	Temperature C°° (F°)	25 (77)	1.800 - 2.200 kΩ

Is the inspection result normal?

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

IGNITION SIGNAL

Description

INFOID:0000000001693439

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.

Component Function Check

INFOID:0000000001693440

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT-III: GO TO 2.
YES-2 >> Without CONSULT-III: GO TO 3.
NO >> Go to EC-625, "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.

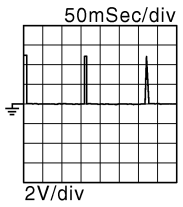
Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-625, "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.

ECM		Ground		Voltage signal
Connector	Terminal	Connector	Terminal	
F10	17	E16	108	
	18			
	21			
	22			

NOTE:
The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-625, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001693441

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	
E16	105	E16	108	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-477, "Diagnosis Procedure".

2.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser-2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between condenser-2 harness connector and ground.

Condenser-2		Ground	Voltage
Connector	Terminal		
F26	1	Ground	Battery voltage

Is the inspection result normal?

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

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and condenser-2 harness connector.

IPDM E/R		Condenser-2		Continuity
Connector	Terminal	Connector	Terminal	
E43	3	F26	1	Existed

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

Is the inspection result normal?

YES >> Go to EC-477, "Diagnosis Procedure".
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CONDENSER-2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between condenser-2 harness connector and ground.

Condenser-2		Ground	Continuity
Connector	Terminal		
F26	2	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK CONDENSER

Refer to EC-628, "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	F34	3	Ground	Battery voltage
2	F35	3		
3	F36	3		
4	F37	3		

Is the inspection result normal?

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

7. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity
Cylinder	Connector	Terminal		
1	F34	2	Ground	Existed
2	F35	2		
3	F36	2		
4	F37	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

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	F34	1	F10	17	Existed
2	F35	1		18	
3	F36	1		22	
4	F37	1		21	

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-628, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000001693442

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 [at 25°C (77°F)]
1 and 2	Except 0 or ∞ Ω
1 and 3	Except 0 Ω
2 and 3	

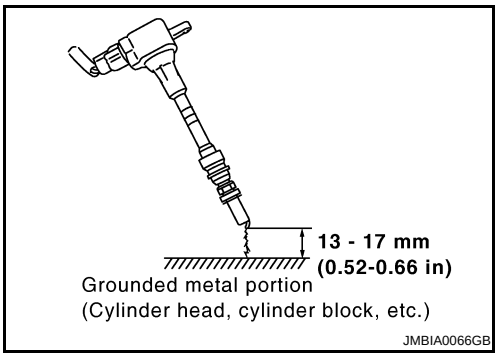
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning ignition coil with power transistor.

2. CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:
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:0000000001693443

1. CHECK CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser-2 harness connector.

3. Check resistance between condenser-2 terminals as follows.

Terminals	Resistance
1 and 2	Above 1 MΩ [at 25°C (77°F)]

Is the inspection result normal?

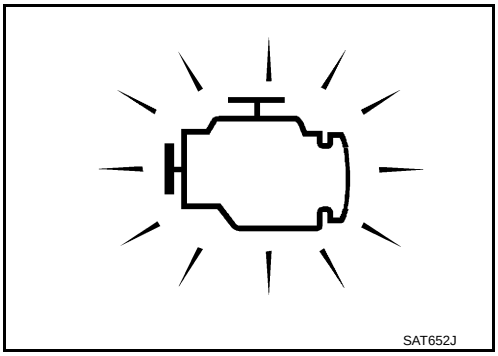
YES >> INSPECTION END
NO >> Replace condenser.

MALFUNCTION INDICATOR

Description

INFOID:0000000001693444

The Malfunction Indicator (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 EC-630, "Diagnosis Procedure".



Component Function Check

INFOID:0000000001693445

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 EC-630, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001693446

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 EC-481, "Diagnosis Procedure".

2.CHECK DTC WITH COMBINATION METER

Refer to MWI-22, "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-55, "Intermittent Incident".

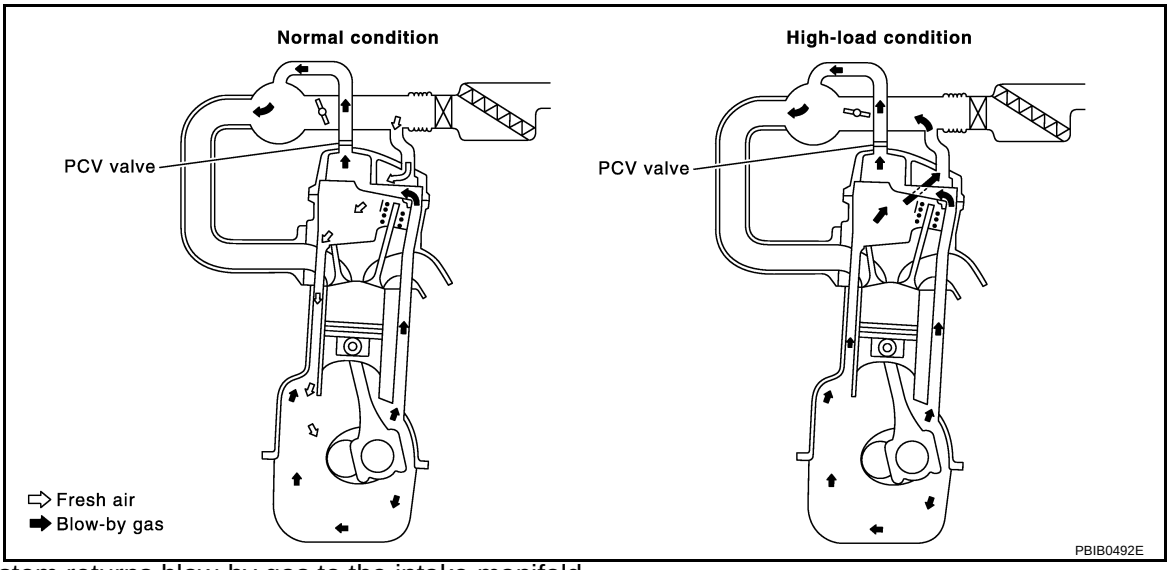
Is the inspection result normal?

YES >> Replace combination meter.
NO >> Repair or replace.

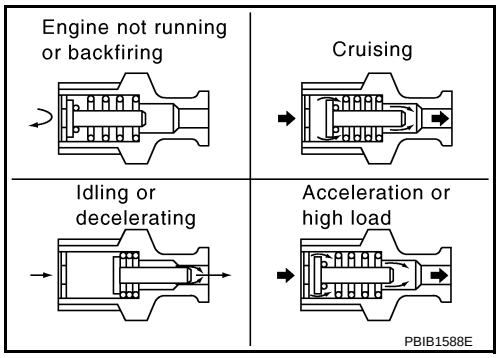
POSITIVE CRANKCASE VENTILATION

Description

INFOID:0000000001693447



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

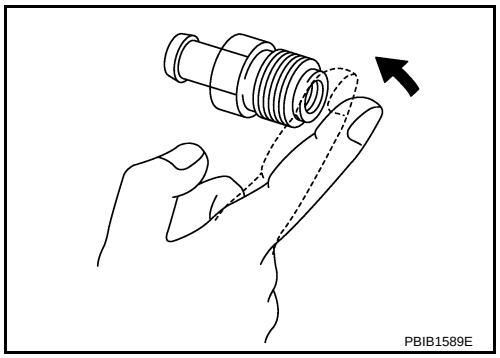
INFOID:0000000001693448

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.

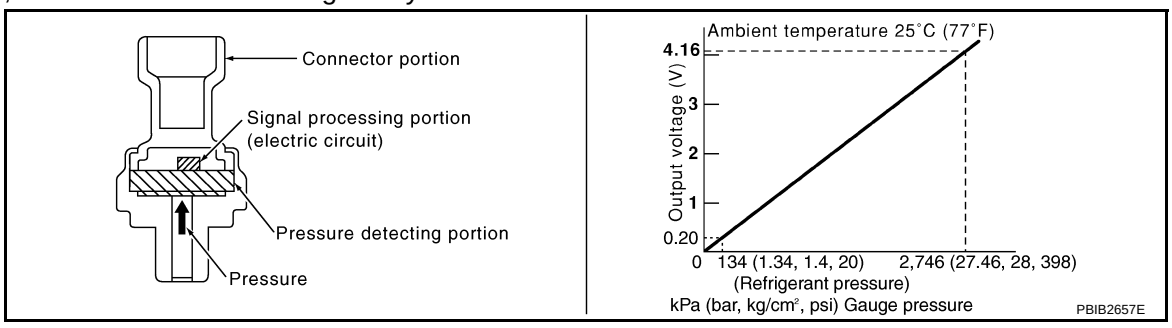


REFRIGERANT PRESSURE SENSOR

Description

INFOID:0000000001693449

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:0000000001693450

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.

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F11	41 (Refrigerant pressure sensor signal)	F11	48	1.0 - 4.0V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-632, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001693451

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 E15. Refer to Ground Inspection in GI-58, "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		
E17	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 E8, F8
- 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	
E17	1	F11	48	Existed

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

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- 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	
E17	2	F11	41	Existed

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

Is the inspection result normal?

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

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- 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-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.
NO >> Repair or replace.

VSS

Description

INFOID:0000000001697511

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.

Diagnosis Procedure

INFOID:0000000001697512

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

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

2.PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch OFF.
2. Lift up the vehicle.
3. Start engine and let it idle.
4. Select “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-III.
5. Select “VHCL SPEED SE” indication whe n rotating wheels with suitable gear position.

“VHCL SPEED SE” indication should exceed 10 km/h (6 MPH).

Is the inspection result normal?

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

3.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-25, "CONSULT-III Function (ABS)" (with ABS) or BRC-105, "CONSULT-III Function (ABS)" (with ESP/TCS/ABS).

Is the inspection result normal?

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

4.CHECK COMBINATION METER FUNCTION

Refer to MWI-25, "DTC Logic".

>> INSPECTION END

ECU DIAGNOSIS

ECM

Reference Value

INFOID:0000000001693499

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 EC-477, "Diagnosis Procedure".		
B/FUEL SCHDL	See EC-477, "Diagnosis Procedure".		
A/F ALPHA-B1	See EC-477, "Diagnosis Procedure".		
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158F)
HO2S1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
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
HO2S1 MNTR (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds
HO2S2 MNTR (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		LEAN ←→ RICH
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 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	• 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 (A/T) or 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
THRL SEN 2-B1	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T) or 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
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

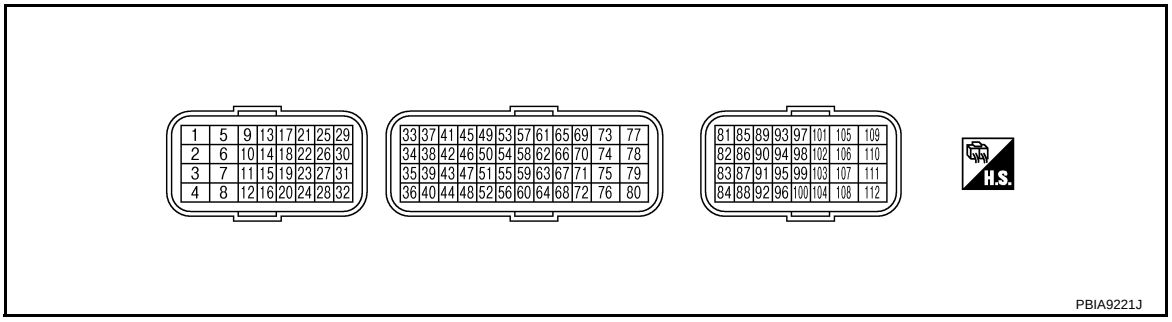
Monitor Item	Condition		Values/Status
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	• Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Shift lever: Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON
		Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	• Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF
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 (A/T), 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 • Shift lever: P or N (A/T), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	10° - 20° BTDC
		2,000 rpm	25° - 45° BTDC
PURG VOL C/V	• Engine: After warming up • Shift lever: P or N (A/T), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0%
		2,000 rpm	0% - 50%
INT/V TIM (B1)	• Engine: After warming up • Shift lever: P or N (A/T), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	–5° - 5°CA
		2,000 rpm	Approx. 0° - 40°CA
INT/V SOL (B1)	• Engine: After warming up • Shift lever: P or N (A/T), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0% - 2%
		2,000 rpm	Approx. 0% - 90%
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

Monitor Item	Condition		Values/Status
COOLING FAN	• Engine: After warning up, idle the engine • Air conditioner switch: OFF	Engine coolant temperature is 98°C (208F) or less	OFF
		Engine coolant temperature is between 98°C (208°F) and 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH
HO2S1 HTR (B1)	• Engine: After warming up • Engine speed: Below 3,600rpm		ON
	• Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1)	• Engine speed: Below 3,900 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
VEHICLE SPEED	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
IDL A/V LEARN	• Engine: running	Idle air volume learning has not been performed yet.	YET
		Idle air volume learning has already been performed successfully.	CMPLT
TRVL AFTER MIL	• Ignition switch: ON	Vehicle has traveled after MI has turned ON.	0 - 65,535 km (0 - 40,723 miles)
O2 SEN HTR DTY	• Engine coolant temperature when engine started: More than 80°C (176F) • Engine speed: Below 3,600 rpm		Approx. 30%
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
MAIN SW	• Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	• Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	• Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	• Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
BRAKE SW1 (ASCD brake switch)	• Ignition switch: ON	• Brake pedal: Fully released (A/T) • Brake pedal and clutch pedal: Fully released (M/T)	ON
		• Brake pedal: Slightly depressed (A/T) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	OFF
BRAKE SW2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
VHCL SPD CUT	• Ignition switch: ON		NON
LO SPEED CUT	• Ignition switch: ON		NON
AT OD MONITOR	• Ignition switch: ON		OFF
AT OD CANCEL	• Ignition switch: ON		OFF

Monitor Item	Condition		Values/Status
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 153 km/h (95 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

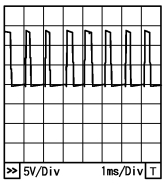
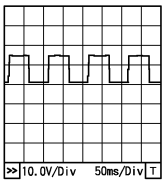
TERMINAL LAYOUT

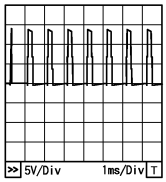
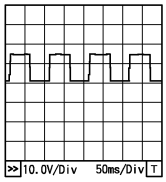
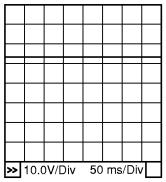
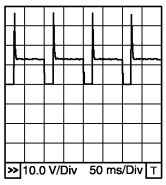


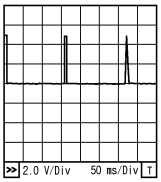
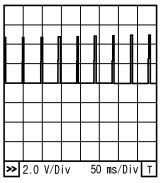
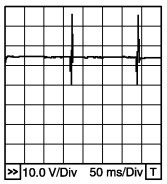
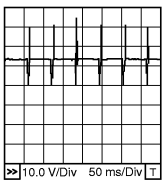
PHYSICAL VALUES

NOTE:
- ECM is located in the engine room left side near battery.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

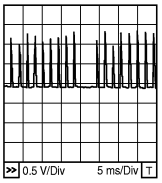
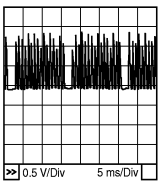
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

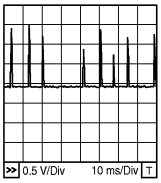
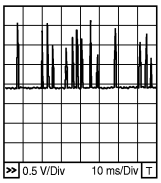
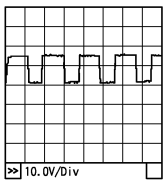
Terminal No. +	Terminal No. −	Wire color	Description: Signal name	Description: Input/Output	Condition	Value (Approx.)
1	Ground	L/W	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	3.2V★  PBIA8150J
2	Ground	R/Y	Throttle control motor relay power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
3	Ground	LG/R	Heated oxygen sensor 1 heater	Output	[Engine is running] • Warm up condition • Engine speed: Below 3,600 rpm	Approximately 3.2V★  PBIA8148J
					[Engine is running] • Warm-up condition • Idle speed [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)

Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
4	Ground	P	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	0 - 14V★  PBIA8149J
5	Ground	R	Heated oxygen sensor 2 heater	Output	[Engine is running] • Engine speed: Below 3,900 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	10V★  PBIA8148J
					[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,900 rpm	BATTERY VOLTAGE (11 - 14V)
9	Ground	W/B	EVAP canister purge volume control solenoid valve	Output	[Engine is running] • Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
					[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)	BATTERY VOLTAGE (11 - 14V)★  PBIB0520E
10 11	Ground	B B/W	ECM ground	—	[Engine is running] • Idle speed	Body ground
15	Ground	G/L	Throttle control motor relay	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
					[Ignition switch: ON]	0 - 1.0V

Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
17 18 21 22	Ground	L/Y BR/Y R/G SB	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 4 Ignition signal No. 3	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.3V★  PBIA9265J
					[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	0.2 - 0.5V★  PBIA9266J
23	Ground	B/O	Fuel pump relay	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.0V
					[Ignition switch: ON] • More than a few seconds after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)
25 29 30 31	Ground	R/O Y O L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
					[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIA4943J
32	Ground	Y/L	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] • A few seconds after turning ignition switch OFF	0 - 1.0V
					[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)

Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
33	Ground	L/R	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
					[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
34	Ground	L/O	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
					[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
36	Ground	V/W	Sensor ground (Throttle position sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
37	Ground	W	Knock sensor	Input	[Engine is running] • Idle speed	2.5V
38	Ground	GR/B	Engine coolant temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with engine coolant temperature.
40	Ground	—	Sensor ground (Knock sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
41	Ground	G/P	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
44	Ground	B	Sensor ground (Engine coolant temperature sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
45	Ground	BR	Mass air flow sensor	Input	[Ignition switch ON] • Engine stopped	0.4V
					[Engine is running] • Warm-up condition • Idle speed	1.0 - 1.3V
					[Engine is running] • Warm-up condition • Engine is revving from idle to about 4,000 rpm	1.0 - 1.3 to 2.4V (Check for linear voltage rise in response to engine being increased to about 4,000 rpm.)
46	Ground	V	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with intake air temperature.

Terminal No.		Wire color	Description		Condition	Value (Approx.)
+	–		Signal name	Input/ Output		
48	Ground	R/L	Sensor ground (Refrigerant pressure sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
49	Ground	L/G	Heated oxygen sensor 1	—	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 - 1.0V (Periodically change)
50	Ground	Y	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
52	Ground	LG	Sensor ground (Mass air flow sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
55	Ground	O	Sensor power supply (Intake air temperature sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
56	Ground	P	Sensor ground (Heated oxygen sensor 1)	—	[Engine is running] • Warm-up condition • Idle speed	0V
59	Ground	SB	Sensor ground (Heated oxygen sensor 2)	—	[Engine is running] • Warm-up condition • Idle speed	0V
61	Ground	LG/B	Crankshaft position sensor (POS)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 1.0V★  MBIB1453E
					[Engine is running] • Engine speed: 2,000 rpm	0 - 1.0V★  MBIB1454E
62	Ground	GR/L	Sensor ground [Crankshaft position sensor (POS)]	—	[Engine is running] • Warm-up condition • Idle speed	0V
63	Ground	L	Sensor ground [Camshaft position sensor (PHASE)]	—	[Engine is running] • Warm-up condition • Idle speed	0V

Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
65	Ground	G	Camshaft position sensor (PHASE)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 1.0V★  MBIB1455E
					[Engine is running] • Engine speed is 2,000 rpm	0 - 1.0V★  MBIB1456E
69	Ground	W/B	Neutral position switch	Input	[Ignition switch: ON] • Shift lever: P or N (A/T), Neutral (M/T)	BATTERY VOLTAGE (11 - 14V)
					[Ignition switch: ON] • Shift lever: Except above position	0V
72	Ground	V/R	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5V
73	Ground	Y/R	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	7 - 10V★  PBIA4937J
74	Ground	Y/W	Sensor power supply (Refrigerant pressure sensor)	—	[Ignition switch: ON]	5V
75	Ground	L/W	Sensor power supply [Crankshaft position sensor (POS)]	—	[Ignition switch: ON]	5V
78	Ground	Y/V	Sensor power supply [Camshaft position sensor (PHASE)]	—	[Ignition switch: ON]	5V
83	Ground	P	CAN communication line	Input/ Output	—	—
84	Ground	L	CAN communication line	Input/ Output	—	—
88	Ground	O	Data link connector	Input/ Output	[Ignition switch: ON] • CONSULT-III or GST: Disconnected	2.7V

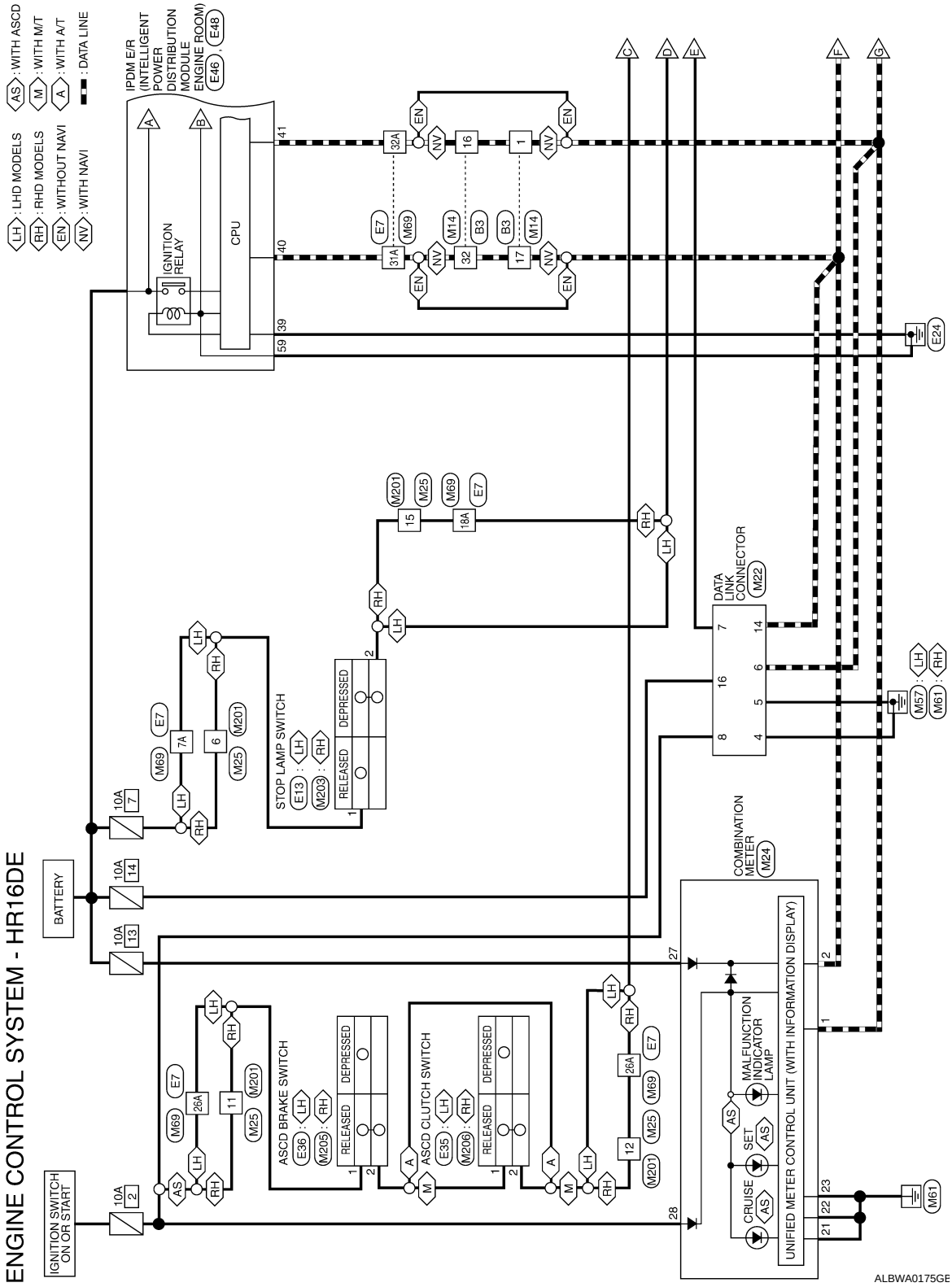
Terminal No.		Wire color	Description		Condition	Value (Approx.)
+	–		Signal name	Input/ Output		
93	Ground	W/L	Ignition switch	Input	[Ignition switch: OFF]	0V
					[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
94	Ground	V	ASCD steering switch	Input	[Ignition switch: ON] • ASCD steering switch: OFF	4V
					[Ignition switch: ON] • CANCEL switch: Pressed	1V
					[Ignition switch: ON] • MAIN switch: Pressed	0V
					[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3V
					[Ignition switch: ON] • SET/COAST switch: Pressed	2V
95	Ground	B	Sensor ground (ASCD steering switch)	—	[Engine is running] • Warm-up condition • Idle speed	0V
99	Ground	R/W	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0V
					[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
100	Ground	R	ASCD brake switch	Input	[Ignition switch: ON] • Brake pedal: Slightly depressed (A/T) • Brake pedal and clutch pedal: Slightly depressed (M/T)	0V
					[Ignition switch: ON] • Brake pedal: Fully released (A/T) • Brake pedal and/or clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)
102	Ground	BR	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5V
103	Ground	GR	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
104	Ground	Y	Sensor ground (Accelerator pedal position sensor 2)	—	[Engine is running] • Warm-up condition • Idle speed	0V
105	Ground	G	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
106	Ground	V	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5V
108	Ground	B	ECM ground	—	[Engine is running] • Idle speed	Body ground

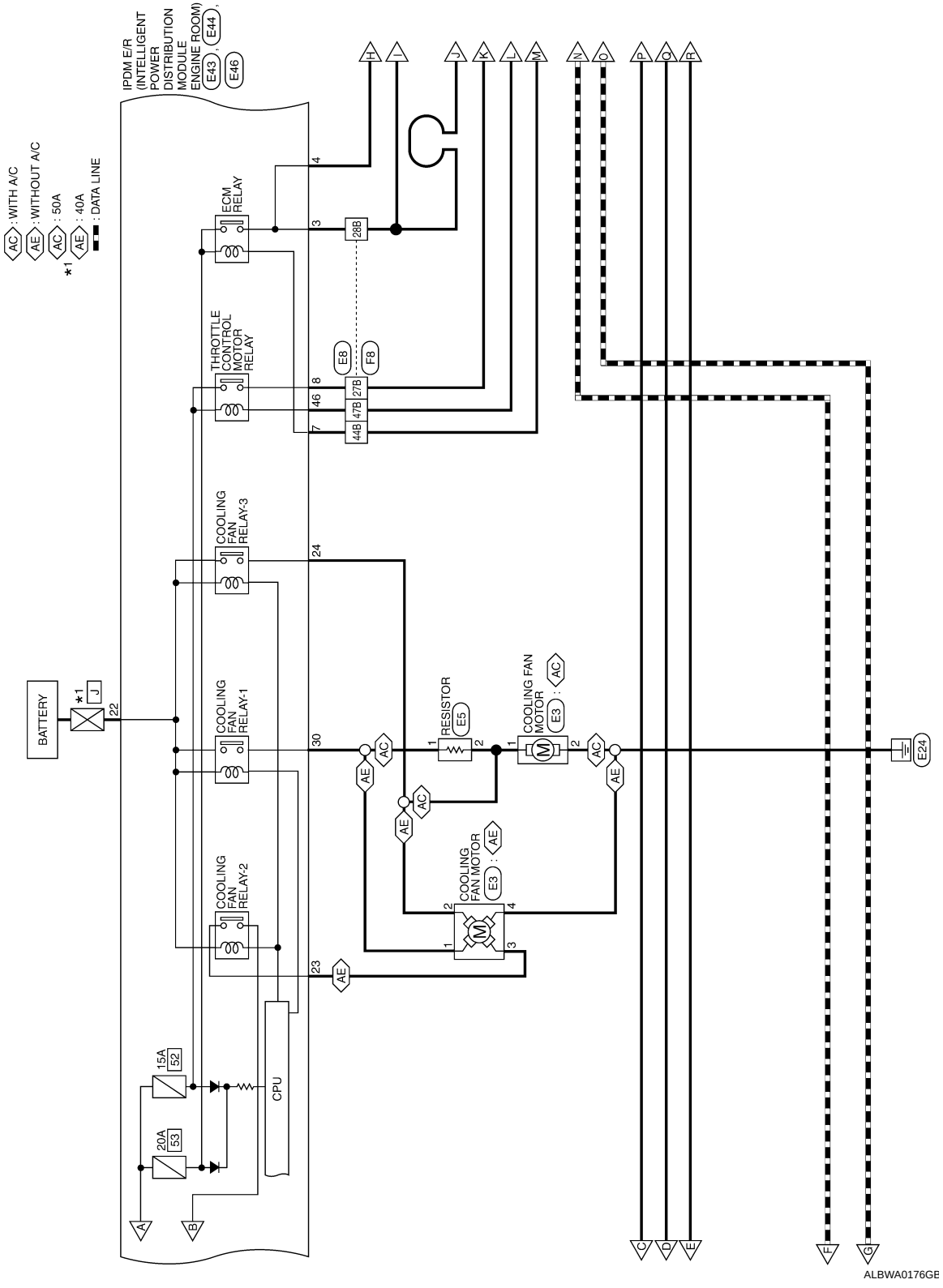
Terminal No.		Wire color	Description		Condition	Value (Approx.)
+	–		Signal name	Input/ Output		
110	Ground	G	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9V
					[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7V
111	Ground	R	Sensor ground (Accelerator pedal position sensor 1)	—	[Engine is running] • Warm-up condition • Idle speed	0V

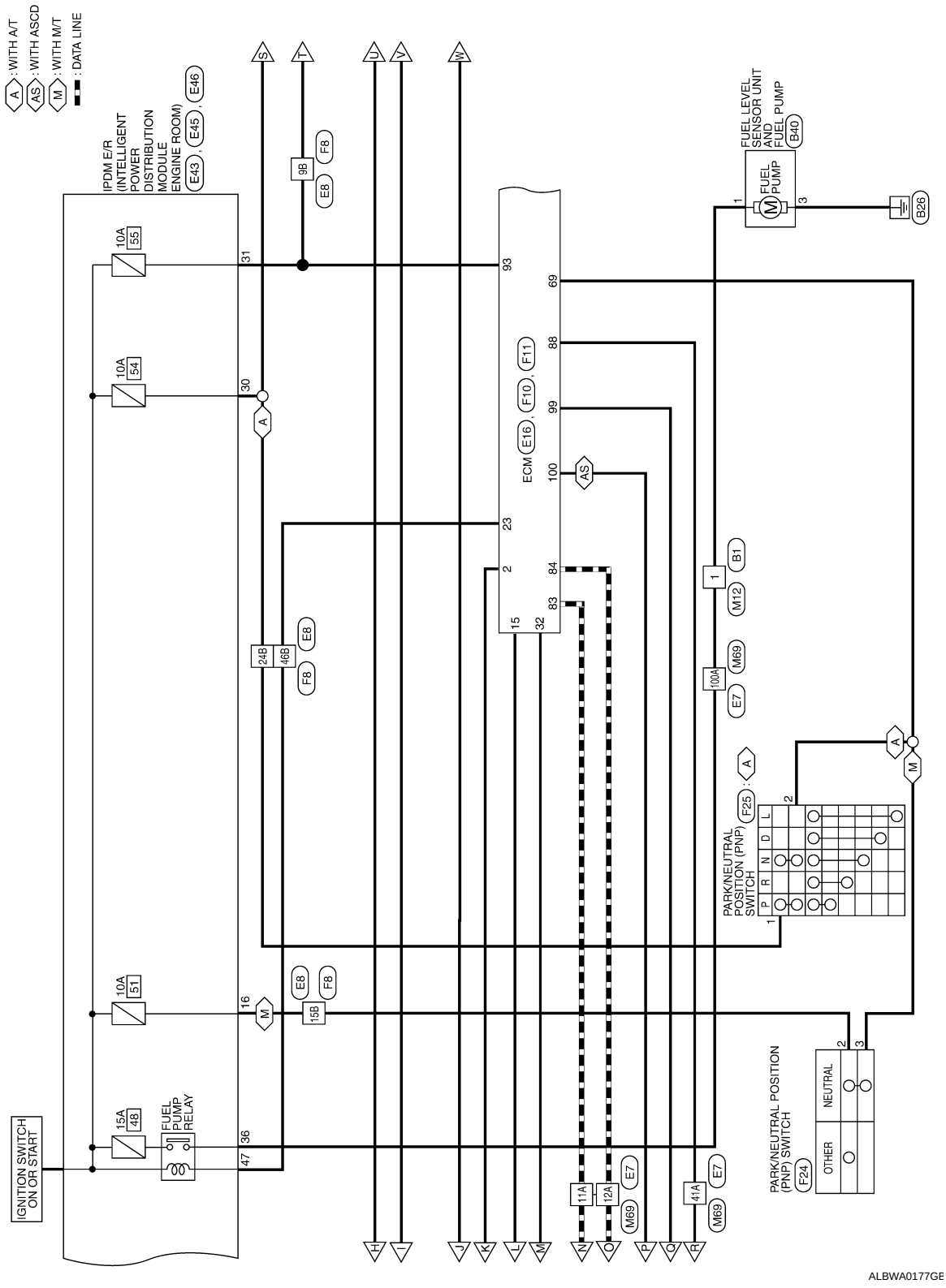
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

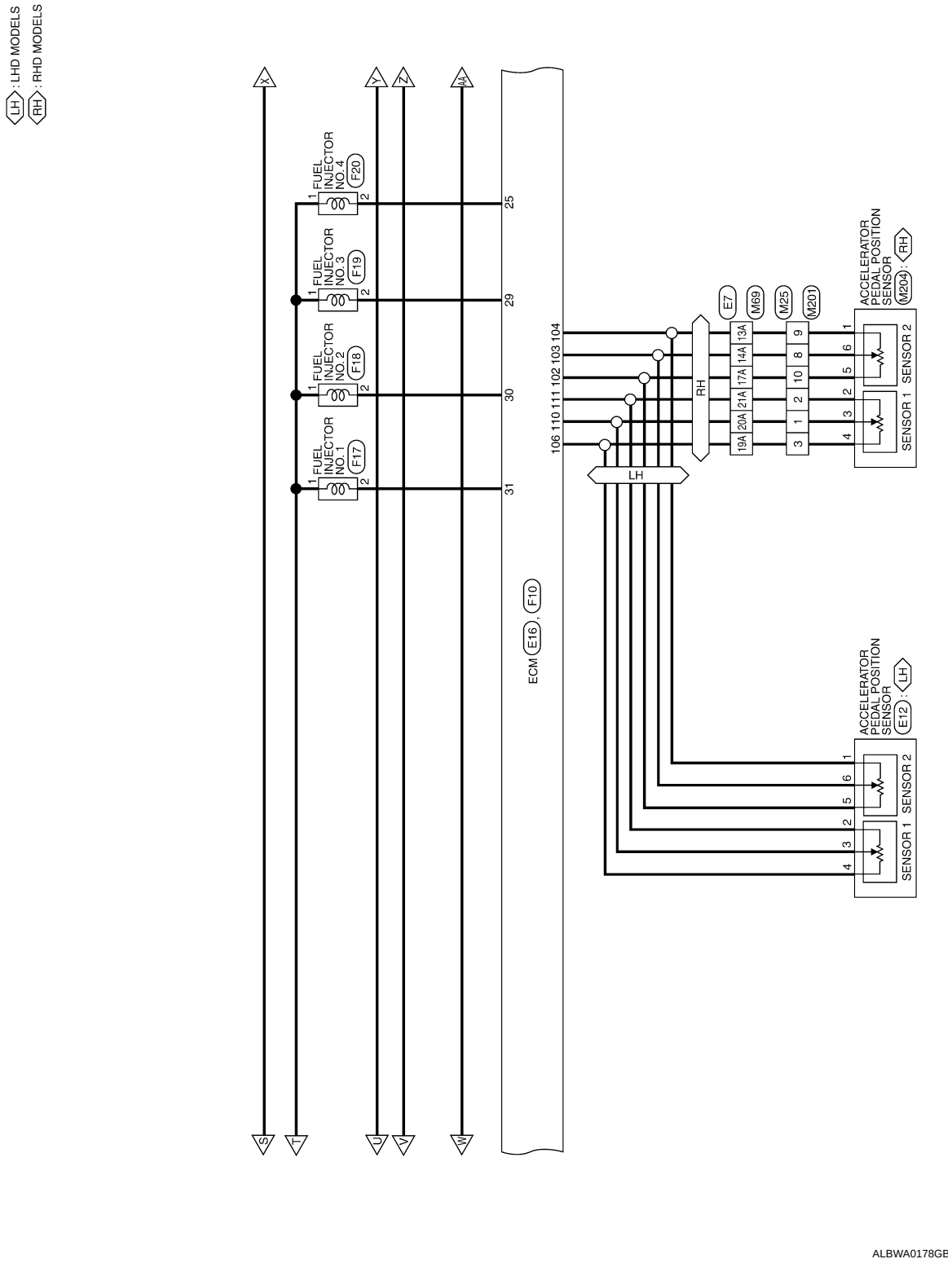
Wiring Diagram - ENGINE CONTROL SYSTEM -

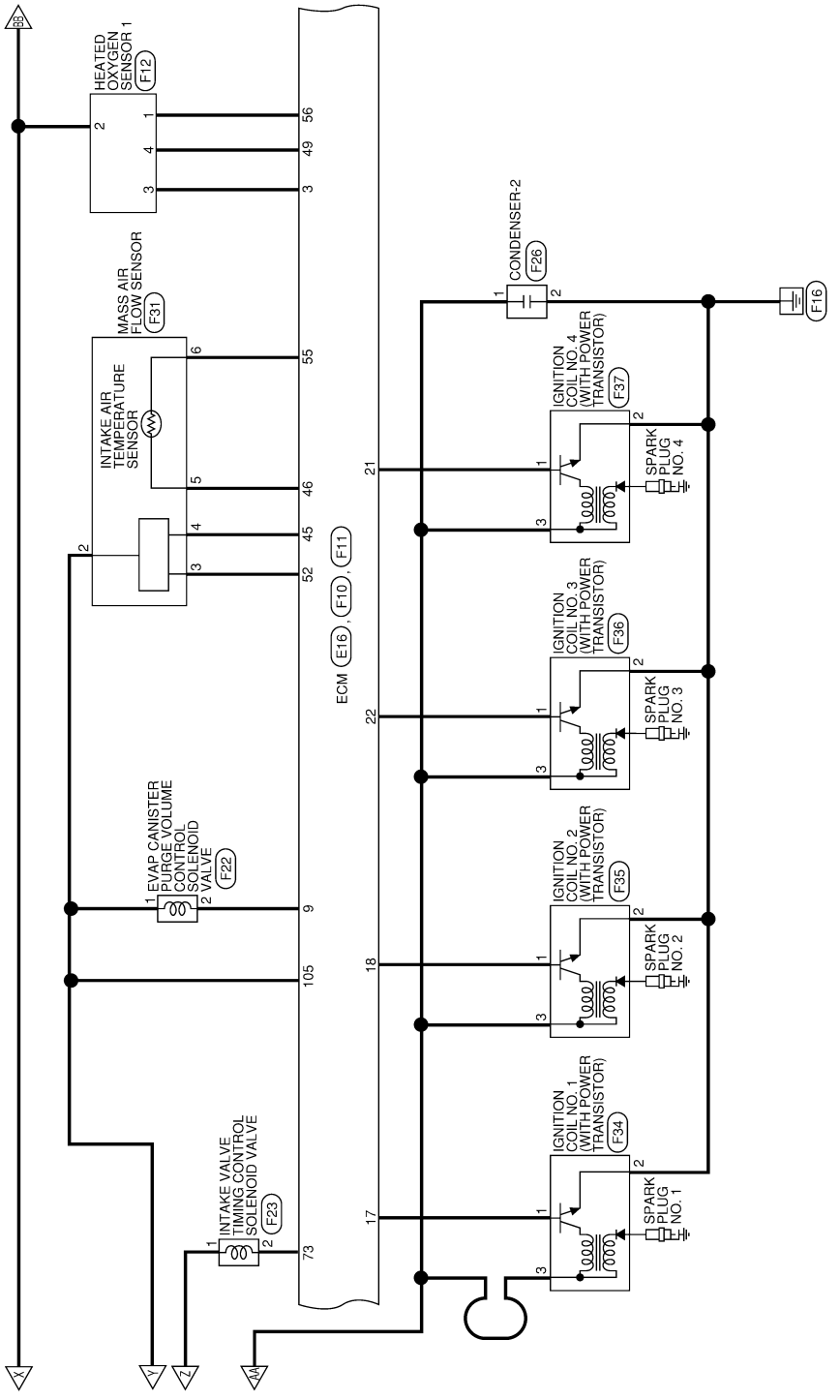
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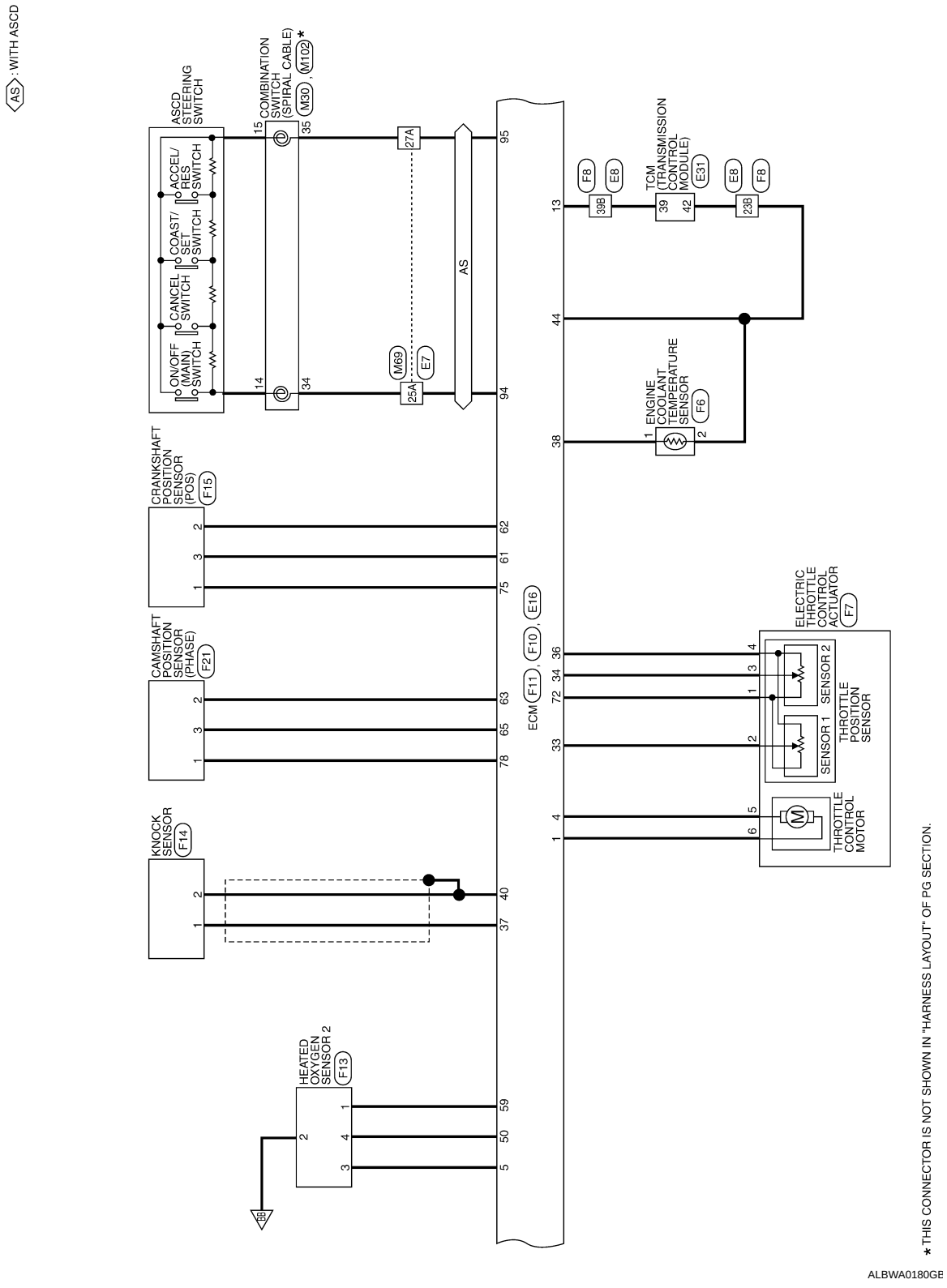


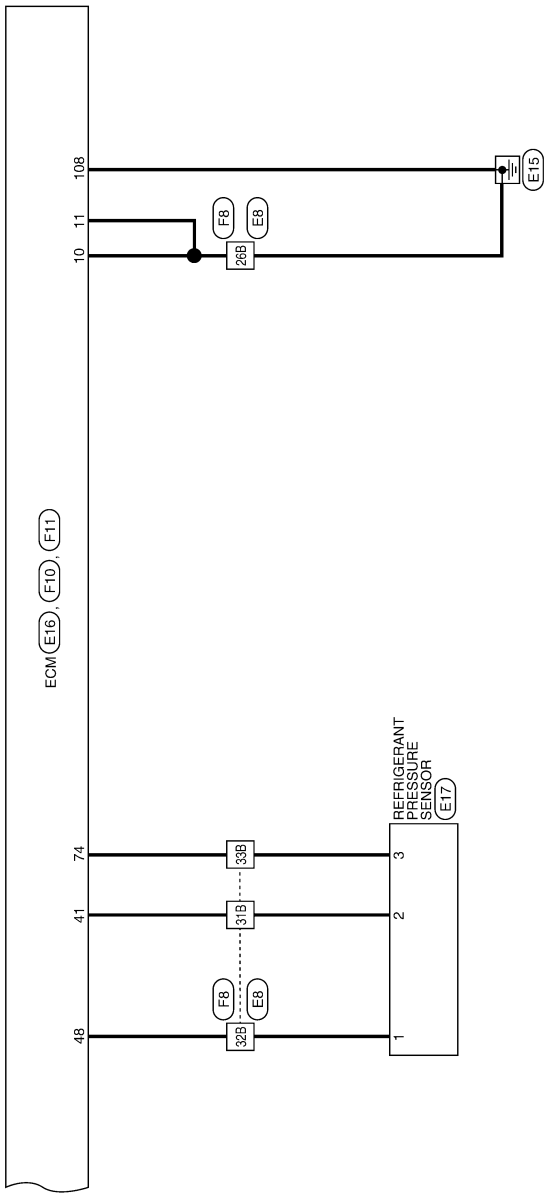

IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) E43, E44, E46
AC : WITH A/C
AE : WITHOUT A/C
AC : 50A
AE : 40A
*1
: DATA LINE
ECM RELAY
THROTTLE CONTROL MOTOR RELAY
COOLING FAN RELAY-3
COOLING FAN RELAY-1
COOLING FAN RELAY-2
BATTERY
RESISTOR E5
COOLING FAN MOTOR E3
CPU
15A 52
20A 53
E8
F8
28B
27B
47B
44B
E24
ALBWA0176GB


A : WITH A/T
AS : WITH ASCD
M : WITH M/T
: DATA LINE
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) E43, E45, E46
10A 55
10A 54
10A 51
15A 48
FUEL PUMP RELAY
IGNITION SWITCH ON OR START
ECM E16, F10, F11
FUEL LEVEL SENSOR UNIT AND FUEL PUMP B40
FUEL PUMP
B26
B1
M12
M69
E7
100A
PARK/NEUTRAL POSITION (PNP) SWITCH F25
PARK/NEUTRAL POSITION (PNP) SWITCH F24
NEUTRAL
OTHER
E8
F8
9B
24B
46B
15B
11A
12A
41A
ALBWA0177GE


LH : LHD MODELS
RH : RHD MODELS
X
Y
Z
M4
S
T
U
V
W
FUEL INJECTOR NO.4 F20
FUEL INJECTOR NO.3 F19
FUEL INJECTOR NO.2 F18
FUEL INJECTOR NO.1 F17
25
29
30
31
ECM E16, F10
106 110 111 102 103 104
RH
LH
E7
M69
M25
M201
13A
14A
17A
21A
20A
19A
ACCELERATOR PEDAL POSITION SENSOR M204 : RH
SENSOR 1 SENSOR 2
ACCELERATOR PEDAL POSITION SENSOR E12 : LH
SENSOR 1 SENSOR 2
ALBWA0178GE

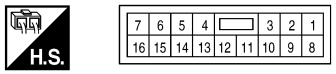

HEATED OXYGEN SENSOR 1 F12
MASS AIR FLOW SENSOR F31
INTAKE AIR TEMPERATURE SENSOR
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE F22
INTAKE VALVE TIMING CONTROL SOLENOID VALVE F23
ECM E16, F10, F11
CONDENSER-2 F26
IGNITION COIL NO. 4 (WITH POWER TRANSISTOR) F37
IGNITION COIL NO. 3 (WITH POWER TRANSISTOR) F36
IGNITION COIL NO. 2 (WITH POWER TRANSISTOR) F35
IGNITION COIL NO. 1 (WITH POWER TRANSISTOR) F34
SPARK PLUG NO. 4
SPARK PLUG NO. 3
SPARK PLUG NO. 2
SPARK PLUG NO. 1
F16
ALBWA0179GE


AS : WITH ASCD
ASCD STEERING SWITCH
ON/OFF (MAIN) SWITCH
CANCEL SWITCH
COAST/ SET SWITCH
ACCEL/ RES SWITCH
COMBINATION SWITCH (SPIRAL CABLE) (M102), (M30) *
M69
25A
E7
27A
AS
CRANKSHAFT POSITION SENSOR (POS) F15
CAMSHAFT POSITION SENSOR (PHASE) F21
KNOCK SENSOR F14
HEATED OXYGEN SENSOR 2 F13
ECM F11, F10, E16
TCM (TRANSMISSION CONTROL MODULE) E31
F8 E8 39B
E8 F8 23B
ENGINE COOLANT TEMPERATURE SENSOR F6
ELECTRIC THROTTLE CONTROL ACTUATOR F7
THROTTLE POSITION SENSOR
SENSOR 1
SENSOR 2
THROTTLE CONTROL MOTOR
* THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION.
ALBWA0180GE


ECM (E16), (F10), (F11)
108
11
10
74
41
48
F8
E8
26B
33B
31B
32B
REFRIGERANT PRESSURE SENSOR (E17)
3
2
1
E15
ALBWA0181GE

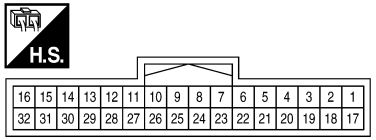
ENGINE CONTROL SYSTEM - HR16DE CONNECTORS

Connector No.	M12
Connector Name	WIRE TO WIRE
Connector Color	WHITE



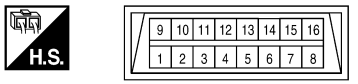
Terminal No.	Color of Wire	Signal Name
1	W	—

Connector No.	M14
Connector Name	WIRE TO WIRE
Connector Color	WHITE



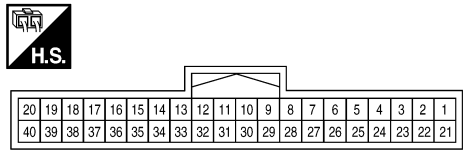
Terminal No.	Color of Wire	Signal Name
1	L	—
16	L	—
17	P	—
32	P	—

Connector No.	M22
Connector Name	DATA LINK CONNECTOR
Connector Color	WHITE



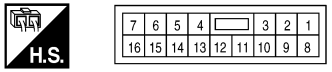
Terminal No.	Color of Wire	Signal Name
4	B	GND
5	B	GND
6	L	CAN-H
7	GR	K-LINE
8	LG	IGN
14	P	CAN-L
16	V	B+

Connector No.	M24
Connector Name	COMBINATION METER
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	L	CAN-H
2	P	CAN-L
21	B	GND 1(ILL)
22	B	GND2(POWER)
23	B	GND3
27	G	BAT
28	SB	IGN

Connector No.	M25
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	G	—
2	R	—
3	P	—
6	L	—
8	GR	—
9	Y	—
10	SB	—
11	GR	—
12	G	—
15	R	—

Connector No.	M30
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Color	GRAY



Terminal No.	Color of Wire	Signal Name
33	B	GND ASCD SW
34	R	SCCD SW

ALBIA0450GB

Connector No.	M102
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Color	GRAY

H.S.



Terminal No.	Color of Wire	Signal Name
14	R	—
15	B	—

Connector No.	M203
Connector Name	STOP LAMP SWITCH (WITH AUTOMATIC TRANSMISSION)
Connector Color	WHITE

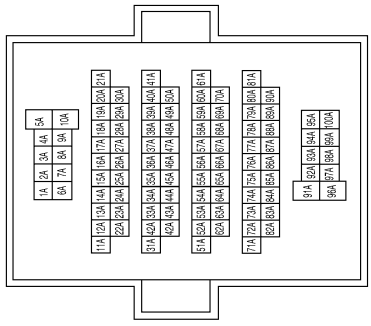
H.S.



Terminal No.	Color of Wire	Signal Name
1	L	—
2	R	—

Connector No.	M69
Connector Name	WIRE TO WIRE
Connector Color	WHITE

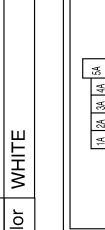
H.S.



Terminal No.	Color of Wire	Signal Name
7A	L	—
11A	P	—
12A	L	—
13A	Y	—
14A	GR	—
17A	SB	—
18A	R	—
19A	P	—
20A	G	—
21A	R	—
25A	R	—
26A	GR	—
27A	B	—
31A	P	—
32A	L	—
41A	GR	—
100A	W	—

Connector No.	M201
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
1	G	—
2	R	—
3	V	—
6	L	—
8	GR	—
9	Y	—
10	BR	—
11	O	—
12	G	—
15	R	—

ALBIA0451GB

Connector No.	M205
Connector Name	ASCD BRAKE SWITCH (WITH AUTOMATIC TRANSMISSION)
Connector Color	BROWN



Terminal No.	Color of Wire	Signal Name
1	O	—
2	G	—

Connector No.	M204
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	Y	GND A APS 2
2	R	GND A APS 1
3	G	APS 1
4	V	AVCC APS 1
5	BR	AVCC APS 2
6	GR	APS 2

Connector No.	M203
Connector Name	STOP LAMP SWITCH (WITH MANUAL TRANSMISSION)
Connector Color	BLACK

Terminal No.	Color of Wire	Signal Name
1	L	—
2	R	—

Connector No.	E3
Connector Name	COOLING FAN MOTOR (WITHOUT A/C)
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	LG	LO (+)
2	Y	HI (+)
3	L	HI (-)
4	B	LO (-)

Connector No.	M206
Connector Name	ASCD CLUTCH SWITCH
Connector Color	BROWN



Terminal No.	Color of Wire	Signal Name
1	G	—
2	B	—

Connector No.	M205
Connector Name	ASCD BRAKE SWITCH (WITH MANUAL TRANSMISSION)
Connector Color	BROWN



Terminal No.	Color of Wire	Signal Name
1	O	—
2	GR	—

ALBIA0452GB

Connector No.	E3
Connector Name	COOLING FAN MOTOR (WITH A/C)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	—
2	B	—

Connector No.	E5
Connector Name	RESISTOR
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	—
2	Y	—

Connector No.	E7
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
7A	L	—
11A	P	—
12A	L	—
13A	Y	—
14A	GR	—
17A	SB	—
18A	R	—
19A	O	—
20A	G	—
21A	R	—
25A	R	—
26A	GR	—
27A	B	—
31A	P	—
32A	L	—
41A	LG	—
100A	BR	—

ALBIA0453GB

Connector No.	E12
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	GND A APS 2
2	R	GND A APS 1
3	G	APS 1
4	P	AVCC APS 1
5	SB	AVCC APS 2
6	GR	APS 2

Connector No.	E8
Connector Name	WIRE TO WIRE
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
9B	O	—
15B	BR	—
23B	B	—
24B	R	—
26B	B	—
27B	G	—
28B	Y	—
31B	GR	—
32B	BR	—
33B	W	—
39B	L	—
44B	G	—
46B	GR	—
47B	Y	—

Connector No.	E13
Connector Name	STOP LAMP SWITCH (MANUAL TRANSMISSION)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	—
2	R	—

Connector No.	E13
Connector Name	STOP LAMP SWITCH (AUTOMATIC TRANSMISSION)
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	—
2	R	—

ALBIA0454GB

Connector No.	E16
Connector Name	ECM
Connector Color	BLACK

H.S.

81	85	89	93	97	101	105	109
82	86	90	94	98	102	106	110
83	87	91	95	99	103	107	111
84	88	92	96	100	104	108	112

Terminal No.	Color of Wire	Signal Name
83	P	CAN-L
84	L	CAN-H
88	LG	K-LINE
93	O	IGN SW
94	R	ASCD SW
95	B	GND ASCD SW
99	R	BRAKE
100	G	ASCD BRAKE SW
102	SB	AVCC-APS2
103	GR	APS2
104	Y	GND-A-APS2
105	G	VBR
106	P	AVCC-APS1
108	B	GND
110	G	APS1
111	R	GND-A-APS1

Connector No.	E17
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Color	BLACK

H.S.

1 2 3

Terminal No.	Color of Wire	Signal Name
1	BR	—
2	GR	—
3	W	—

Connector No.	E36
Connector Name	ASCD BRAKE SWITCH (WITH AUTOMATIC TRANSMISSION)
Connector Color	BROWN

H.S.

2 1

Terminal No.	Color of Wire	Signal Name
1	O	—
2	G	—

Connector No.	E31
Connector Name	TCM (TRANSMISSION CONTROL MODULE)
Connector Color	GRAY

H.S.

25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42
43	44	45				46	47	48

Terminal No.	Color of Wire	Signal Name
39	L	TACHO
42	B	GND A

Connector No.	E35
Connector Name	ASCD CLUTCH SWITCH
Connector Color	BROWN

H.S.

2 1

Terminal No.	Color of Wire	Signal Name
1	G	—
2	B	—

ALBIA0455GB

Connector No.	E36
Connector Name	ASCD BRAKE SWITCH (WITH MANUAL TRANSMISSION)
Connector Color	BROWN

H.S.

2
1

Terminal No.	Color of Wire	Signal Name
1	O	—
2	GR	—

Connector No.	E43
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

9	8	7	6		5	4	3
18	17	16	15	14	13	12	11	10

Terminal No.	Color of Wire	Signal Name
3	Y	IGN COIL
4	G	ECM (VB)
7	G	ECM CONT
8	G	ELEC THROTTLE
16	SB	REV LAMP

Connector No.	E44
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

21	20	19
24	23	22

Terminal No.	Color of Wire	Signal Name
20	L	MOTOR FAN LO
22	G	FL50A MOTOR FAN
23	L	MOTOR FAN GND
24	Y	MOTOR FAN HI

Connector No.	E45
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BROWN

H.S.

29	28		27	26	25
36	35	34	33	32	31	30

Terminal No.	Color of Wire	Signal Name
30	R	O2 SENS (IGN)
31	O	INJ ECU
36	BR	F/PUMP MOTOR

Connector No.	E46
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

42	41	40	39	38	37
48	47	46	45	44	43

Terminal No.	Color of Wire	Signal Name
39	B	SIGNAL GND
40	P	CAN-L
41	L	CAN-H
46	Y	ETC CONT
47	GR	FUEL PUMP CONT

Connector No.	E48
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BLACK

H.S.

59	58	57
62	61	60

Terminal No.	Color of Wire	Signal Name
59	B	POWER GND

ALBIA0456GB

Connector No.	F6
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Color	GRAY



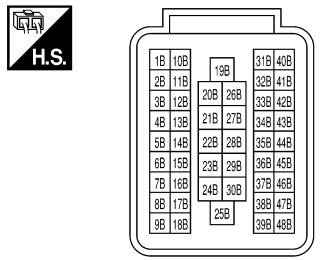
Terminal No.	Color of Wire	Signal Name
1	P	—
2	B	—

Connector No.	F7
Connector Name	ELECTRONIC THROTTLE CONTROL ACTUATOR
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	V	AVCC-TPS
2	LG	TPS1
3	O	TPS2
4	Y	GND-A2
5	P	MOTOR(+)
6	L	MOTOR(-)

Connector No.	F8
Connector Name	WIRE TO WIRE
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
9B	SB	—
15B	R	—
23B	B	—

Terminal No.	Color of Wire	Signal Name
24B	R	—
26B	B	—
27B	SB	—
28B	V	—
31B	GR	—
32B	BR	—
33B	W	—
39B	L	—
44B	P	—
46B	GR	—
47B	Y	—

ALBIA0457GB

Terminal No.	Color of Wire	Signal Name
17	R	IGN COIL #1
18	LG	IGN COIL #2
21	G	IGN COIL #4
22	SB	IGN COIL #3
23	GR	FPR
25	V	INJ #4
29	Y	INJ #3
30	O	INJ #2
31	L	INJ #1
32	P	SSOF

Terminal No.	Color of Wire	Signal Name
1	L	MOTOR 1
2	SB	VMOT
3	G	O2 HF
4	P	MOTOR 2
5	G	O2HR
9	P	EVAP
10	B	GND
11	B	GND
13	L	TACHO
15	Y	MOTRLY

Connector No.	F10
Connector Name	ECM
Connector Color	GRAY

H.S.

33	37	41	45	49	53	57	61	65	69	73	77								
34	38	42	46	50	54	58	62	66	70	74	78								
35	39	43	47	51	55	59	63	67	71	75	79								
36	40	44	48	52	56	60	64	68	72	76	80								

Terminal No.	Color of Wire	Signal Name
33	LG	TPS 1
34	O	TPS 2
36	Y	GND-A TPS
37	W	KNK
38	P	TW
40	SHIELD	GND KNK
41	GR	PDPRES
44	B	GND-A TW
45	G	QA+
46	V	TA
48	BR	GND-A (PDPRES)
49	W	O2SF
50	W	O2SR

Terminal No.	Color of Wire	Signal Name
52	LG	QA-
55	O	GND-TA
56	B	GNDA-O2SF
59	O	GND-A O2SR
61	W	POS
62	R	GND POS
63	BR	GND-(A)-PHASE
65	G	PHASE
69	L	NEUT H
72	V	AVCC-TPS
73	P	CVTC
74	W	AVCC(PDPRES)
75	BR	POS AVCC
78	O	PHASE AVCC

Connector No.	F11
Connector Name	ECM
Connector Color	BROWN

H.S.

1	5	9	13	17	21	25	29	33	37	41	45								
2	6	10	14	18	22	26	30	34	38	42	46								
3	7	11	15	19	23	27	31	35	39	43	47								
4	8	12	16	20	24	28	32	36	40	44	48								

ALBIA0458GB

Connector No.	F12
Connector Name	HEATED OXYGEN SENSOR 1
Connector Color	BLACK

H.S.



Terminal No.	Color of Wire	Signal Name
1	B	GND-O2
2	R	PWR SUPPLY
3	SG	HEATER GND
4	W	SIGNAL

Connector No.	F13
Connector Name	HEATED OXYGEN SENSOR 2
Connector Color	BLACK

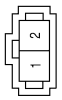
H.S.



Terminal No.	Color of Wire	Signal Name
1	O	GND-02
2	R	PWR SUPPLY
3	G	HEATER GND
4	W	SIGNAL

Connector No.	F14
Connector Name	KNOCK SENSOR
Connector Color	BLACK

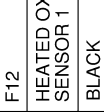
H.S.



Terminal No.	Color of Wire	Signal Name
1	W	KNK
2	SHIELD	GND

Connector No.	F15
Connector Name	CRANKSHAFT POSITION SENSOR (POS)
Connector Color	BLACK

H.S.



Terminal No.	Color of Wire	Signal Name
1	BR	POWER SUPPLY
2	R	GND
3	W	SIGNAL

Connector No.	F17
Connector Name	FUEL INJECTOR NO. 1
Connector Color	GRAY

H.S.



Terminal No.	Color of Wire	Signal Name
1	SB	—
2	L	—

Connector No.	F18
Connector Name	FUEL INJECTOR NO. 2
Connector Color	GRAY

H.S.



Terminal No.	Color of Wire	Signal Name
1	SB	—
2	0	—

ALBIA0459GB

Connector No.	F19
Connector Name	FUEL INJECTOR NO. 3
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	—
2	Y	—

Connector No.	F20
Connector Name	FUEL INJECTOR NO. 4
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	—
2	V	—

Connector No.	F21
Connector Name	CAMSHAFT POSITION SENSOR (PHASE)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	POWER SUPPLY
2	BR	GND
3	G	SIGNAL

Connector No.	F22
Connector Name	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	G	—
2	P	—

Connector No.	F23
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
Connector Color	GREEN

H.S.

Terminal No.	Color of Wire	Signal Name
1	V	—
2	P	—

Connector No.	F24
Connector Name	NEUTRAL AND REVERSE SWITCH
Connector Color	GREEN

H.S.

Terminal No.	Color of Wire	Signal Name
2	R	—
3	L	—

ALBIA0460GB

Connector No.	F25
Connector Name	PARK/NEUTRAL POSITION (PNP) SWITCH
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	
2	L	

Connector No.	F26
Connector Name	CONDENSER-2
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	V	—
2	B	—

Connector No.	F31
Connector Name	MASS AIR FLOW SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
2	BR	POWER SUPPLY
3	V	TA SIGNAL
4	G	QA (+)
5	LG	QA (-)
6	O	TA GND

Connector No.	F34
Connector Name	IGNITION COIL NO. 1 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	—
2	B	—
3	V	—

Connector No.	F35
Connector Name	IGNITION COIL NO. 2 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

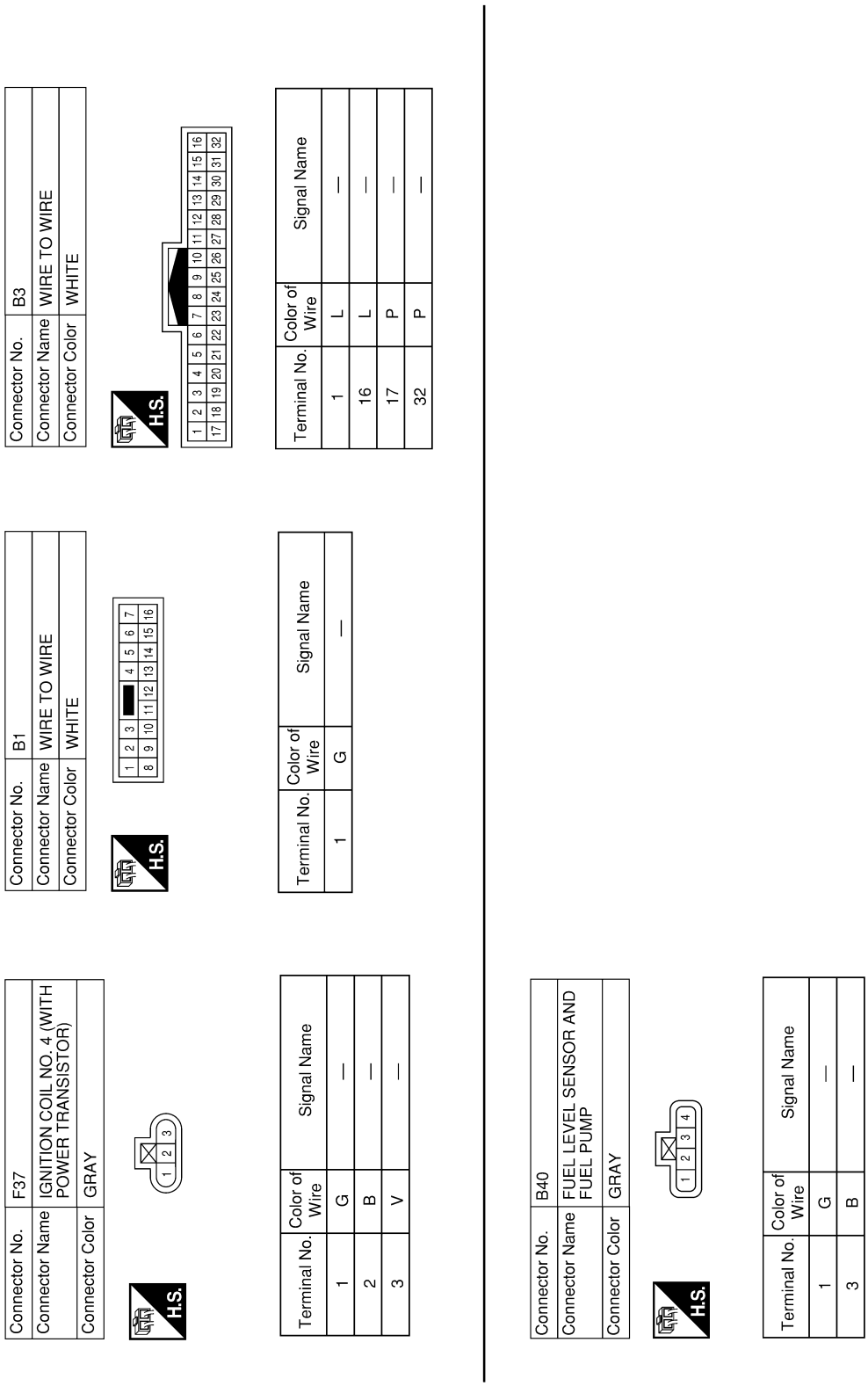
Terminal No.	Color of Wire	Signal Name
1	LG	—
2	B	—
3	V	—

Connector No.	F36
Connector Name	IGNITION COIL NO. 3 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	—
2	B	—
3	V	—

ALBIA0461GB



ALBIA0462GB

Fail Safe

INFOID:0000000001693501

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.	EC-630

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 turning ignition switch ON or START. 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)
		More than approx. 4 minutes after ignition ON or START	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 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.	
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.	
P1121	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 P or N (A/T), Neutral (M/T) position, and engine speed will not exceed 1,000 rpm or more.	
P1122	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.	
P1124 P1126	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.	

DTC No.	Detected items	Engine operating condition in fail-safe mode
P1128	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.
P1229	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.
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
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:0000000001693502

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 • P0102 P0103 Mass air flow sensor • P0117 P0118 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0327 P0328 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0605 ECM • P1229 Sensor power supply • P1610 - P1615 NATS • P1706 Park/neutral position (PNP) switch • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	• P0132 P0134 Heated oxygen sensor 1 • P0138 Heated oxygen sensor 2 • P1065 ECM • P1111 Intake valve timing control solenoid valve • P1122 Electric throttle control function • P1124 P1126 Throttle control motor relay • P1128 Throttle control motor • P1217 Engine over temperature (OVERHEAT) • P1805 Brake switch • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD vehicle speed sensor
3	• P0011 Intake valve timing control • P1121 Electric throttle control actuator • P1212 ESP communication line

DTC Index

INFOID:0000000001693503

×:Applicable —: Not applicable

DTC*1		Items (CONSULT-III screen terms)	Trip	MI	Reference page
CONSULT-III	ECM*2				
U1000	1000*3	CAN COMM CIRCUIT	2	—	EC-481
U1001	1001*3	CAN COMM CIRCUIT	2	—	EC-481

DTC*1		Items (CONSULT-III screen terms)	Trip	MI	Reference page
CONSULT-III	ECM*2				
U1010	1010	CONTROL UNIT(CAN)	2	—	EC-482
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	**Flashing***4	EC-457
P0011	0011	INT/V TIM CONT-B1	2	—	EC-483
P0102	0102	MAF SEN/CIRCUIT-B1	1	×	EC-487
P0103	0103	MAF SEN/CIRCUIT-B1	1	×	EC-487
P0117	0117	ECT SEN/CIRC	2	×	EC-492
P0118	0118	ECT SEN/CIRC	2	×	EC-492
P0122	0122	TP SEN 2/CIRC-B1	1	×	EC-495
P0123	0123	TP SEN 2/CIRC-B1	1	×	EC-495
P0132	0132	HO2S1 (B1)	2	×	EC-498
P0134	0134	HO2S1 (B1)	2	×	EC-502
P0138	0138	HO2S2 (B1)	2	×	EC-507
P0222	0222	TP SEN 1/CIRC-B1	1	×	EC-511
P0223	0223	TP SEN 1/CIRC-B1	1	×	EC-511
P0327	0327	KNOCK SEN/CIRC-B1	2	—	EC-514
P0328	0328	KNOCK SEN/CIRC-B1	2	—	EC-514
P0335	0335	CKP SEN/CIRCUIT	2	×	EC-516
P0340	0340	CMP SEN/CIRC-B1	2	×	EC-520
P0605	0605	ECM	1 or 2	× or —	EC-524
P1065	1065	ECM BACK UP/CIRCUIT	2	×	EC-526
P1111	1111	INT/V TIM C/CIRC	2	×	EC-528
P1121	1121	ETC ACTR-B1	1	×	EC-531
P1122	1122	ETC FUNCTION/CIRC-B1	1	×	EC-533
P1124	1124	ETC MOT PWP	1	×	EC-537
P1126	1126	ETC MOT PWP-B1	1	×	EC-537
P1128	1128	ETC MOT-B1	1	×	EC-540
P1212	1212	TCS/CIRC	2	—	EC-542
P1217	1217	ENG OVER TEMP	1	×	EC-543
P1225	1225	CTP LEARNING-B1	2	—	EC-547
P1226	1226	CTP LEARNING-B1	2	—	EC-549
P1229	1229	SENSOR POWER/CIRC	1	×	EC-551
P1564	1564	ASCD SW	1	—	EC-553
P1572	1572	ASCD BRAKE SW	1	—	EC-556
P1574	1574	ASCD VHL SPD SEN	1	—	EC-564
P1610	1610	LOCK MODE	2	—	SEC-36
P1611	1611	ID DISCARD IMM-ECM	2	—	SEC-30
P1615	1615	DIFFERENCE OF KEY	2	—	SEC-29
P1706	1706	P-N POS SW/CIRCUIT	2	×	EC-566
P1805	1805	BRAKE SW/CIRCUIT	1	×	EC-569
P2122	2122	APP SEN 1/CIRC	1	×	EC-572
P2123	2123	APP SEN 1/CIRC	1	×	EC-572
P2127	2127	APP SEN 2/CIRC	1	×	EC-576

DTC*1		Items (CONSULT-III screen terms)	Trip	MI	Reference page
CONSULT-III	ECM*2				
P2128	2128	APP SEN 2/CIRC	1	×	EC-576
P2135	2135	TP SENSOR-B1	1	×	EC-580
P2138	2138	APP SENSOR	1	×	EC-583

*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 to EC-457, "Diagnosis Description".

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:0000000001161687

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	EC-605
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-681
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-602
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-683
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-631
	Incorrect idle speed adjustment						1	1	1	1		1			EC-389
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-531, EC-533, EC-537
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-389
	Ignition circuit	1	1	2	2	2		2	2			2			EC-625
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-477
Mass air flow sensor circuit		1	1	2	2	2		2	2			2			EC-487
Engine coolant temperature sensor circuit					3		3			3					EC-492
Heated oxygen sensor 1 circuit					3										EC-498, EC-502
Throttle position sensor circuit							2			2					EC-495, EC-511, EC-547, EC-549, EC-580
Accelerator pedal position sensor circuit				3	2	1									EC-551, EC-572, EC-576, EC-583
Knock sensor circuit				2								3			EC-514
Crankshaft position sensor (POS) circuit		2	2												EC-516
Camshaft position sensor (PHASE) circuit		3	2												EC-520

	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	
Vehicle speed signal circuit		2	3		3						3			EC-634
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-524, EC-526
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-528
PNP switch circuit			3		3		3	3			3			EC-566
Refrigerant pressure sensor circuit		2				3			3		4			EC-632
Electrical load signal circuit							3							EC-597
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-298 (with NAVI) HAC-184(without NAVI)
ABS actuator and electric unit (control unit)			4											BRC-86

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-10
	Fuel piping			5	5	5		5	5			5			FL-4
	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-27
	Air cleaner														EM-27
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)														EM-27
	Electric throttle control actuator														EM-29
	Air leakage from intake manifold/ Collector/Gasket														EM-29
Cranking	Battery	1	1	1		1		1	1			1		1	PG-6
	Generator circuit														CHG-15
	Starter circuit	3													STR-13
	Signal plate	6													EM-89
	PNP switch	4													TM-621 (M/T) TM-44 (A/T)
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-80
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-89
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														

		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	
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			EM-50
	Camshaft														EM-59
	Intake valve timing control														EM-50
	Intake valve												3		EM-80
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-32
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-40, EM-42, LU-9
	Oil level (Low)/Filthy oil														LU-6
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-16
	Thermostat									5					CO-22
	Water pump														CO-20
	Water gallery														CO-24
	Cooling fan									5					CO-18 (with A/C) CO-18 (without A/C)
	Coolant level (Low)/Contaminated coolant														CO-11
NATS (NISSAN Vehicle Immobilizer System)		1	1												SEC-7

1 - 6: The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

Description

INFOID:0000000001161688

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,500 rpm under no load [for example, the shift lever position is P or N (A/T), neutral (M/T) and engine speed is over 2,500 rpm] fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 2,000 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, EC-401, "System Description".

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000001706095

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SRC and SB section of this Service Manual.

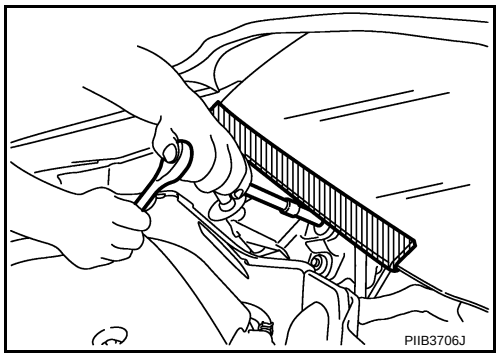
WARNING:

- **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 SRC section.**
- **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 for Procedure without Cowl Top Cover

INFOID:0000000001706096

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



Precautions For Xenon Headlamp Service

INFOID:0000000001706097

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 A/T

INFOID:0000000001706098

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.

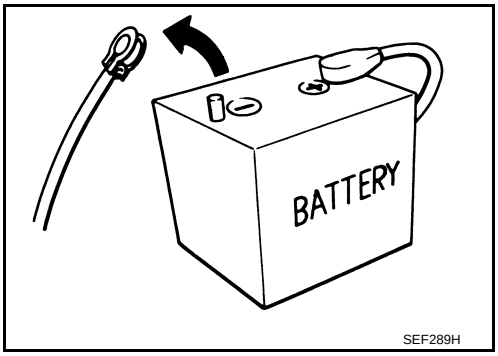
CAUTION:

- **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 XX-XX, "*****".**
- **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 fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.**

General Precautions

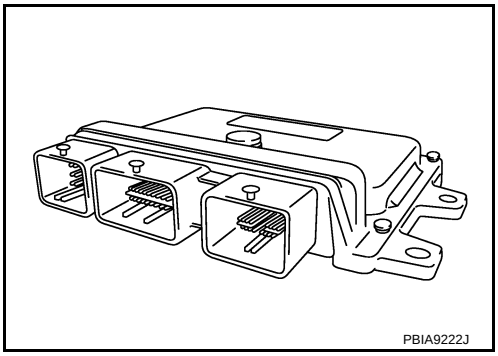
INFOID:0000000001706099

- **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.**

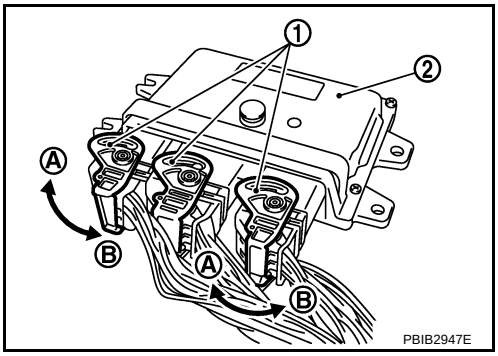


SEF289H

- **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**


PBIA9222J

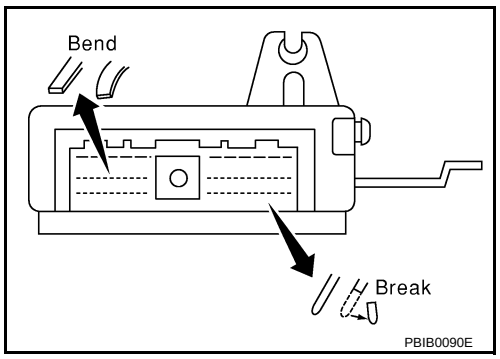
- **When connecting ECM harness connector (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.**

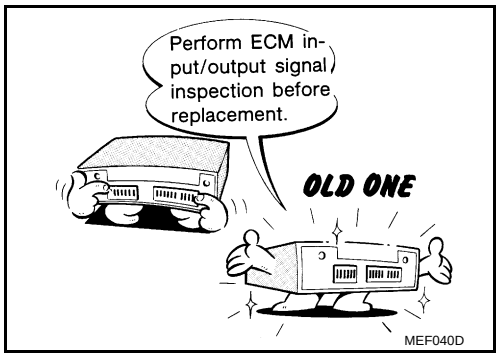


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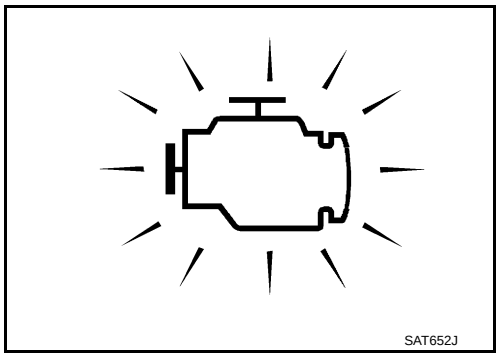
2. ECM
A. Loosen

- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **Keep engine control system parts and harness dry.**
- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-328, "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).**

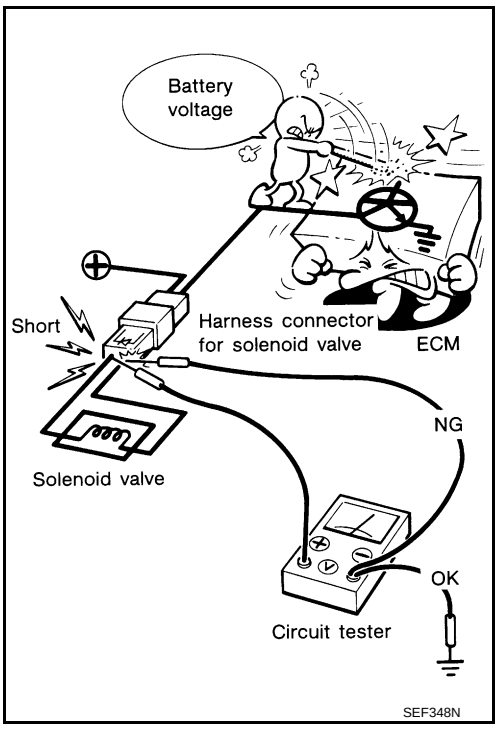




- **After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check.** The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.

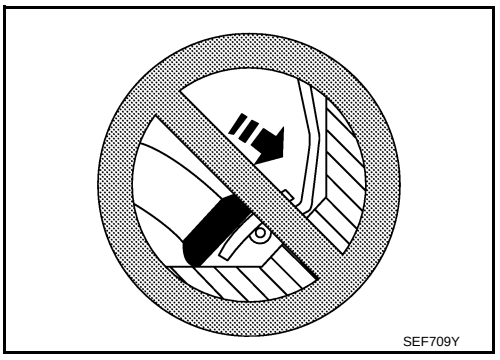


- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

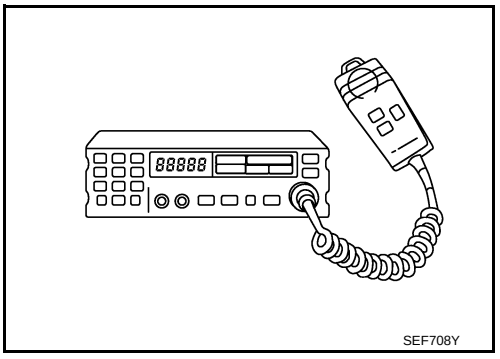


- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**

- **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.**



- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
- **Keep the antenna as far as possible from the electronic control units.**
- **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
  Do not let them run parallel for a long distance.
- **Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.**
- **Be sure to ground the radio to vehicle body.**

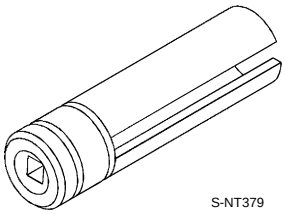
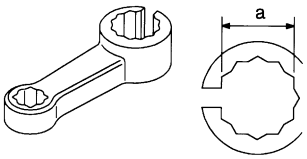
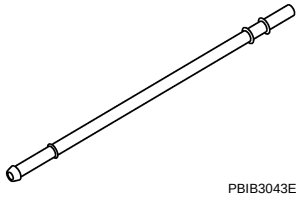


PREPARATION

PREPARATION

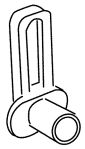
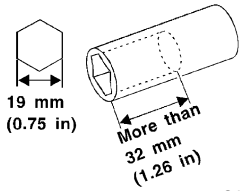
Special Service Tools

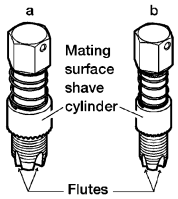
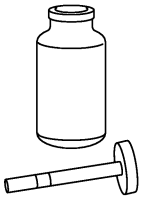
INFOID:0000000001705203

Tool number Tool name	Description
KV10117100 Heated oxygen sensor wrench  S-NT379	Loosening or tighening heated oxygen sensor with 22 mm (0.87 in) hexagon unit
KV10114400 Heated oxygen sensor wrench  S-NT636	Loosening or tighening heated oxygen sensor 2 a: 22 mm (0.87 in)
KV10118400 Fuel tube adapter  PBIB3043E	Measuring fuel pressure

Commercial Service Tools

INFOID:0000000001705204

Tool name	Description
Quick connector release  PBIC0198E	Removing fuel tube quick connectors in engine room (Available in SEC. 164 of PARTS CATALOG: Par No. 16441 6N210)
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor

Tool name	Description
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 MAINTENANCE

FUEL PRESSURE

Inspection

INFOID:0000000001705205

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

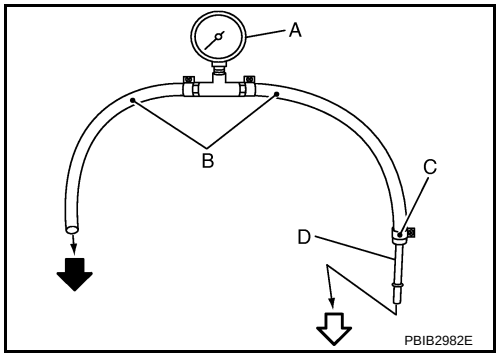
CAUTION:

- **Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.**
- **The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.**
- **Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains sealability with O-rings inside.**
- **Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.**

NOTE:

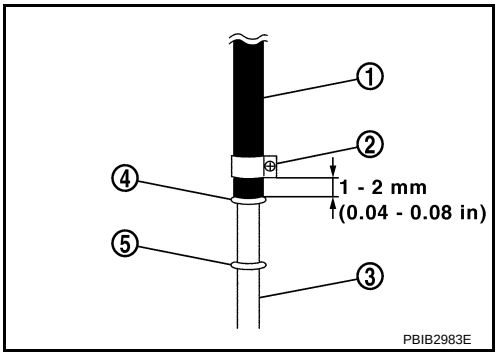
Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because C11 models do not have fuel return system.

1. Release fuel pressure to zero.
2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.
   - ⇦: To quick connector
   - ⬅: To fuel tube (engine side)
   - C: Clamp
   - Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
   - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
   - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
   - Use Pressure Gauge to check fuel pressure.



3. Remove fuel hose.
   - Do not twist or kink fuel hose because it is plastic hose.

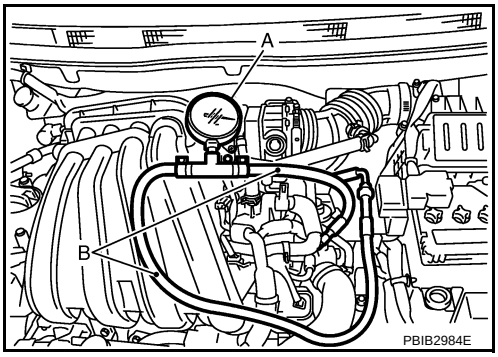
4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
   - No.2 spool (5)
   - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
   - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
   - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
   - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
   - When reconnecting fuel line, always use new clamps.
   - Use a torque driver to tighten clamps.
   - Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).



Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

   - Make sure that clamp screw does not contact adjacent parts.

5. Connect fuel tube adapter to quick connector.
   - A: Fuel pressure gauge
   - B: Fuel hose for fuel pressure check
6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
7. Turn ignition switch ON and check for fuel leakage.
8. Start engine and check for fuel leakage.
9. Read the indication of fuel pressure gauge.
   - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
   - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.



At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2, 51 psi)

10. If result is unsatisfactory, go to next step.
11. Check the following.
    - Fuel hoses and fuel tubes for clogging
    - Fuel filter for clogging
    - Fuel pump
    - Fuel pressure regulator for clogging

    If OK, replace fuel pressure regulator.
    If NG, repair or replace.

EVAPORATIVE EMISSION SYSTEM

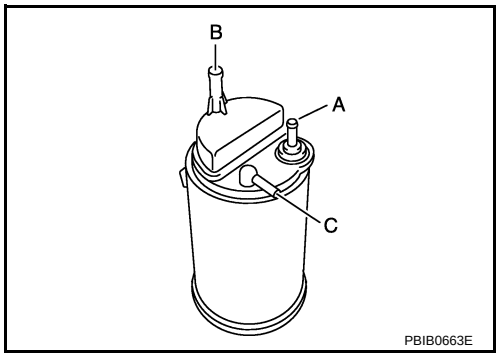
Inspection

INFOID:0000000001161697

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).

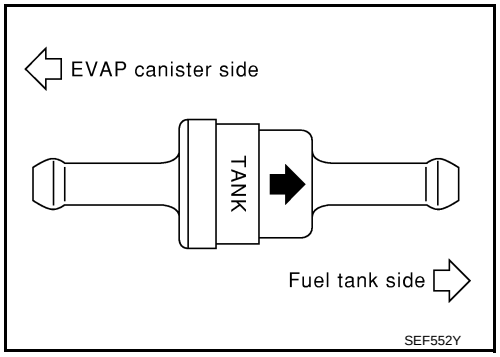


3. Visually inspect the fuel check valve for cracks, damage, loose connections chafing and deterioration.
4. Check fuel check valve as follows:

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.

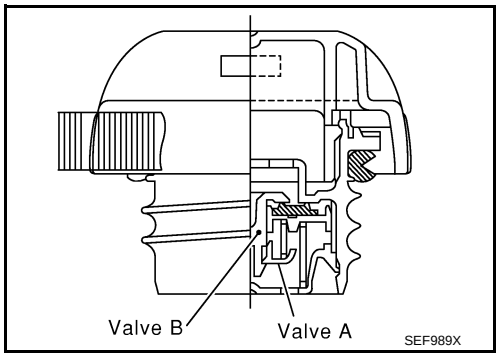
b. Blow air through connector on EVAP canister side. Air flow should be smoothly directed toward fuel tank side.

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.

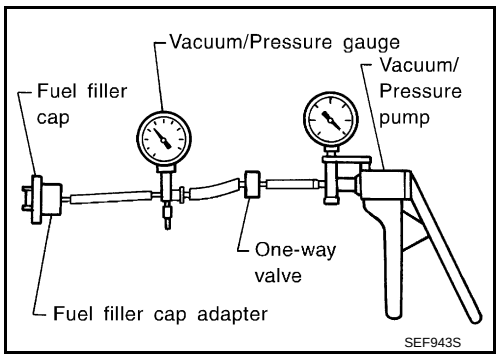
a. Wipe clean valve housing.



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:0000000001161698

Transmission	Condition	Specification
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:0000000001161699

Transmission	Condition	Specification
M/T	No load* (in Neutral position)	15 ± 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

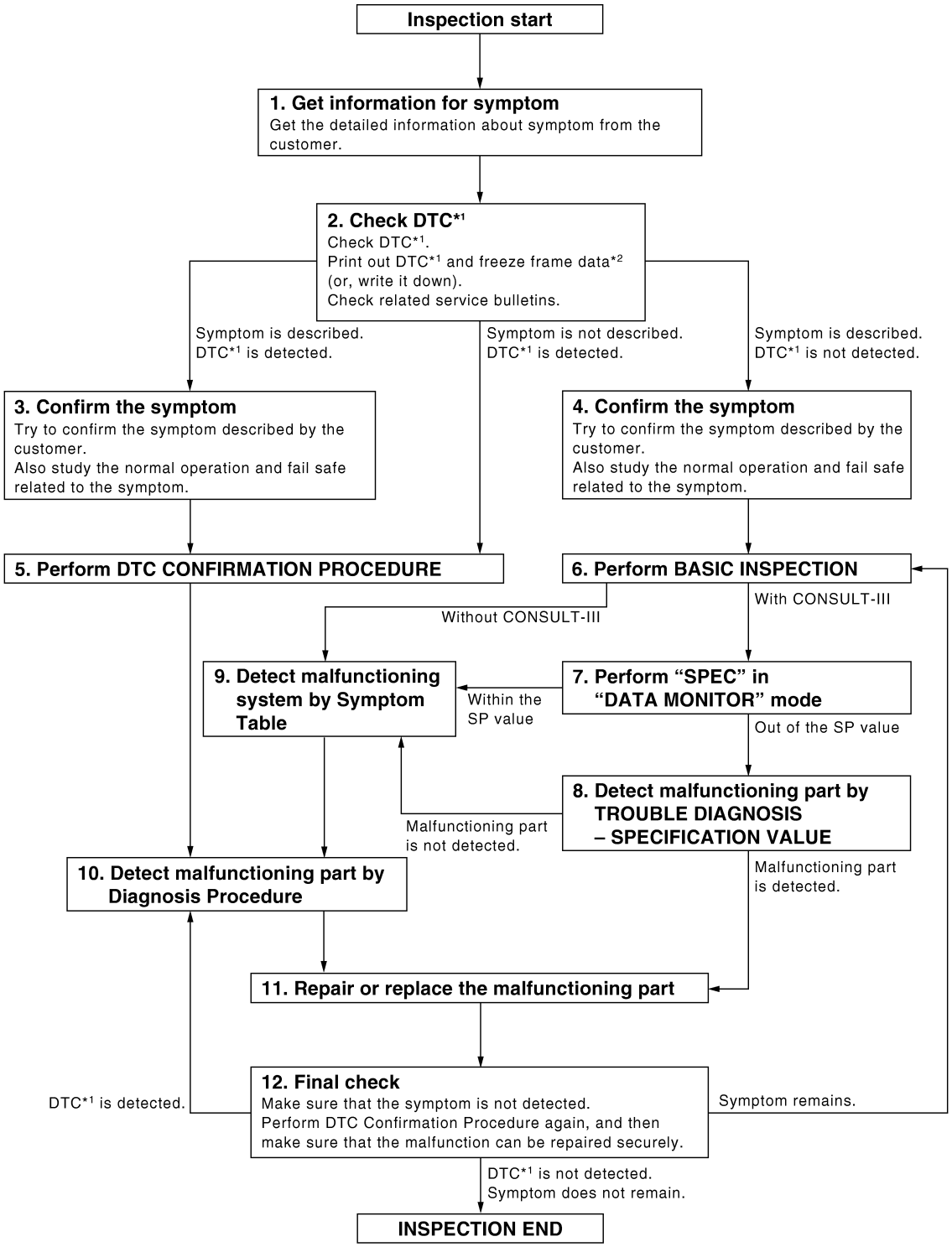
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000001161700

OVERALL SEQUENCE



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

JMBIA0078GB

DETAILED FLOW

1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the “Diagnostic Work Sheet”. (Refer to EC-687, "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 EC-760, "Diagnosis Description".)
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to EC-1024, "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 EC-1028, "Description" and EC-1017, "Fail Safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
Also study the normal operation and fail safe related to the symptom. Refer to EC-1028, "Description" and EC-1017, "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 EC-1019, "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 EC-1020, "DTC Index".

6.PERFORM BASIC INSPECTION

Perform EC-689, "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 EC-781, "Component Function Check".

Is the measurement value within the SP value?

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

8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-782, "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 EC-1024, "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-58, "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 EC-990, "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 EC-760, "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 EC-760, "Diagnosis Description".) If the completion of SRT is needed, drive vehicle under the specific DRIVING PATTERN in EC-1021, "How to Set SRT Code".

Diagnostic Work Sheet

INFOID:0000000001161701

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.

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	

MTBL0017

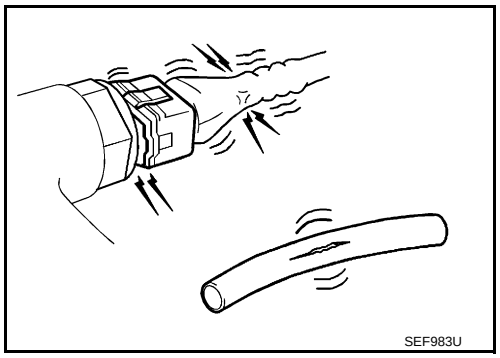
INSPECTION AND ADJUSTMENT
BASIC INSPECTION

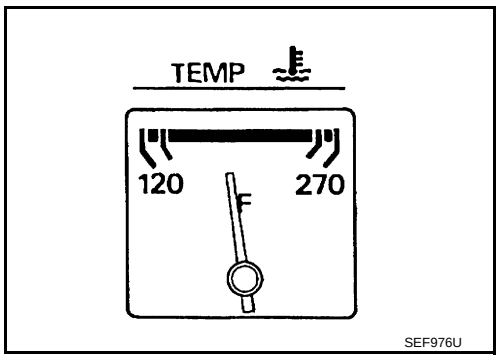
BASIC INSPECTION : Special Repair Requirement

INFOID:0000000001161702

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.


SEF983U

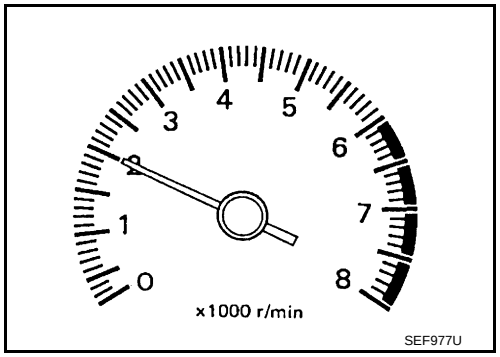


SEF976U

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 GST.

Is any DTC detected?

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



SEF977U

2.REPAIR OR REPLACE

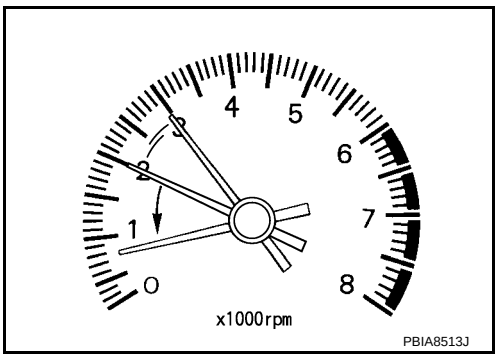
Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> 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 EC-692, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-1038, "Idle Speed".



Is the inspection result normal?

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

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-693, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-694, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-694, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 7.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   For procedure, refer to EC-692, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-1038, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the Following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-866, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-862, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace. Then GO TO 4

9. CHECK ECM FUNCTION

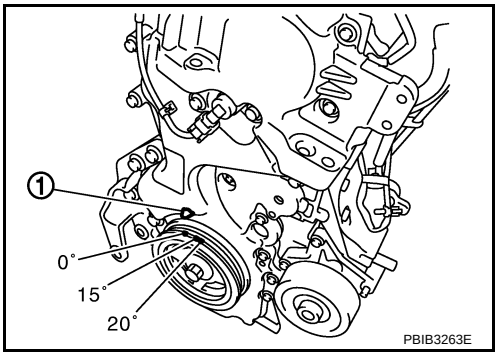
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-7, "ECM RE-COMMUNICATING FUNCTION : Description".

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.

2. Check ignition timing with a timing light.
For procedure, refer to EC-693, "IGNITION TIMING : Special Repair Requirement"
For specification, refer to EC-1038, "Ignition Timing".



1 : Timing indicator

Is the inspection result normal?

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

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-693, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-694, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-694, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 14.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

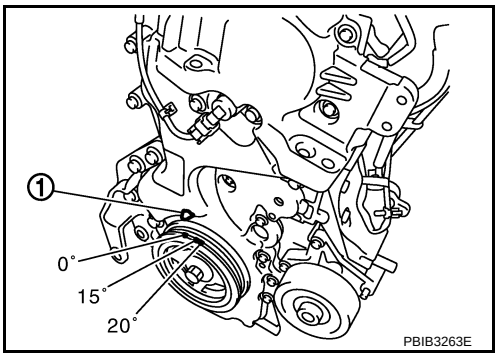
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
For procedure, refer to EC-692, "IDLE SPEED : Special Repair Requirement".
For specification, refer to EC-1038, "Idle Speed".

Is the inspection result normal?

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

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.
For procedure, refer to EC-693, "IGNITION TIMING : Special Repair Requirement".
For specification, refer to EC-1038, "Ignition Timing".



1 : Timing indicator

Is the inspection result normal?

YES >> INSPECTION END.
NO >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-177, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair the timing chain installation. Then GO TO 4.

17.DETECT MALFUNCTIONING PART

Check the following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-866, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-862, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair or replace. Then GO TO 4

18.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 SEC-7, "ECM RE-COMMUNICATING FUNCTION : Description".

>> GO TO 4.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description

INFOID:0000000001161703

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement

INFOID:0000000001161704

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

Refer to SEC-7, "ECM RE-COMMUNICATING FUNCTION : Description".

>> GO TO 2.

2.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-693, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-694, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 4.

4.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-694, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

IDLE SPEED

IDLE SPEED : Description

INFOID:0000000001161705

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

IDLE SPEED : Special Repair Requirement

INFOID:0000000001161706

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:0000000001161707

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

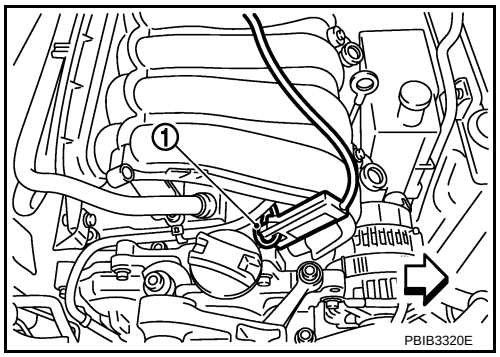
IGNITION TIMING : Special Repair Requirement

INFOID:0000000001161708

1.CHECK IGNITION TIMING

1. Attach timing light to loop wire (1) as shown.

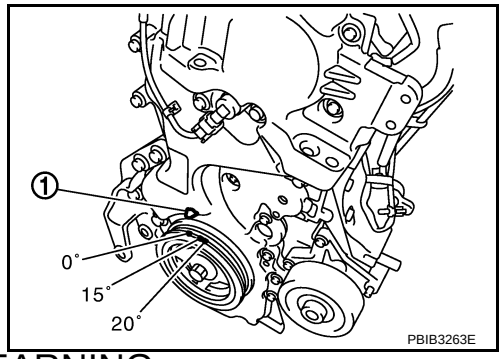
⇦ : Vehicle front



2. Check ignition timing.

1 : Timing indicator

>> INSPECTION END



ACCELERATOR PEDAL RELEASED POSITION LEARNING

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description

INFOID:0000000001161711

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:0000000001161712

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:0000000001161713

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

THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement

INFOID:0000000001161714

1.START

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
   Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

>> END

IDLE AIR VOLUME LEARNING

IDLE AIR VOLUME LEARNING : Description

INFOID:0000000001161715

Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps each engine idle speed within the specific range. It must be performed under any of the following conditions:
- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

IDLE AIR VOLUME LEARNING : Special Repair Requirement

INFOID:0000000001161716

1.PRECONDITIONING

Make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.
- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 100°C (158 - 212°F)
- PNP switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
  On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
- Drive vehicle for 10 minutes.

Do you have CONSULT-III?

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

2.IDLE AIR VOLUME LEARNING

With CONSULT-III
1. Perform Accelerator Pedal Released Position Learning. Refer to EC-693, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-694, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
3. Start engine and warm it up to normal operating temperature.
4. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.
5. Touch “START” and wait 20 seconds.

Is “CMPLT” displayed on CONSULT-III screen?

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

3. IDLE AIR VOLUME LEARNING

Without CONSULT-III

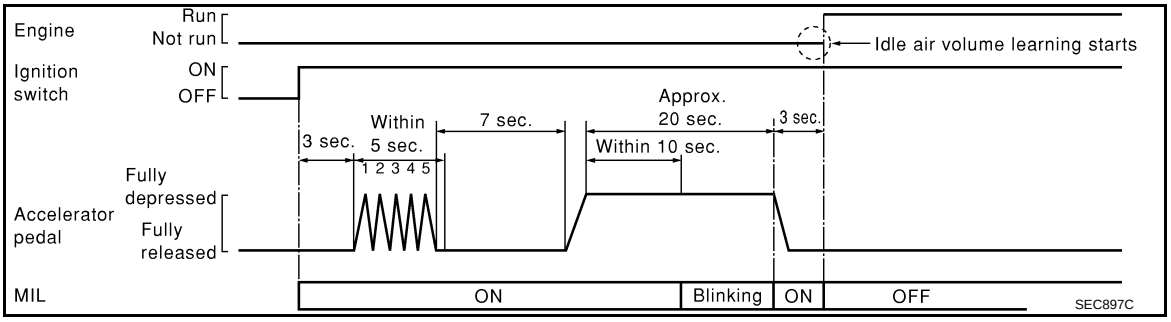
NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

1. Perform Accelerator Pedal Released Position Learning. Refer to EC-693, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-694, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
3. Start engine and warm it up to normal operating temperature.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
6. Repeat the following procedure quickly five times within 5 seconds.

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

7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MI stops blinking and turned ON.
8. Fully release the accelerator pedal within 3 seconds after the MI turned ON.
9. Start engine and let it idle.
10. Wait 20 seconds.



>> GO TO 4

4. CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. For specification, refer to EC-1038, "Idle Speed" and EC-1038, "Ignition Timing".

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following

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

Is the inspection result normal?

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

6. DETECT MALFUNCTIONING PART

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

It is useful to perform “TROUBLE DIAGNOSIS - SPECIFICATION VALUE”. Refer to EC-781, "Description".

If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:

- Engine stalls.
- Erroneous idle.

>> INSPECTION END

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description

INFOID:0000000001161717

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:0000000001161718

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.

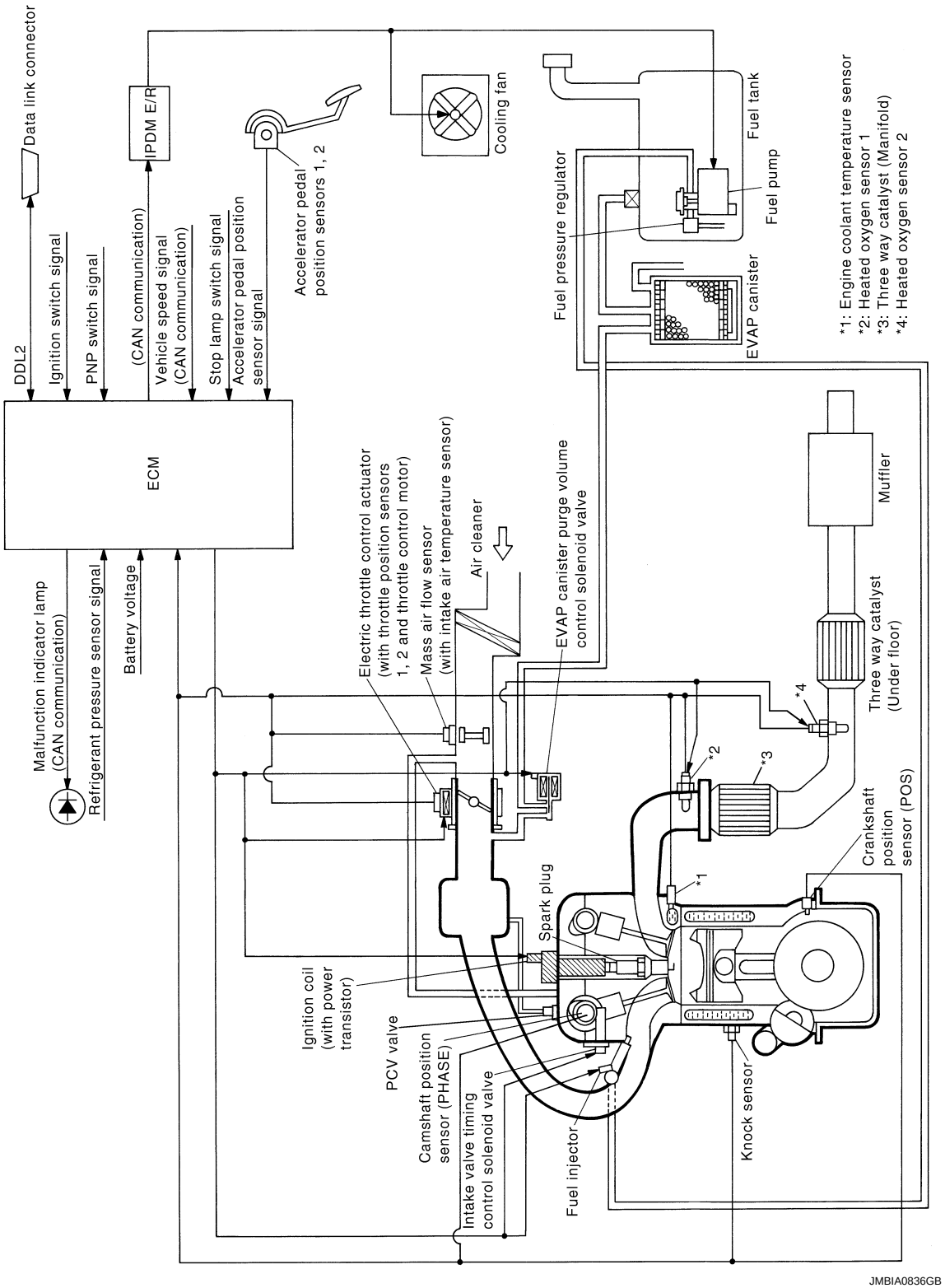
>> END

FUNCTION DIAGNOSIS

ENGINE CONTROL SYSTEM

System Diagram

INFOID:0000000001161719



JMBIA0836GB

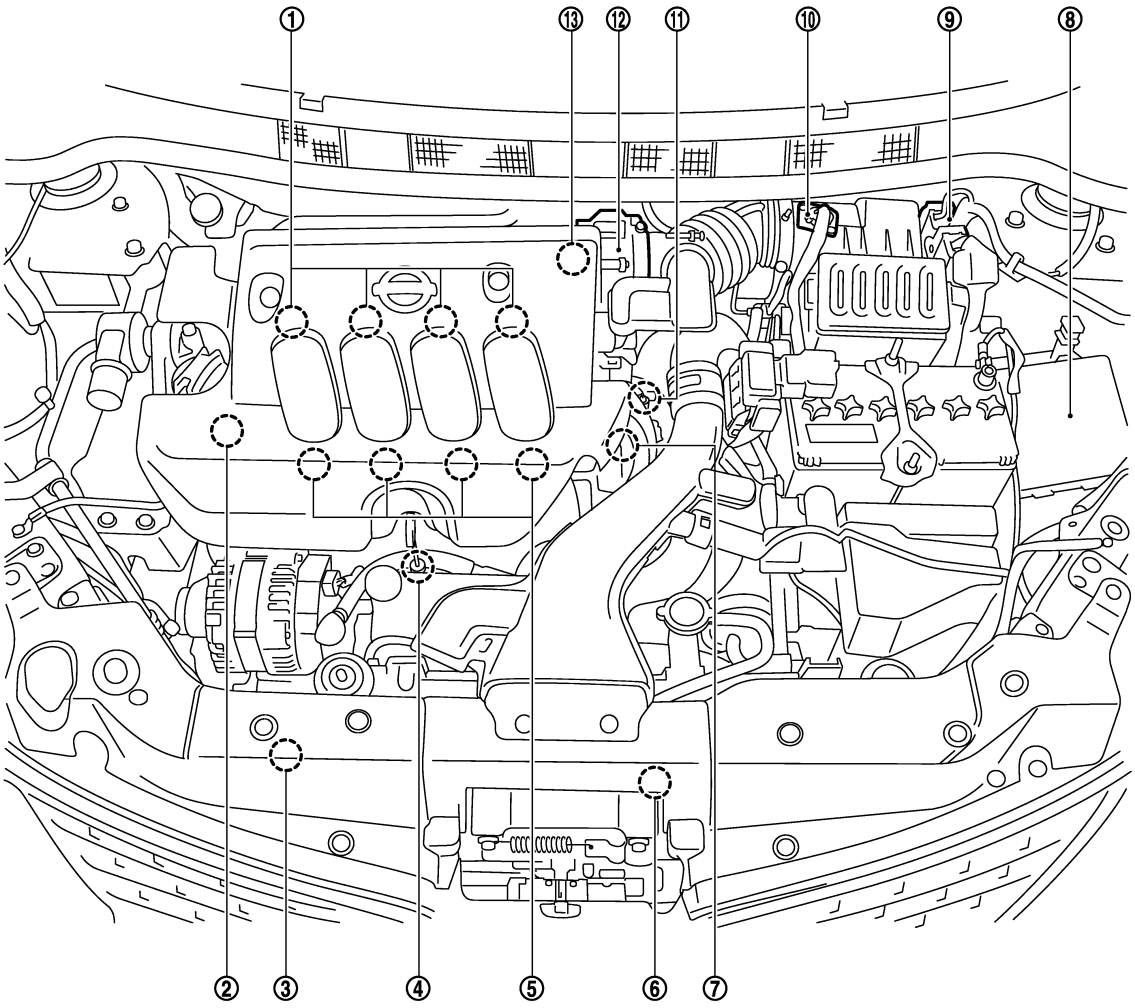
System Description

INFOID:0000000001161720

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

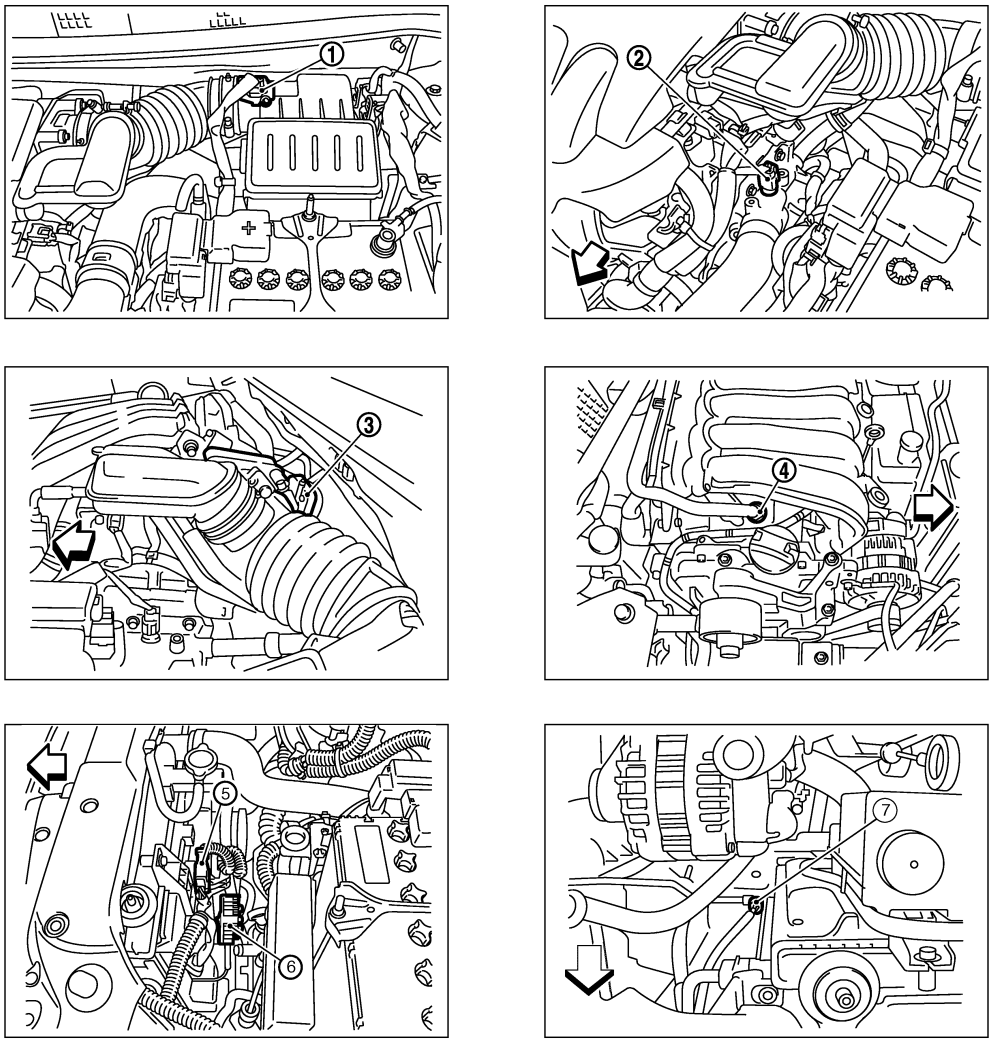
Component Parts Location

INFOID:0000000001161721



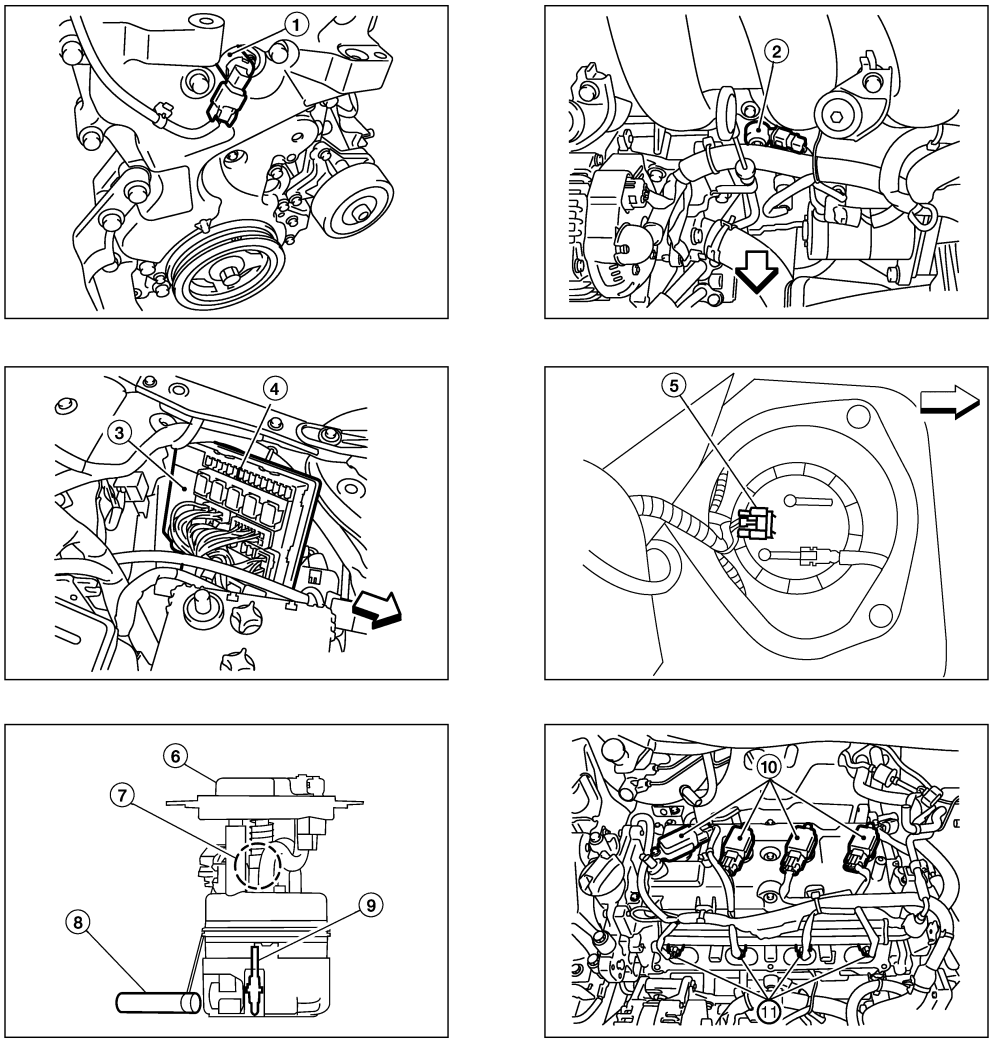
PBIB3261E

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



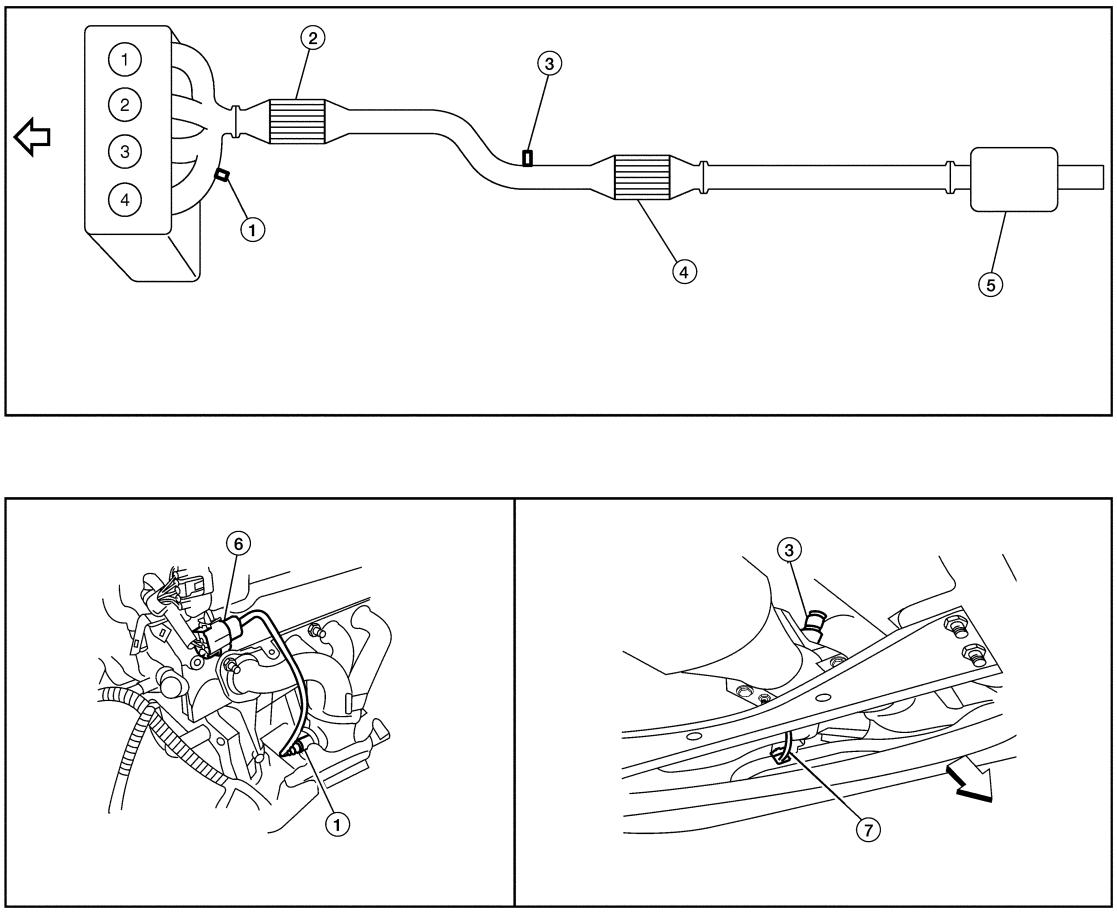
BBIA0724E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator (with built in throttle position sensor, throttle control motor)
4. PCV valve
5. Cooling fan motor
6. Resistor
7. Refrigerant pressure sensor



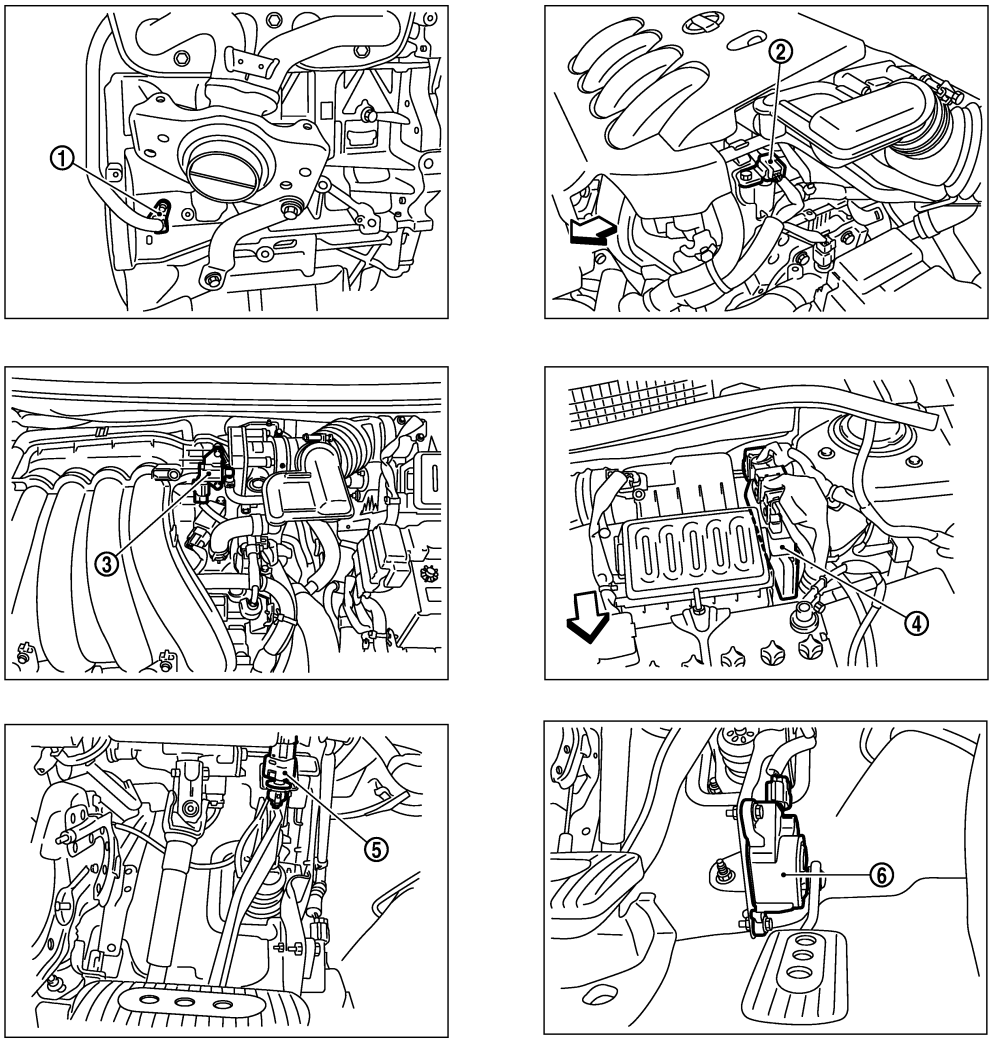
BBIA0735E

1. Intake valve timing control solenoid valve
2. Knock sensor
3. IPDM E/R
4. Fuel pump fuse
5. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
6. Fuel level sensor unit and fuel pump
7. Fuel pressure regulator
8. Fuel level sensor
9. Fuel tank temperature sensor
10. Ignition coil
11. Fuel injector



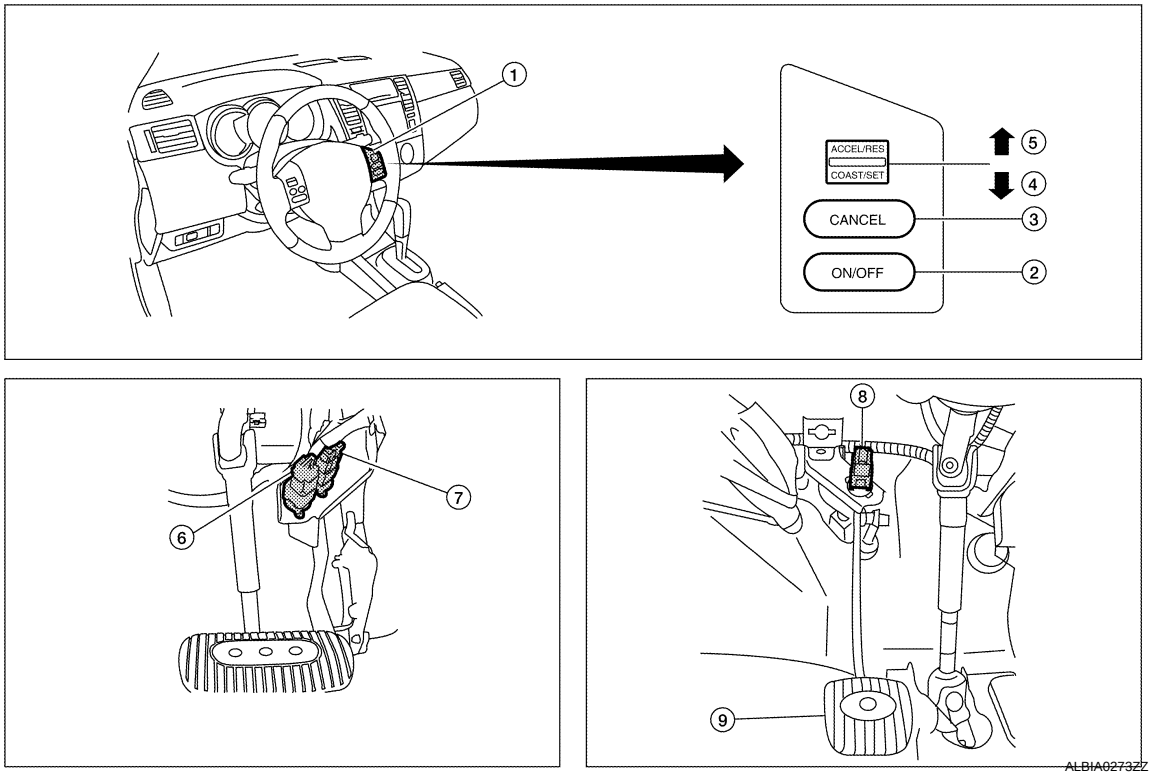
BBIA0733E

1. Heated oxygen sensor 1
2. Three way catalyst (Manifold)
3. Heated oxygen sensor 2
4. Three way catalyst (Under floor)
5. Muffler
6. Heated oxygen sensor 1 harness connector
7. Heated oxygen sensor 2 harness connector



PBIA9902J

1. Crankshaft position sensor (POS)
2. Comshaft position sensor (PHASE)
3. EVAP canistor purge volume control solenoid valve
4. ECM
5. Stop lamp switch
6. Accelerator pedal position sensor



1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELEATE switch
6. Stop lamp switch
7. ASCD brake switch
8. ASCD clutch switch
9. Cluch pedal

Component Description

INFOID:0000000001161722

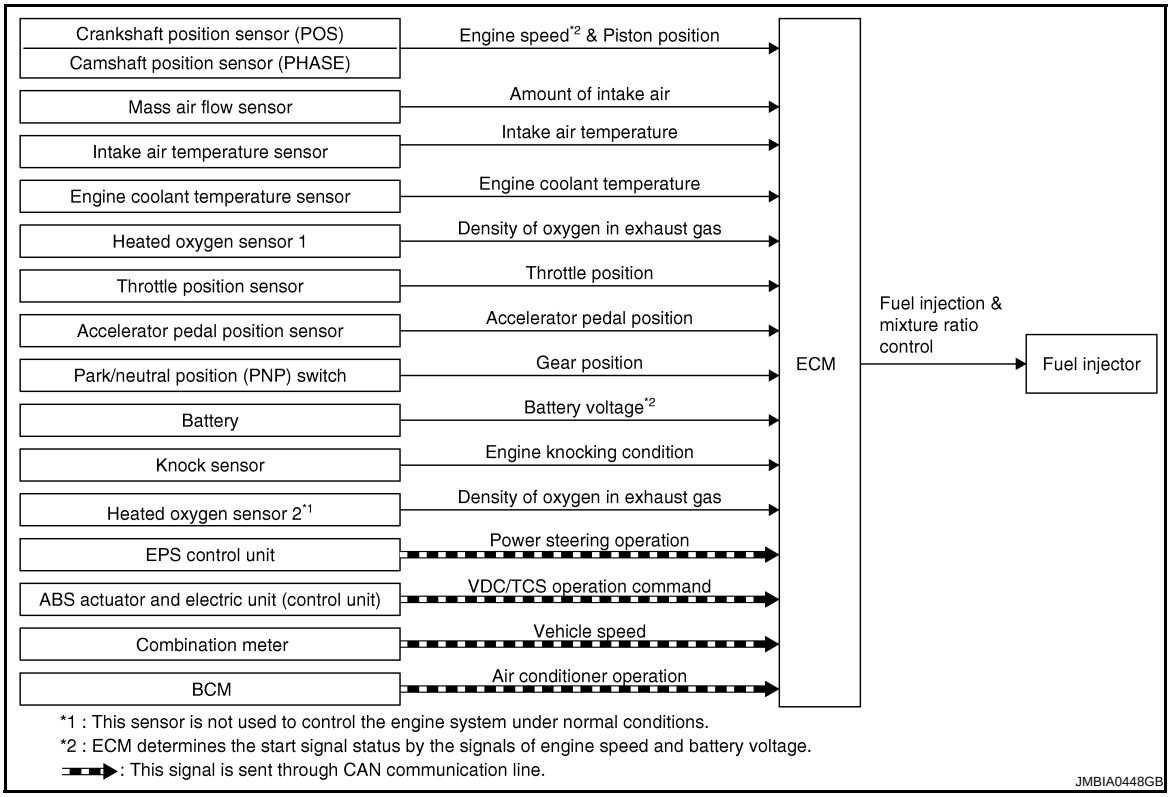
Component	Reference
Accelerator pedal position sensor	EC-948, "Description"
ASCD brake switch	EC-933, "Description"
ASCD steering switch	EC-930, "Description"
ASCD vehicle speed sensor	EC-940, "Description"
Camshaft position sensor (PHASE)	EC-866, "Description"
Crankshaft position sensor (POS)	EC-862, "Description"
Cooling fan motor	EC-737, "System Diagram"
Electric throttle control actuator	EC-885, "Description"
Engine coolant temperature sensor	EC-807, "Description"
EVAP canister purge volume control solenoid valve	EC-875, "Description"
Fuel injector	EC-975, "Description"
Fuel pump	EC-978, "Description"
Heated oxygen sensor 1	EC-813, "Description"
Heated oxygen sensor 1 heater	EC-828, "Description"
Heated oxygen sensor 2	EC-831, "Description"
Heated oxygen sensor 2 heater	EC-841, "Description"
Ignition signal	EC-981, "Description"
Intake air temperature sensor	EC-804, "Description"

Component	Reference
Intake valve timing control solenoid valve	EC-753, "System Description"
Knock sensor	EC-860, "Description"
Mass air flow sensor	EC-799, "Description"
Park/neutral position (PNP) switch	EC-942, "Description"
PCV valve	EC-987, "Description"
Refrigerant pressure sensor	EC-988, "Description"
Stop lamp switch	EC-945, "Description"
Throttle control motor	EC-894, "Description"
Throttle control motor relay	EC-891, "Description"
Throttle position sensor	EC-924, "Description"
Vehicle speed sensor	EC-878, "Description"

MULTIPORT FUEL INJECTION SYSTEM

System Diagram

INFOID:0000000001161723



System Description

INFOID:0000000001161724

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		
Heated oxygen 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	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		
Air conditioner switch*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 heated oxygen 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 heated oxygen sensor 1, refer to EC-813, "Description". This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of heated oxygen 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.

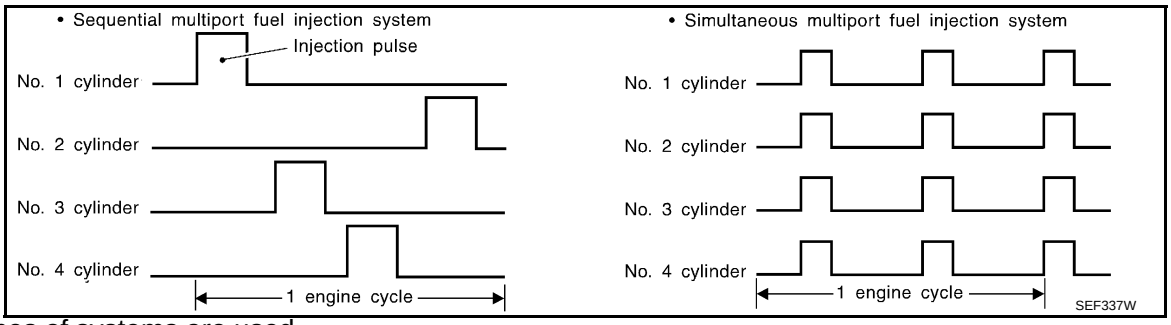
- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 or its circuit
- Insufficient activation of heated oxygen sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from heated oxygen 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 heated oxygen 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.

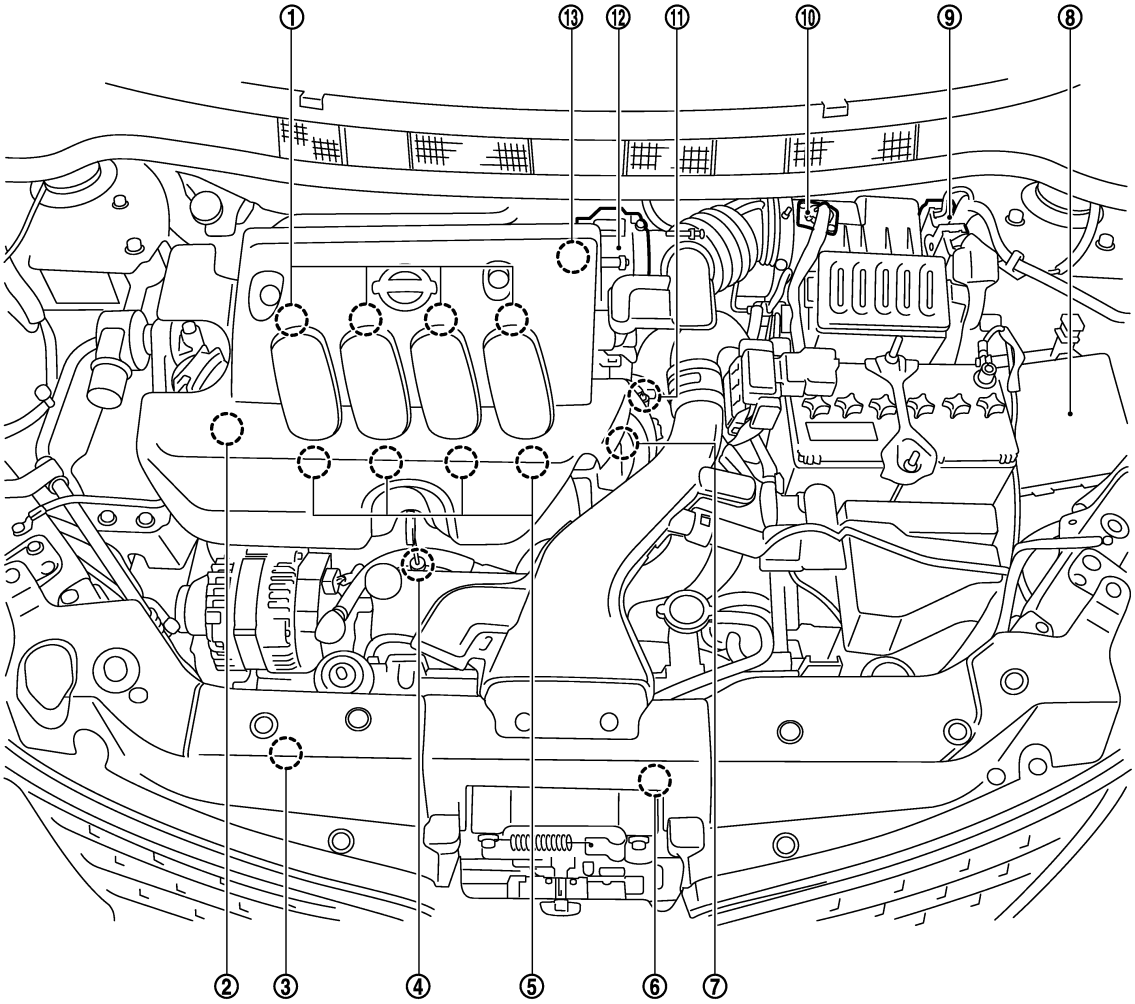
- Sequential Multiport Fuel Injection System
  Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.
- Simultaneous Multiport Fuel Injection System
  Fuel is injected simultaneously into all four cylinders twice each 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 when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

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

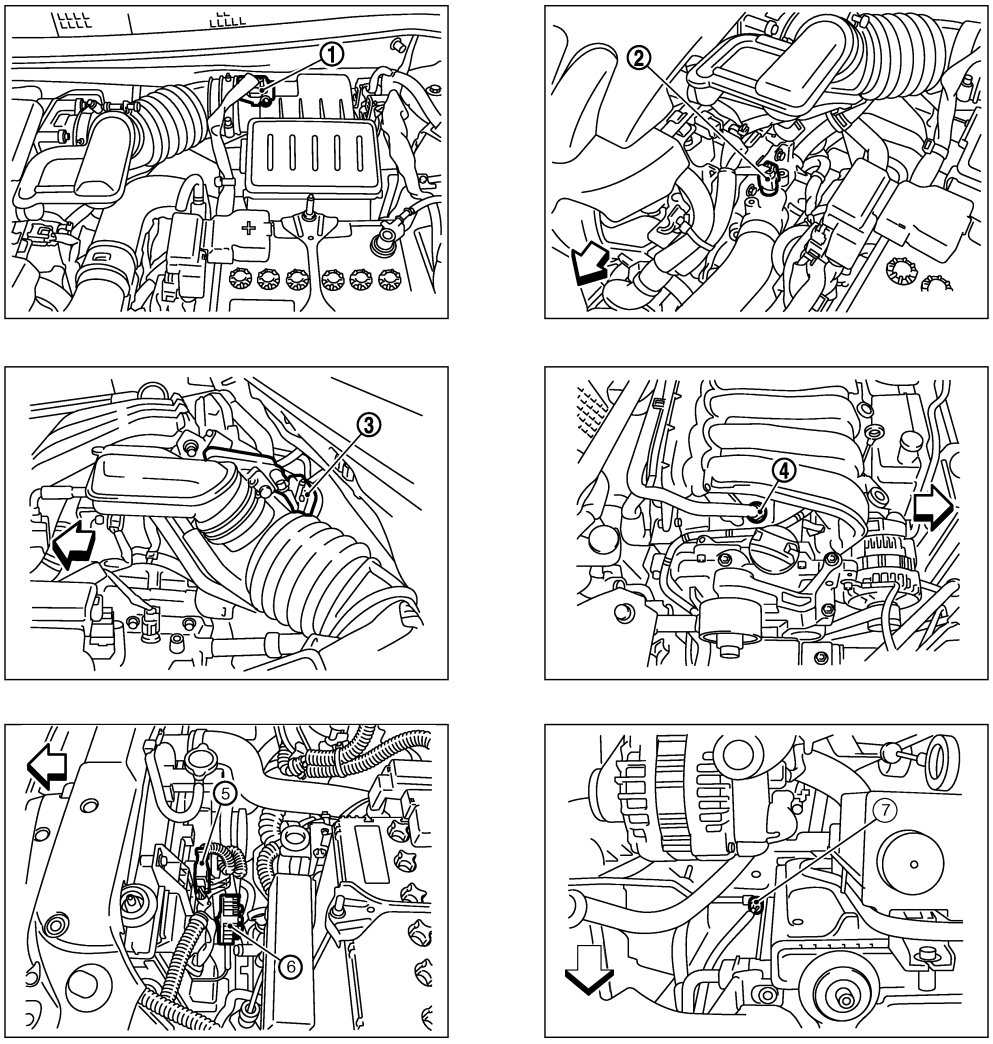
Component Parts Location

INFOID:0000000001603910



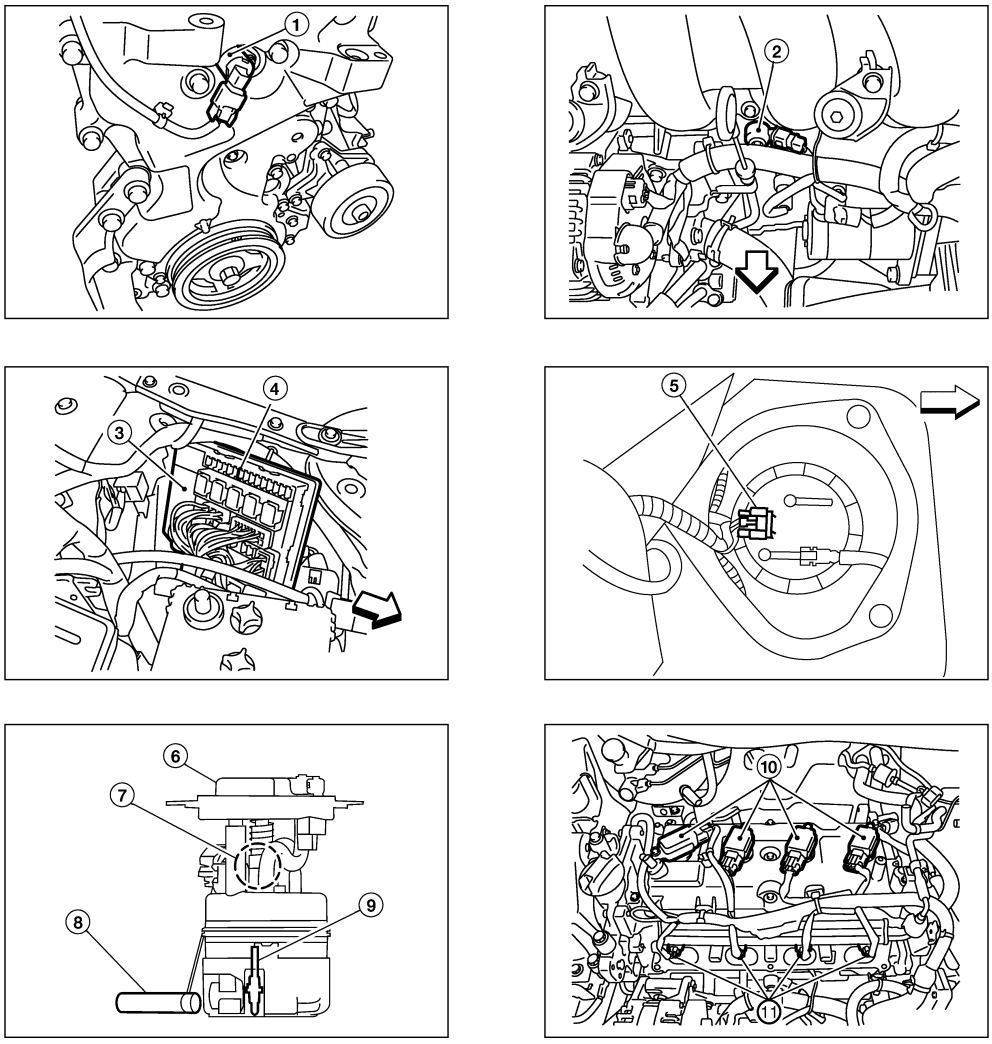
PBIB3261E

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



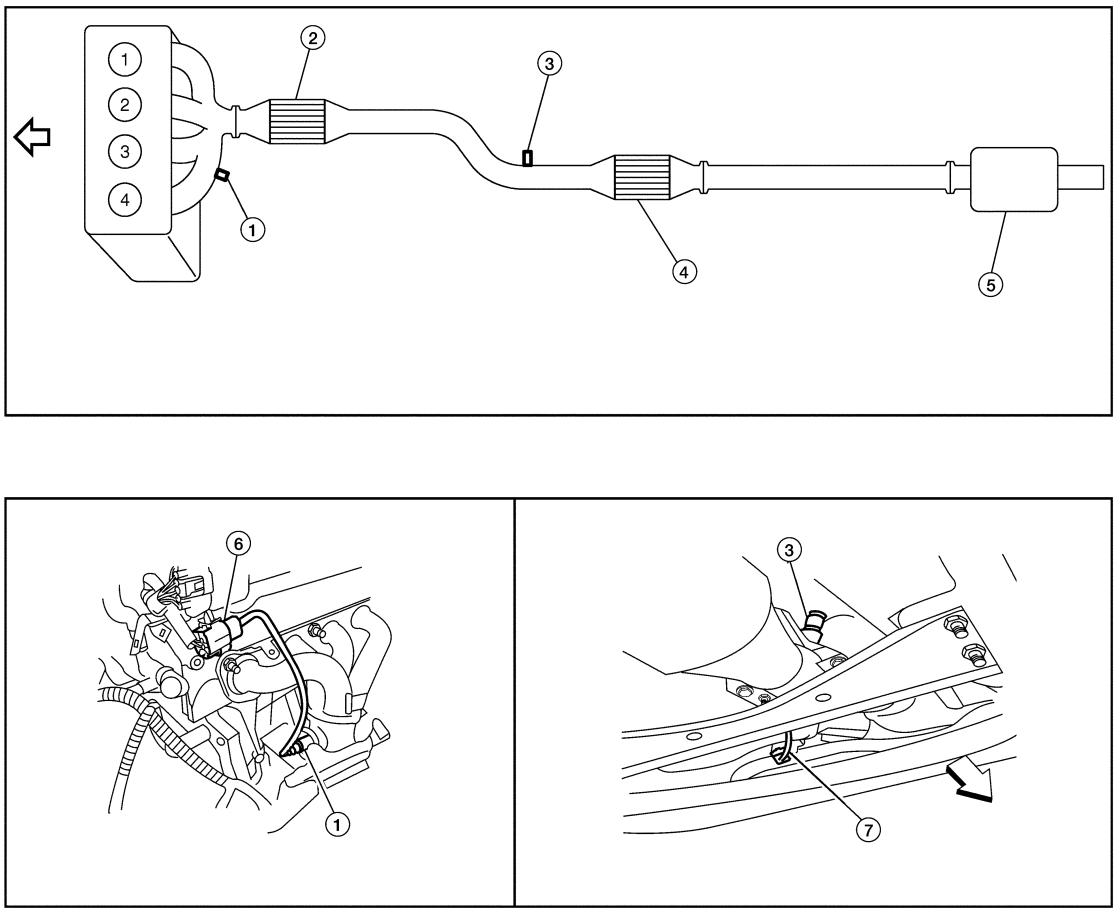
BBIA0724E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator (with built in throttle position sensor, throttle control motor)
4. PCV valve
5. Cooling fan motor
6. Resistor
7. Refrigerant pressure sensor



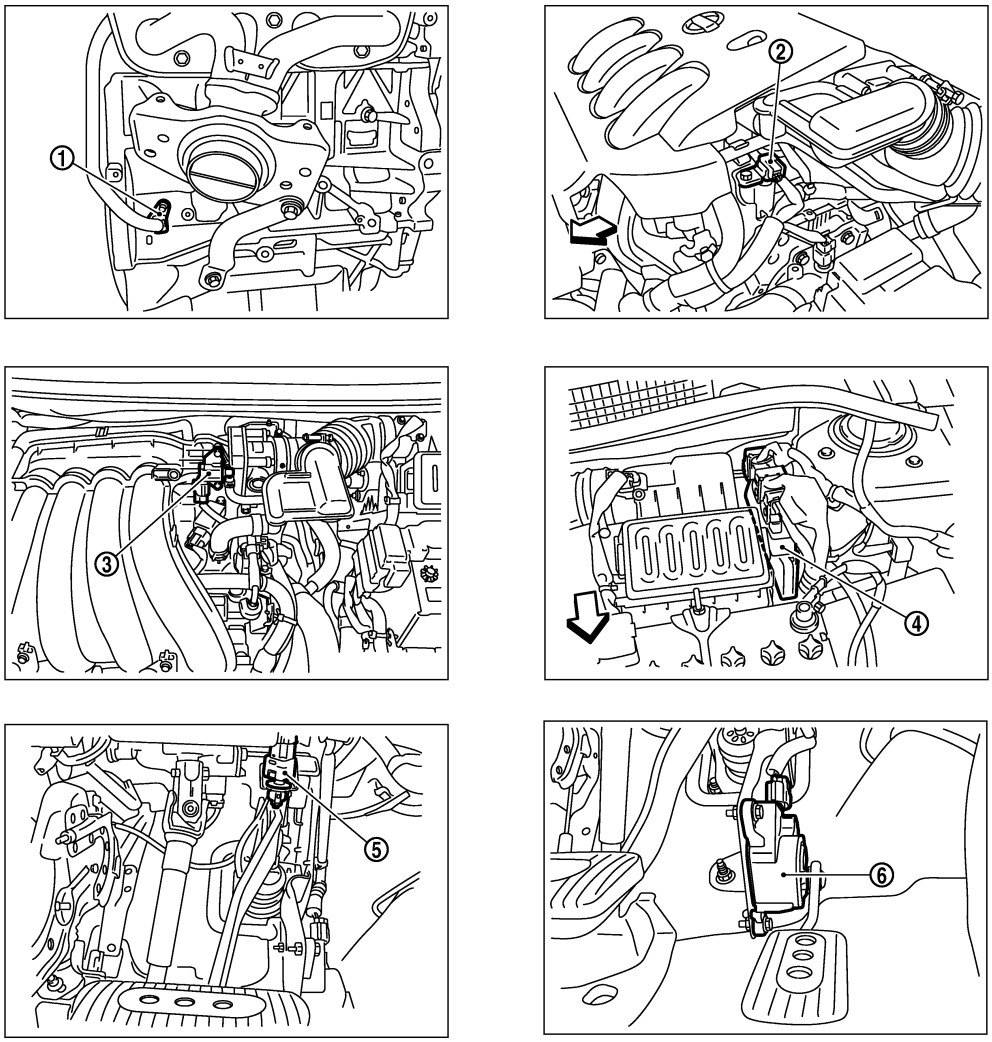
BBIA0735E

1. Intake valve timing control solenoid valve
2. Knock sensor
3. IPDM E/R
4. Fuel pump fuse
5. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
6. Fuel level sensor unit and fuel pump
7. Fuel pressure regulator
8. Fuel level sensor
9. Fuel tank temperature sensor
10. Ignition coil
11. Fuel injector



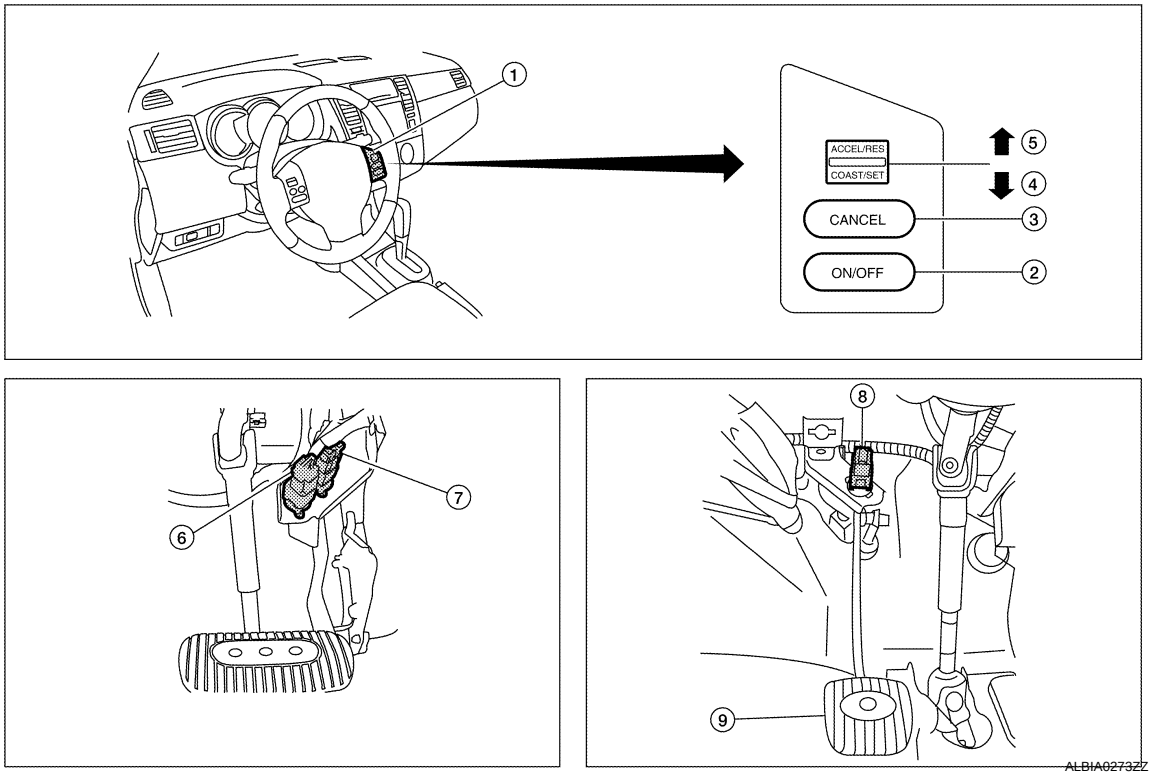
BBIA0733E

1. Heated oxygen sensor 1
2. Three way catalyst (Manifold)
3. Heated oxygen sensor 2
4. Three way catalyst (Under floor)
5. Muffler
6. Heated oxygen sensor 1 harness connector
7. Heated oxygen sensor 2 harness connector



PBIA9902J

1. Crankshaft position sensor (POS)
2. Comshaft position sensor (PHASE)
3. EVAP canistor purge volume control solenoid valve
4. ECM
5. Stop lamp switch
6. Accelerator pedal position sensor



1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELEATE switch
6. Stop lamp switch
7. ASCD brake switch
8. ASCD clutch switch
9. Cluch pedal

Component Description

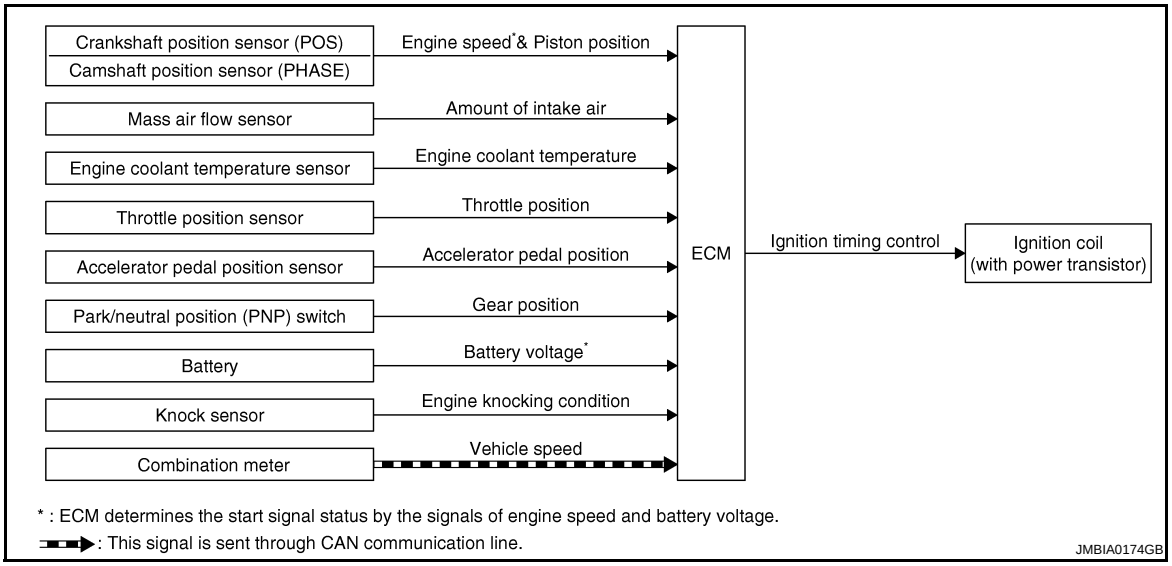
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Component	Reference
Accelerator pedal position sensor	EC-959, "Description"
Camshaft position sensor (PHASE)	EC-866, "Description"
Crankshaft position sensor (POS)	EC-862, "Description"
Engine coolant temperature sensor	EC-807, "Description"
Fuel injector	EC-975, "Description"
Heated oxygen sensor 1	EC-813, "Description"
Heated oxygen sensor 2	EC-831, "Description"
Intake air temperature sensor	EC-804, "Description"
Knock sensor	EC-860, "Description"
Mass air flow sensor	EC-799, "Description"
Park/neutral position (PNP) switch	EC-942, "Description"
Throttle position sensor	EC-810, "Description"
Vehicle speed sensor	EC-878, "Description"

ELECTRIC IGNITION SYSTEM

System Diagram

INFOID:0000000001161727



System Description

INFOID:0000000001161728

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 condition		
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.

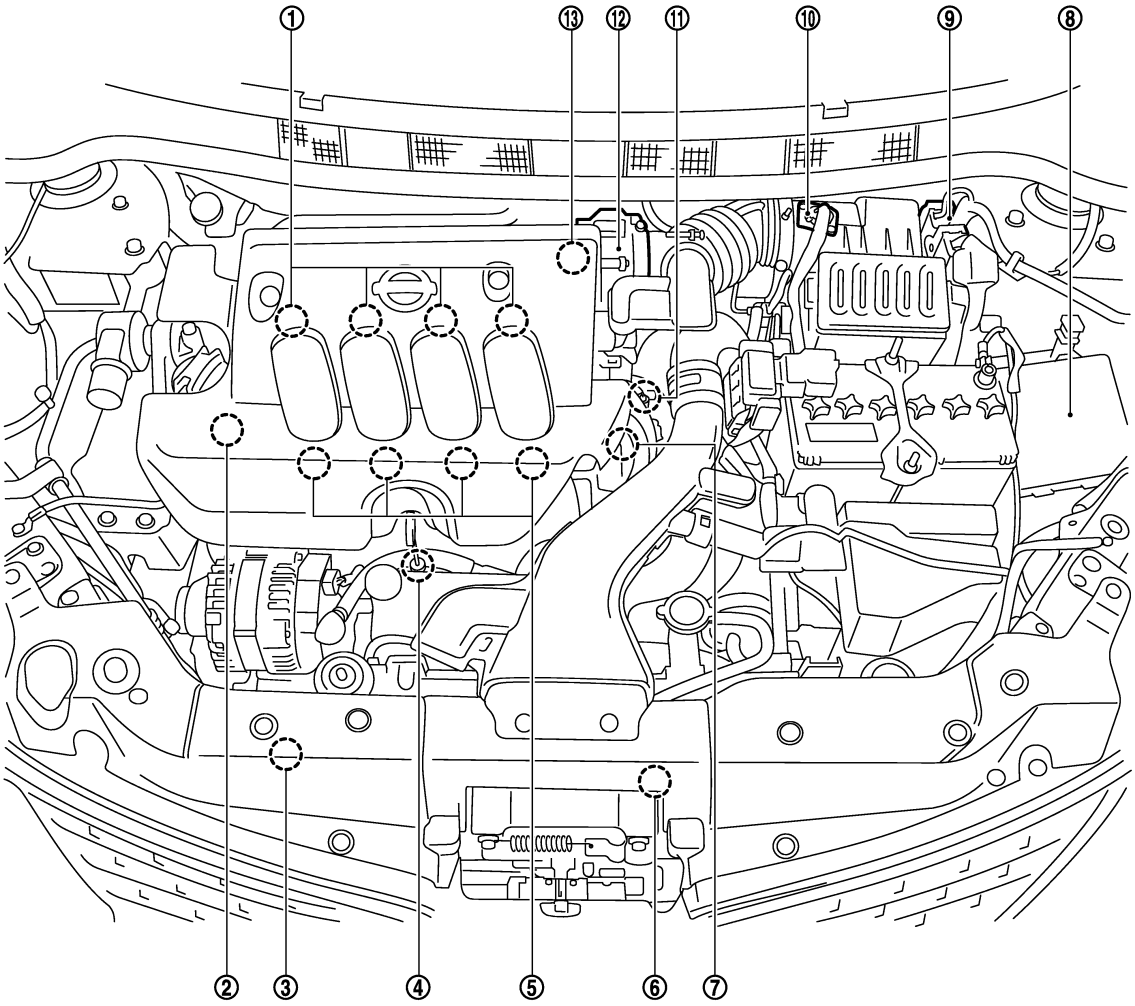
- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

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.

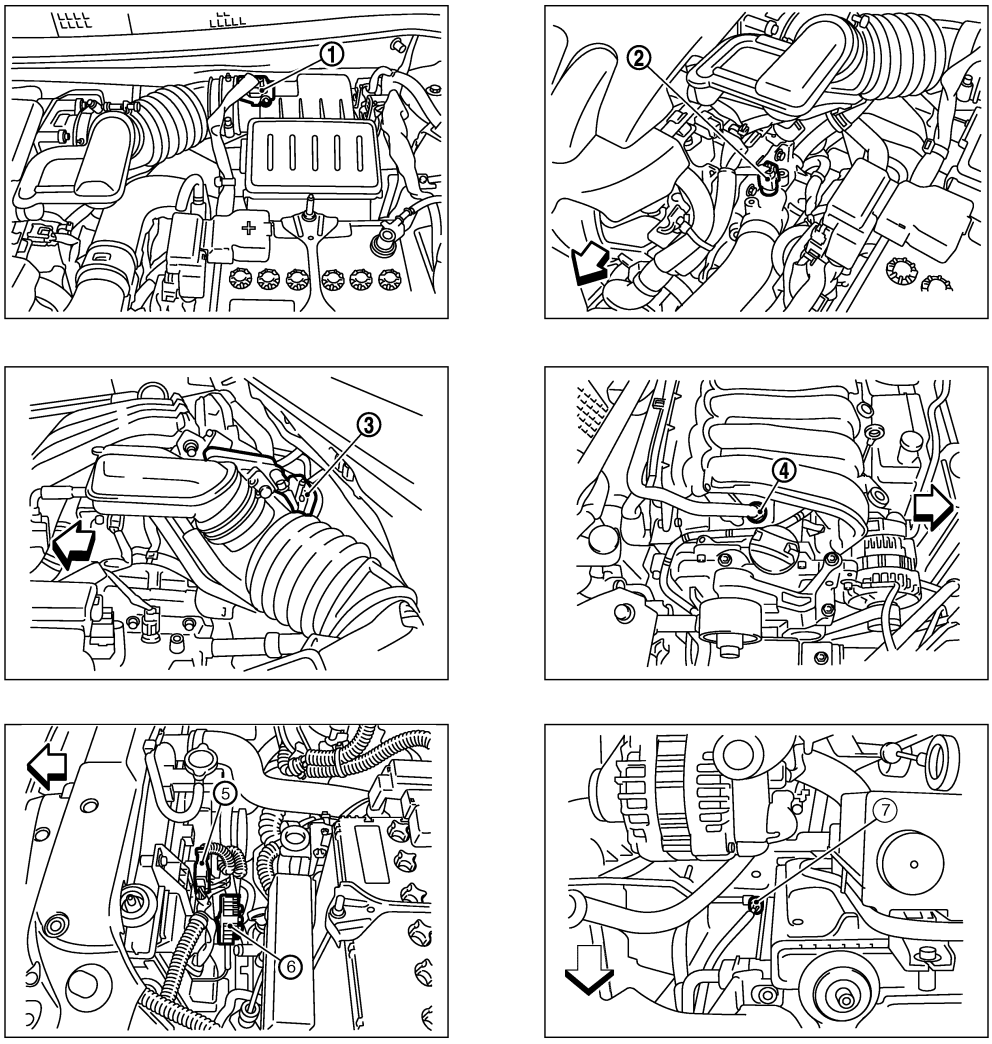
Component Parts Location

INFOID:0000000001603911



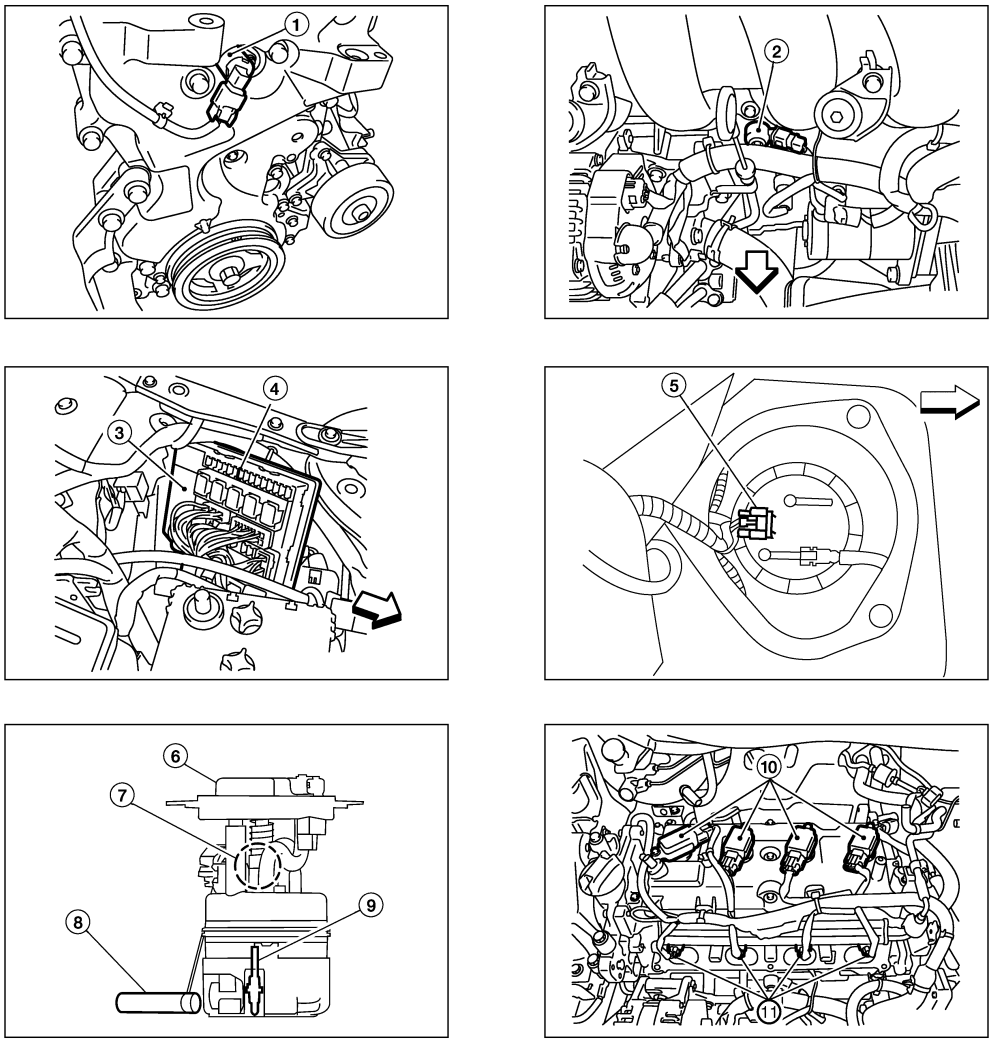
PBIB3261E

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



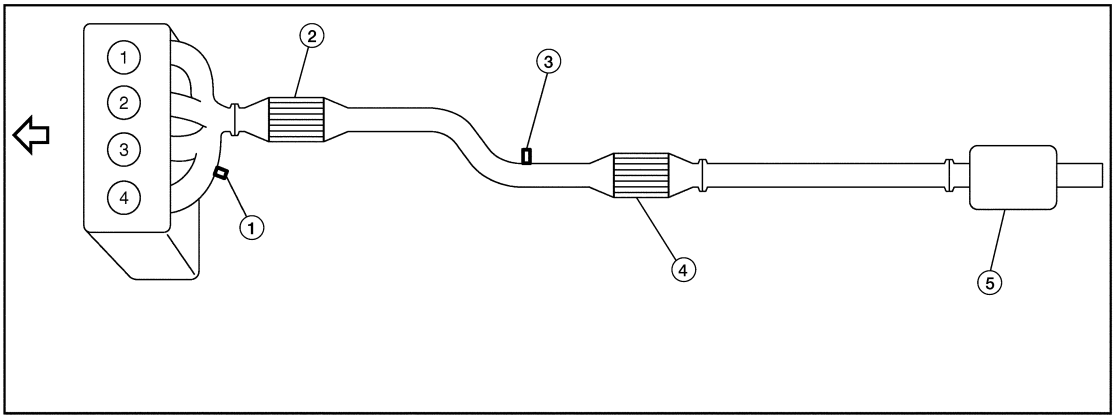
BBIA0724E

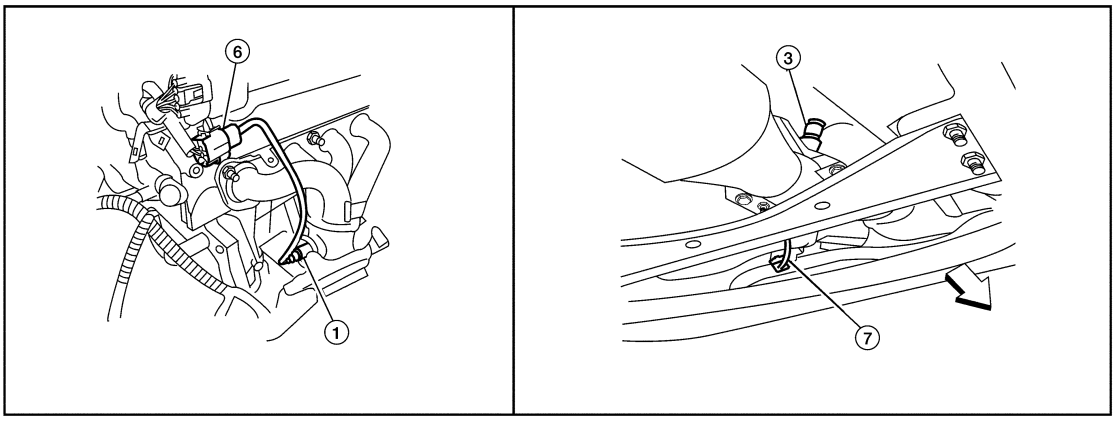
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator (with built in throttle position sensor, throttle control motor)
4. PCV valve
5. Cooling fan motor
6. Resistor
7. Refrigerant pressure sensor



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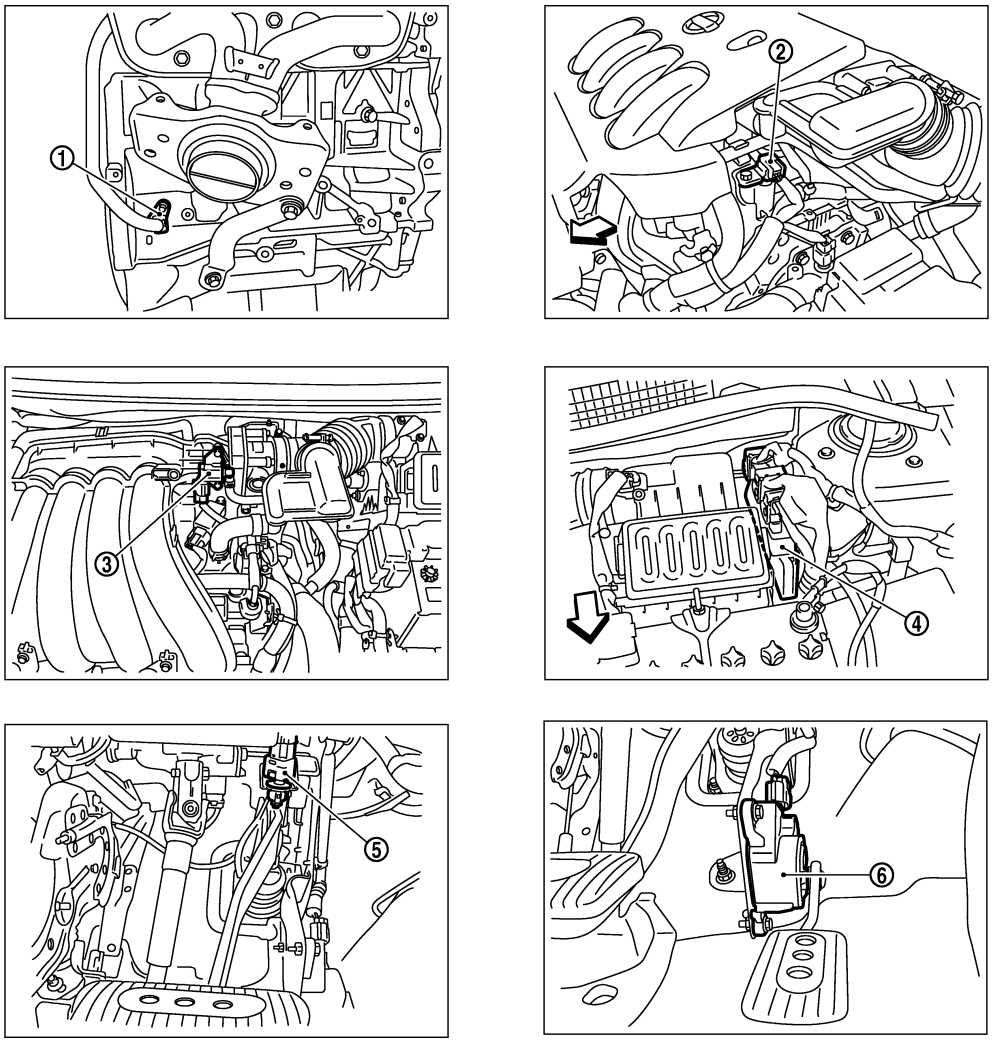
1. Intake valve timing control solenoid valve
2. Knock sensor
3. IPDM E/R
4. Fuel pump fuse
5. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
6. Fuel level sensor unit and fuel pump
7. Fuel pressure regulator
8. Fuel level sensor
9. Fuel tank temperature sensor
10. Ignition coil
11. Fuel injector





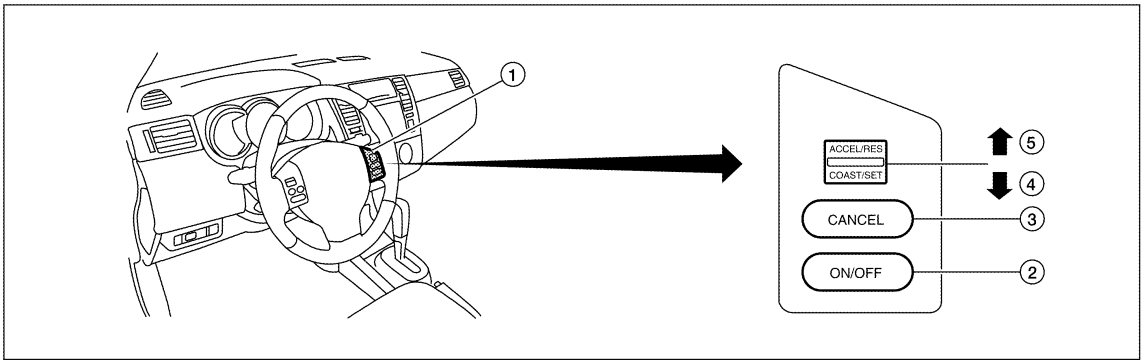
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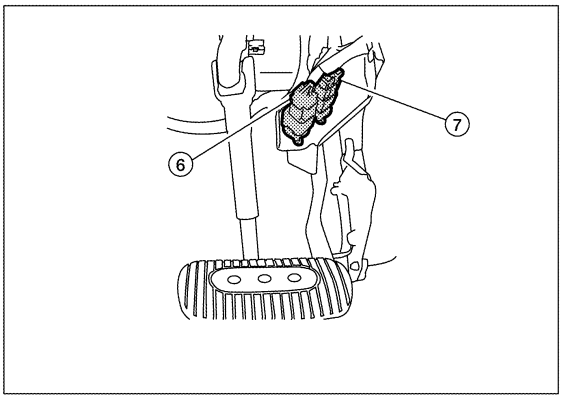
1. Heated oxygen sensor 1
2. Three way catalyst (Manifold)
3. Heated oxygen sensor 2
4. Three way catalyst (Under floor)
5. Muffler
6. Heated oxygen sensor 1 harness connector
7. Heated oxygen sensor 2 harness connector

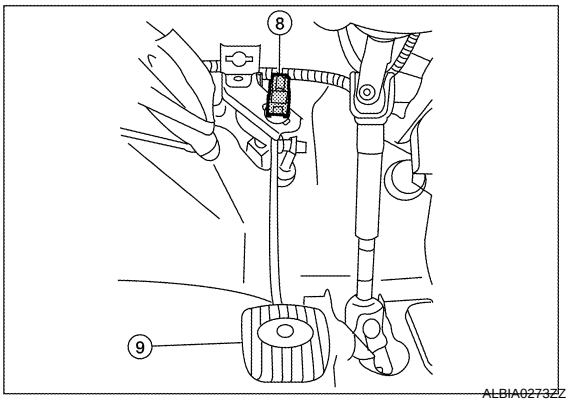


PBIA9902J

1. Crankshaft position sensor (POS)
2. Comshaft position sensor (PHASE)
3. EVAP canistor purge volume control solenoid valve
4. ECM
5. Stop lamp switch
6. Accelerator pedal position sensor







ALBIA0273ZZ

1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELEATE switch
6. Stop lamp switch
7. ASCD brake switch
8. ASCD clutch switch
9. Cluch pedal

Component Description

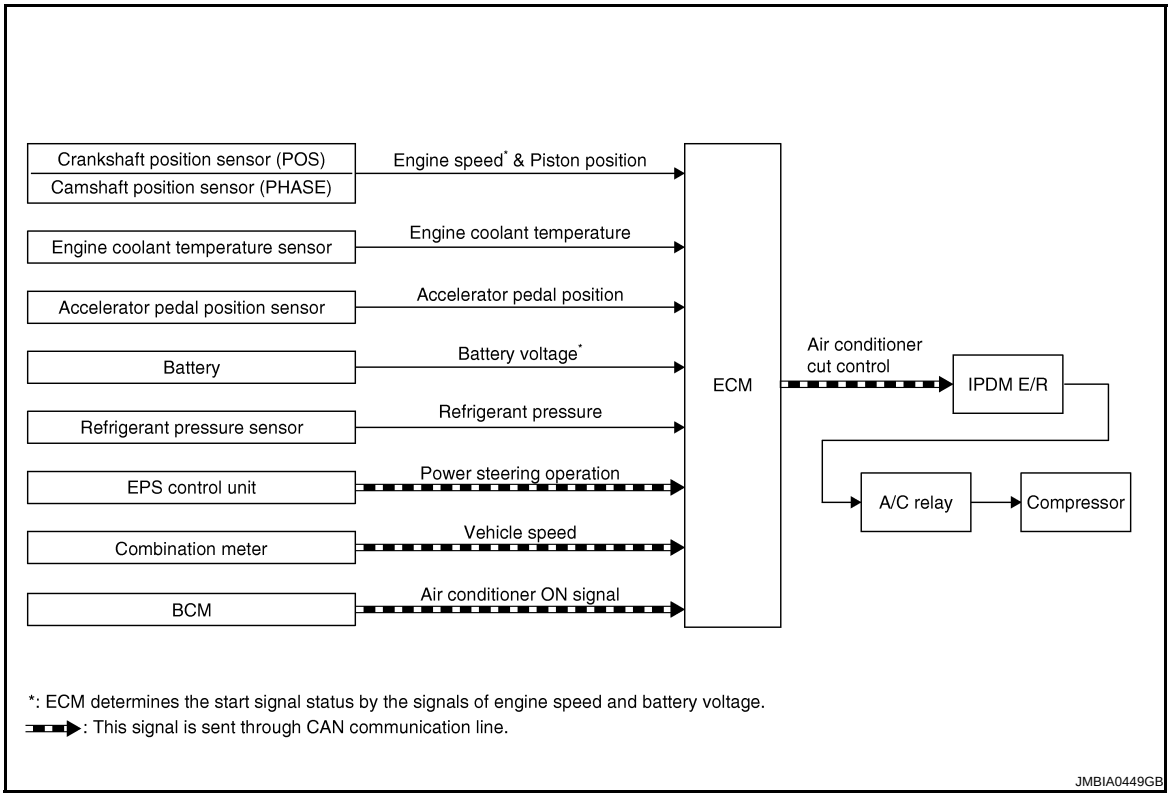
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Component	Reference
Accelerator pedal position sensor	EC-959, "Description"
Camshaft position sensor (PHASE)	EC-866, "Description"
Crankshaft position sensor (POS)	EC-862, "Description"
Engine coolant temperature sensor	EC-807, "Description"
Ignition signal	EC-981, "Description"
Knock sensor	EC-860, "Description"
Mass air flow sensor	EC-799, "Description"
Park/neutral position (PNP) switch	EC-942, "Description"
Throttle position sensor	EC-810, "Description"
Vehicle speed sensor	EC-878, "Description"

AIR CONDITIONING CUT CONTROL

System Diagram

INFOID:0000000001161731



System Description

INFOID:0000000001161732

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch*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

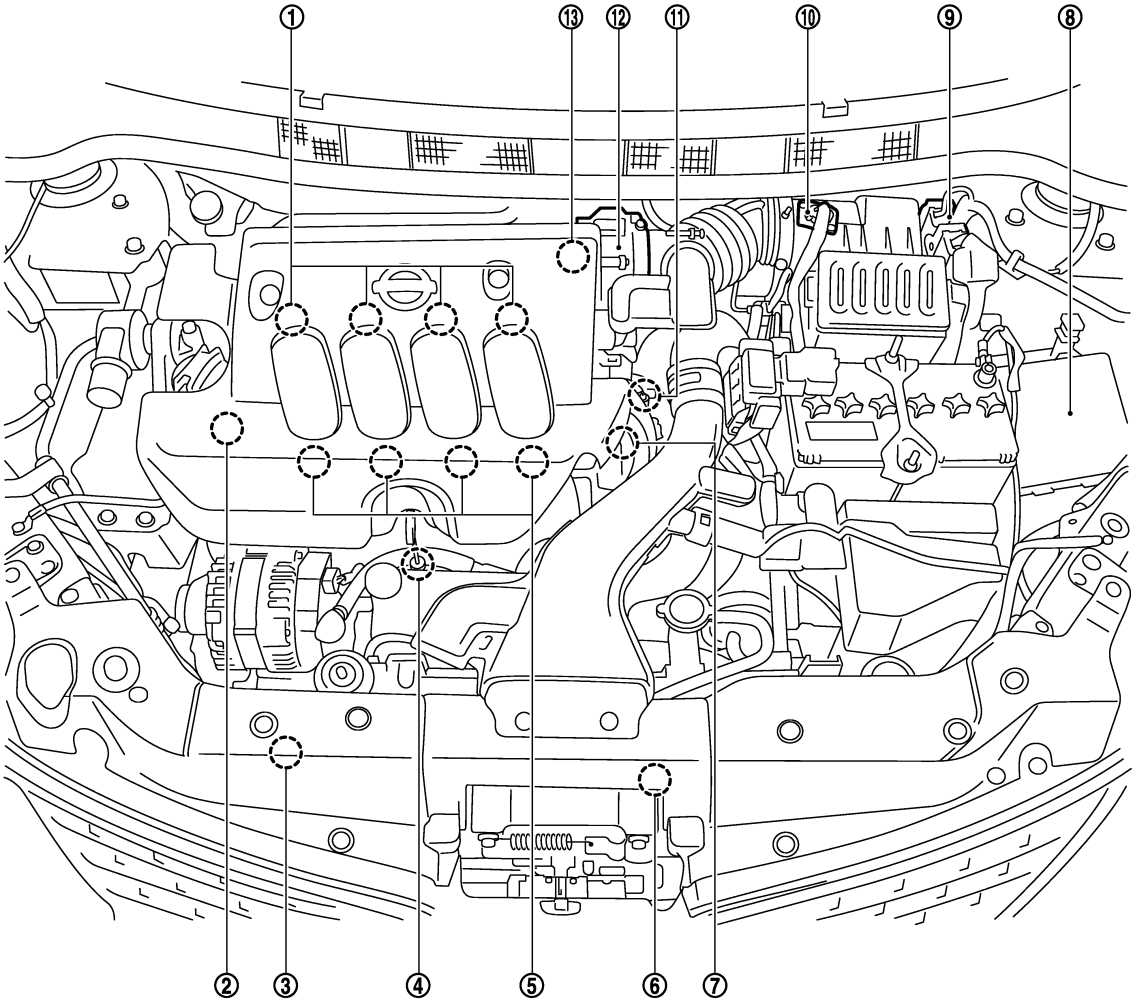
This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

- 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.

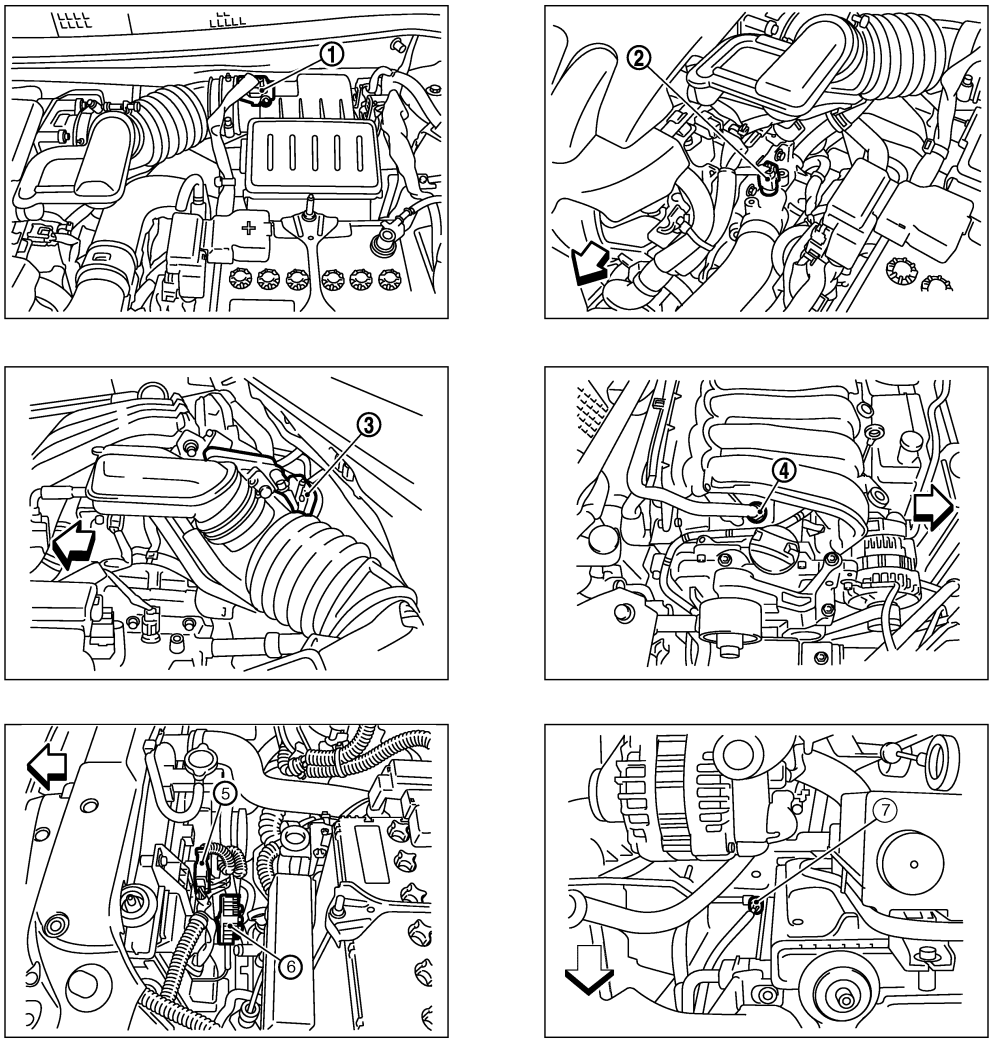
Component Parts Location

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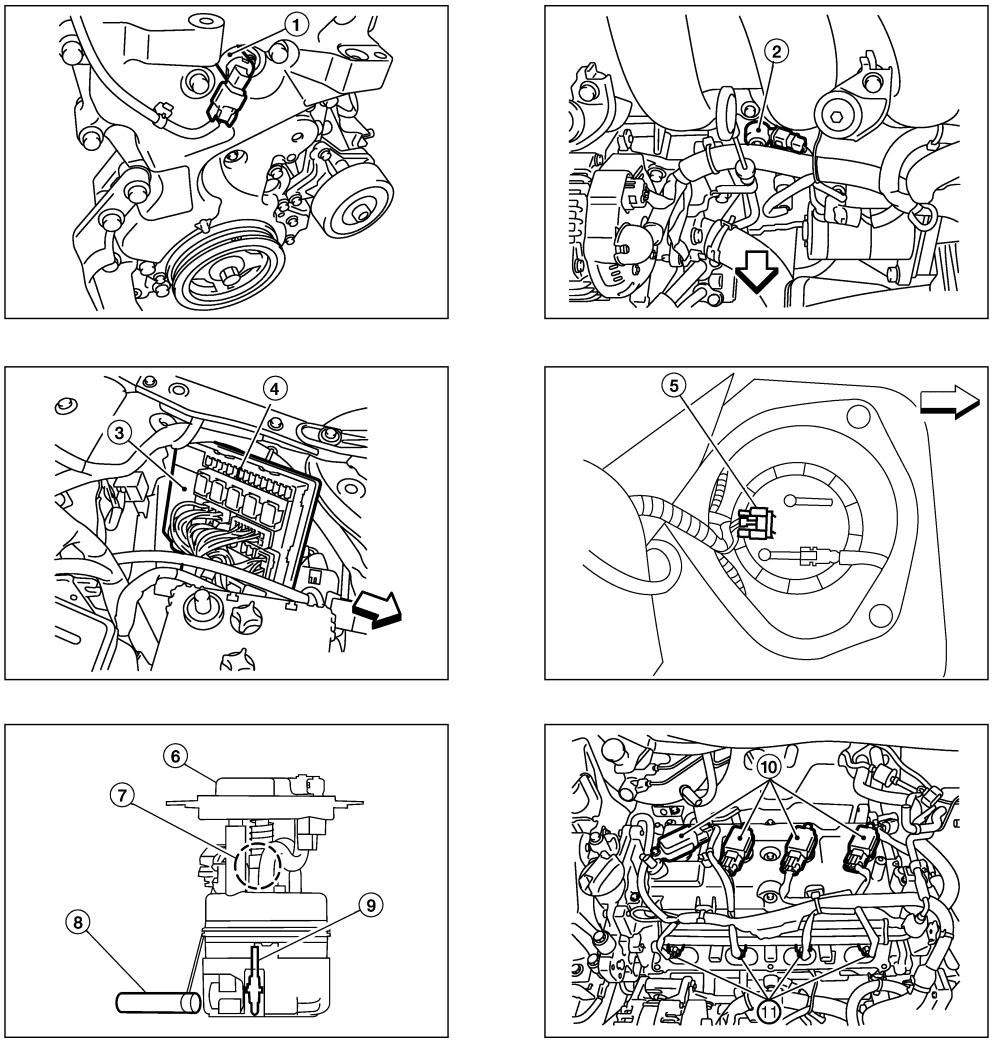
PBIB3261E

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



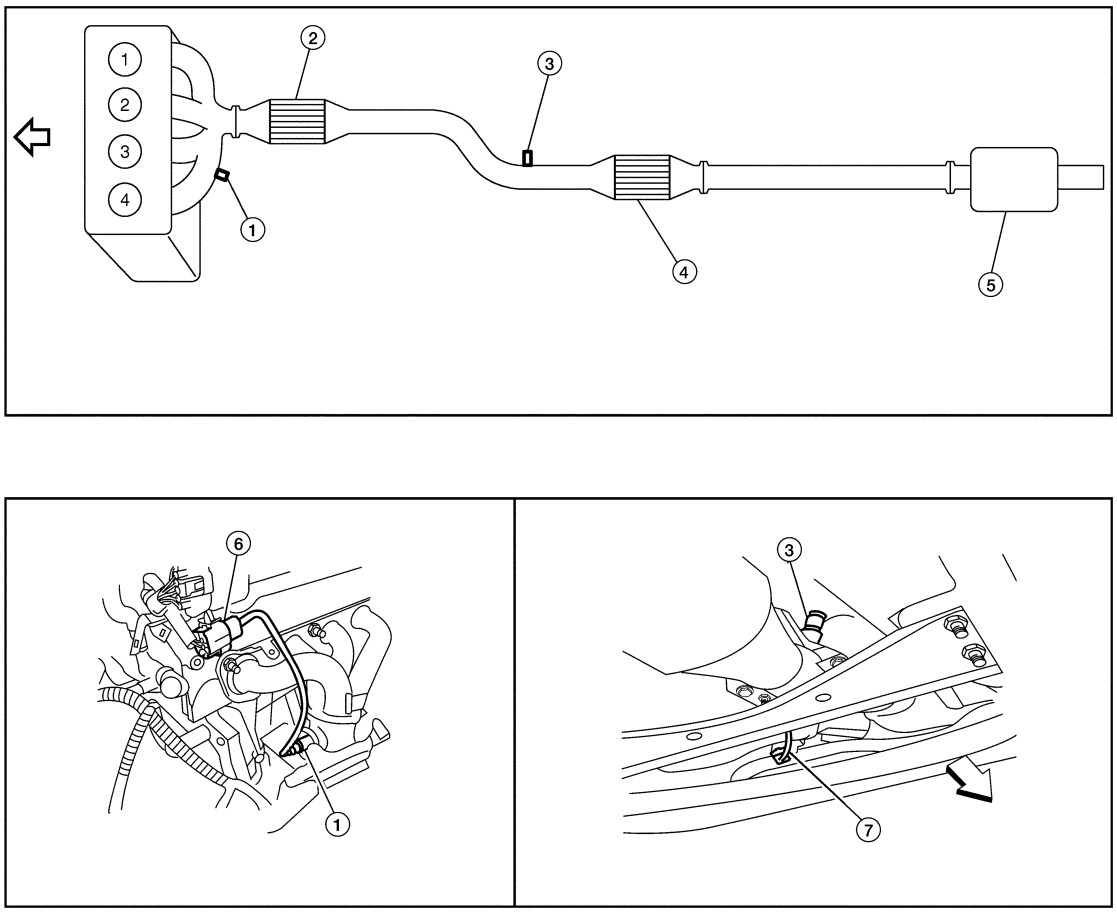
BBIA0724E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator (with built in throttle position sensor, throttle control motor)
4. PCV valve
5. Cooling fan motor
6. Resistor
7. Refrigerant pressure sensor



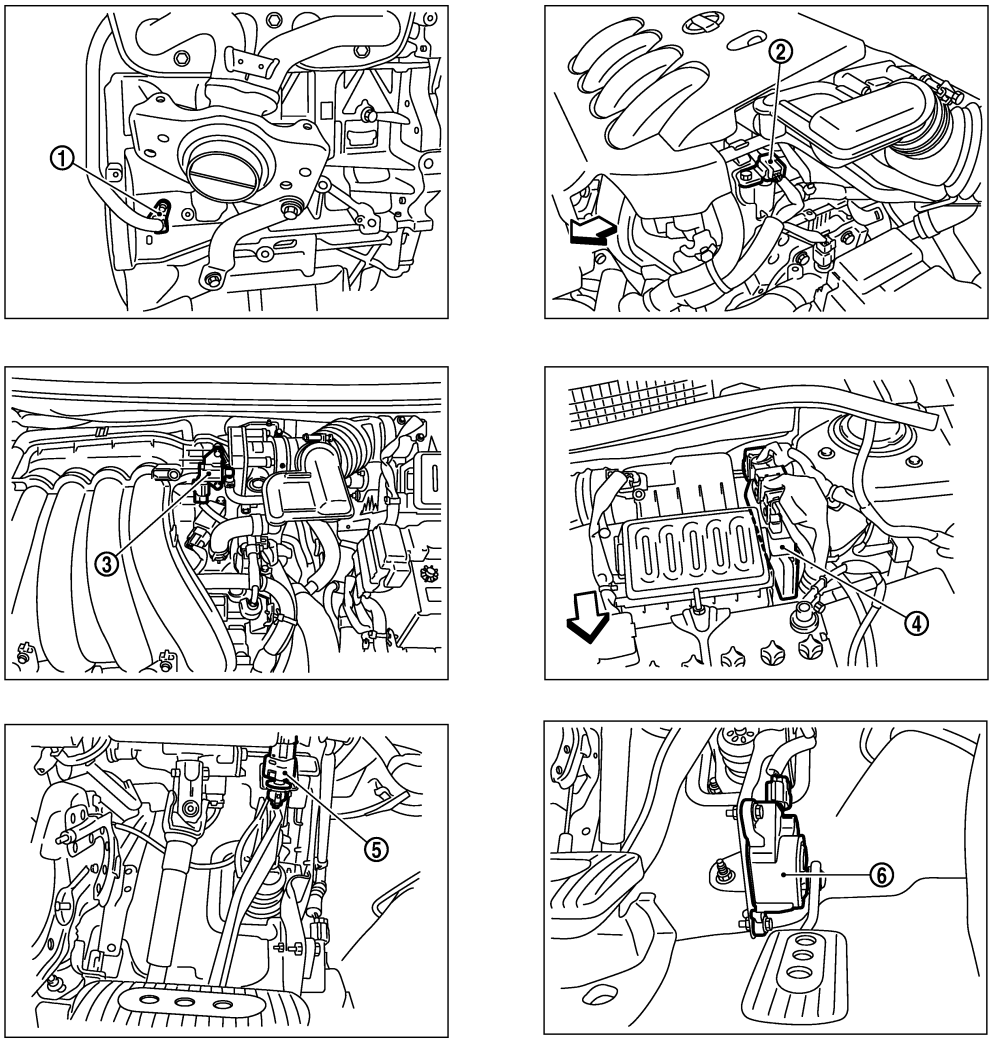
BBIA0735E

1. Intake valve timing control solenoid valve
2. Knock sensor
3. IPDM E/R
4. Fuel pump fuse
5. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
6. Fuel level sensor unit and fuel pump
7. Fuel pressure regulator
8. Fuel level sensor
9. Fuel tank temperature sensor
10. Ignition coil
11. Fuel injector



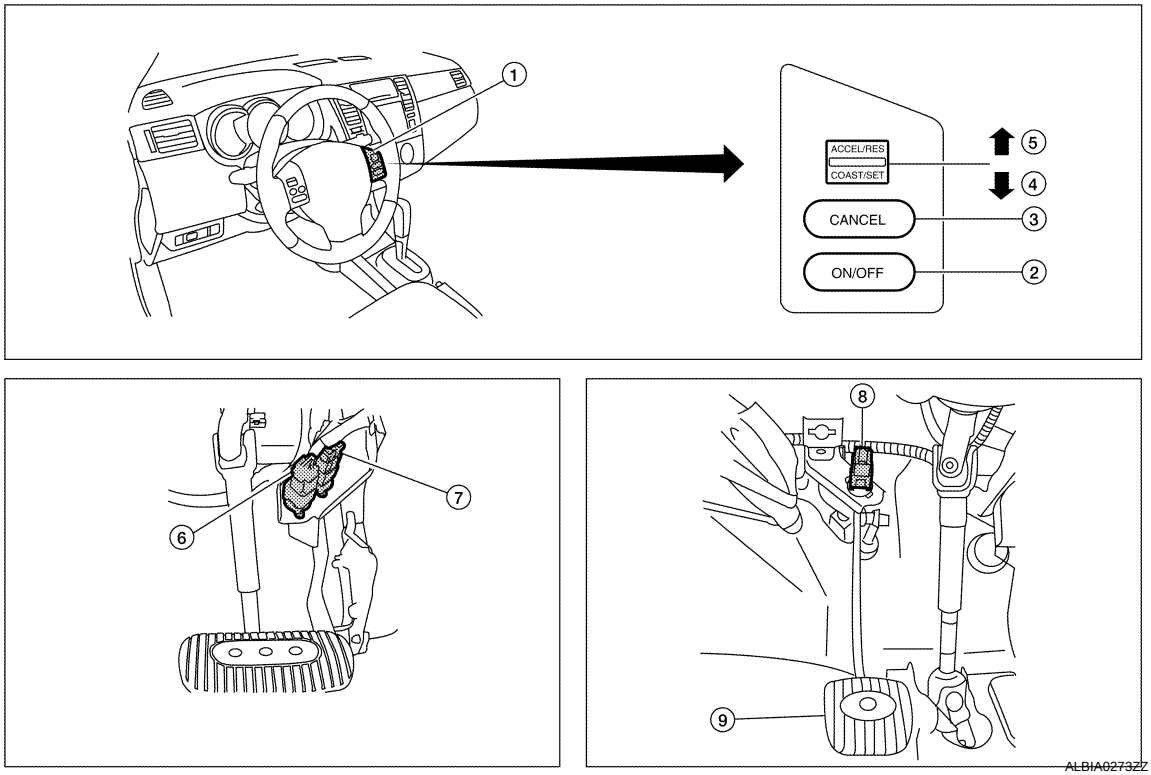
BBIA0733E

1. Heated oxygen sensor 1
2. Three way catalyst (Manifold)
3. Heated oxygen sensor 2
4. Three way catalyst (Under floor)
5. Muffler
6. Heated oxygen sensor 1 harness connector
7. Heated oxygen sensor 2 harness connector



PBIA9902J

1. Crankshaft position sensor (POS)
2. Comshaft position sensor (PHASE)
3. EVAP canistor purge volume control solenoid valve
4. ECM
5. Stop lamp switch
6. Accelerator pedal position sensor



1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELEATE switch
6. Stop lamp switch
7. ASCD brake switch
8. ASCD clutch switch
9. Cluch pedal

Component Description

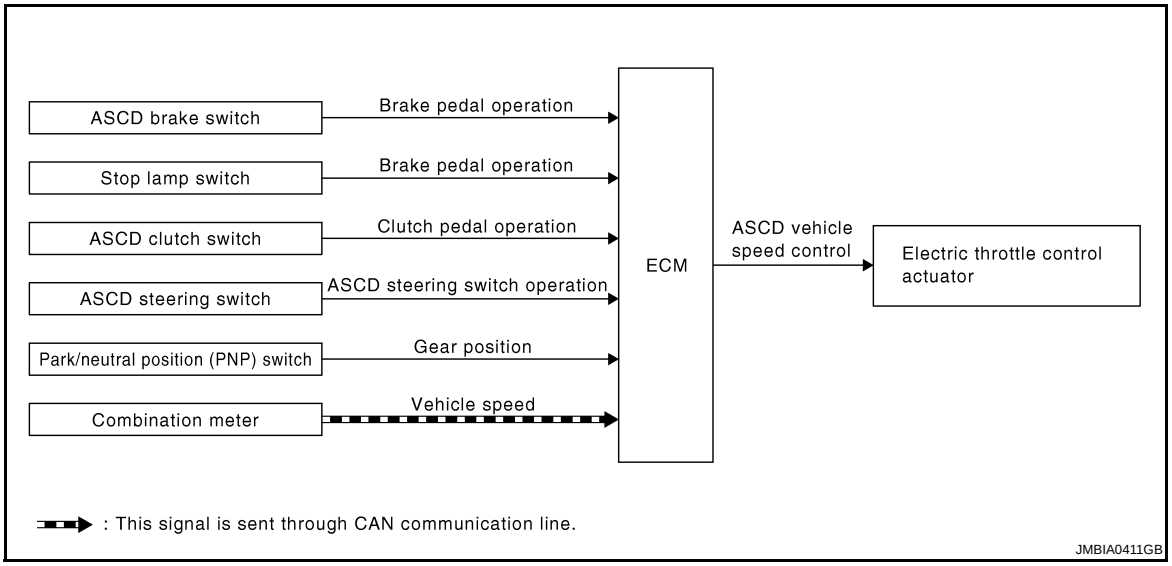
INFOID:0000000001161734

Component	Reference
Accelerator pedal position sensor	EC-948, "Description"
Camshaft position sensor (PHASE)	EC-866, "Description"
Crankshaft position sensor (POS)	EC-862, "Description"
Engine coolant temperature sensor	EC-807, "Description"
Refrigerant pressure sensor	EC-988, "Description"
Vehicle speed sensor	EC-878, "Description"

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram

INFOID:0000000001161735



System Description

INFOID:0000000001161736

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			
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		

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

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH).
ECM controls throttle angle of electric throttle control actuator to regulate engine speed.
Operation status of ASCD is indicated by CRUISE lamp and SET lamp 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 180 km/h (112 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.
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated

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

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

If MAIN switch is turned to OFF 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.

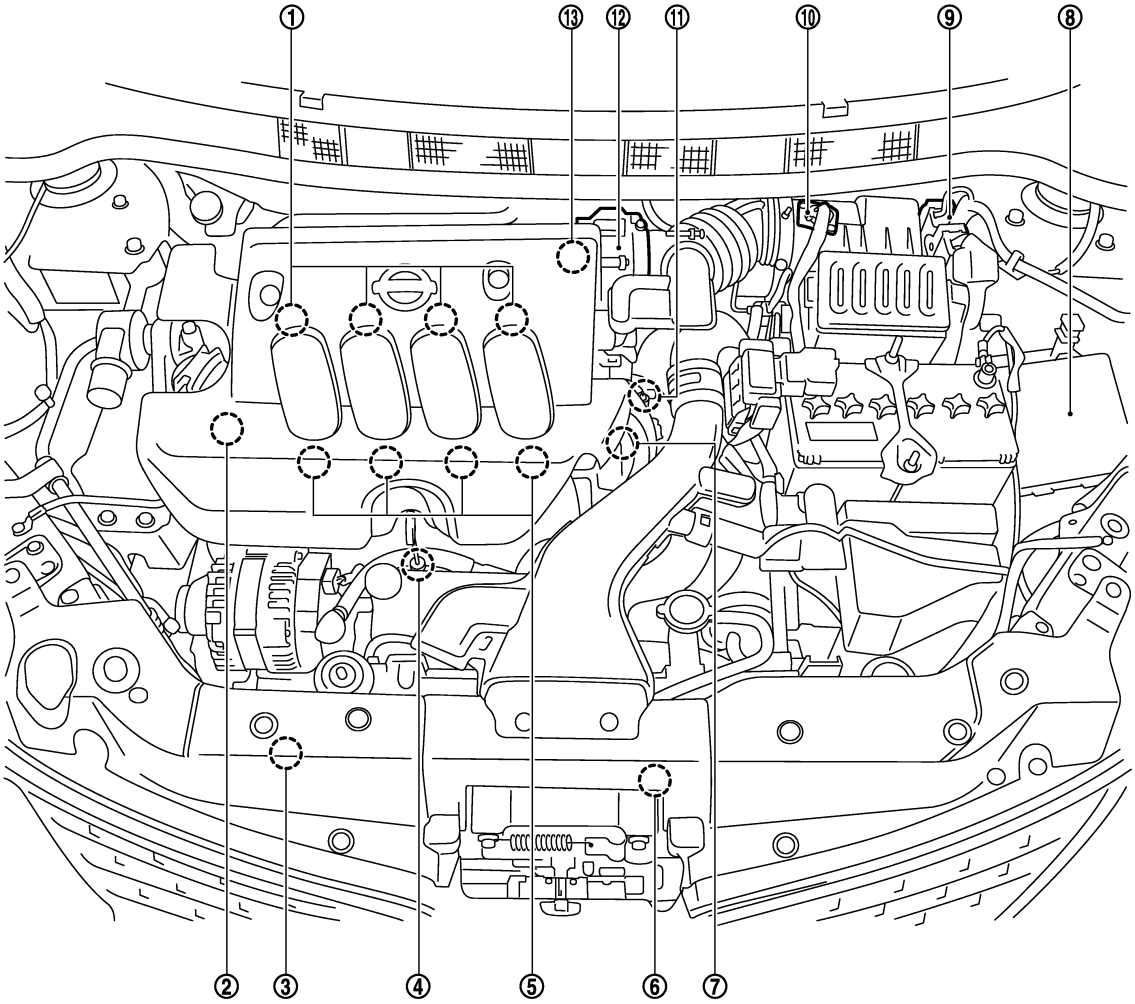
RESUME OPERATION

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
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 180 km/h (112 MPH)

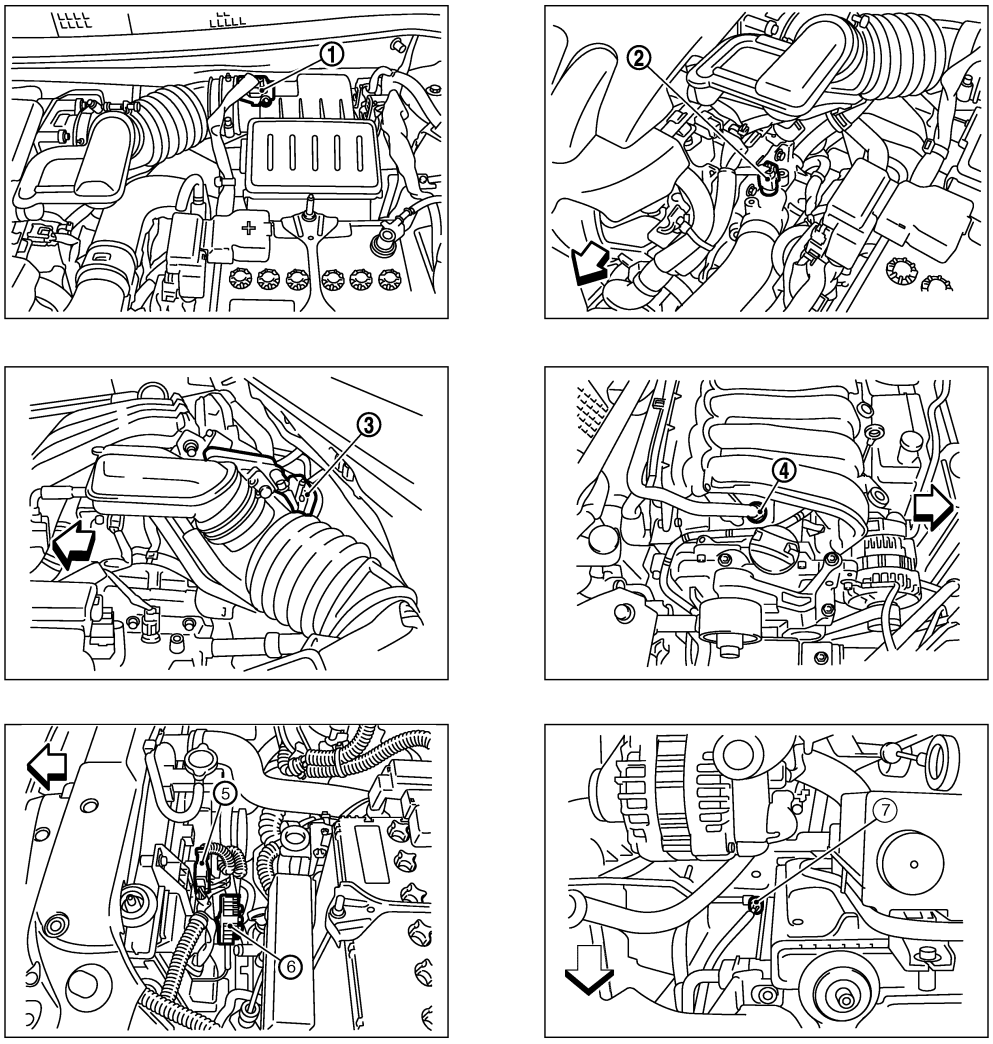
Component Parts Location

INFOID:0000000001603913



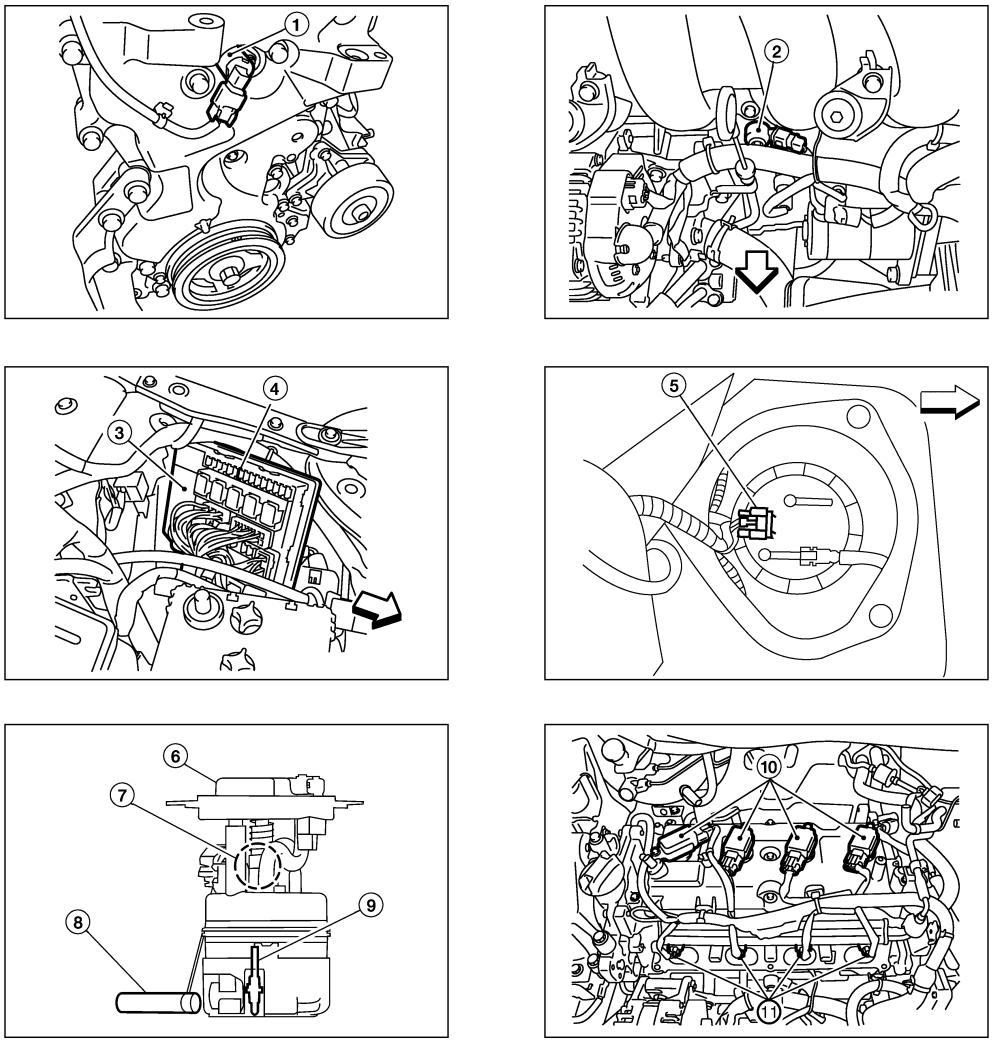
PBIB3261E

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



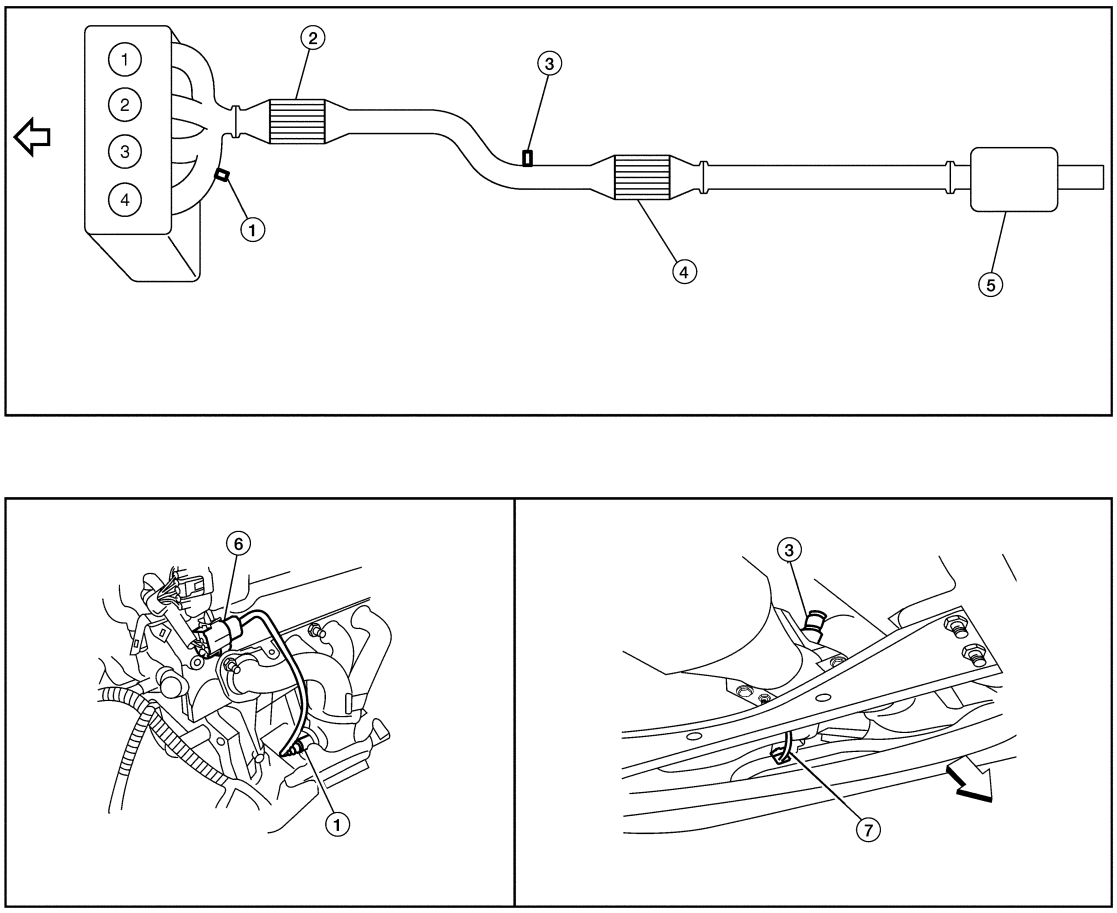
BBIA0724E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator (with built in throttle position sensor, throttle control motor)
4. PCV valve
5. Cooling fan motor
6. Resistor
7. Refrigerant pressure sensor



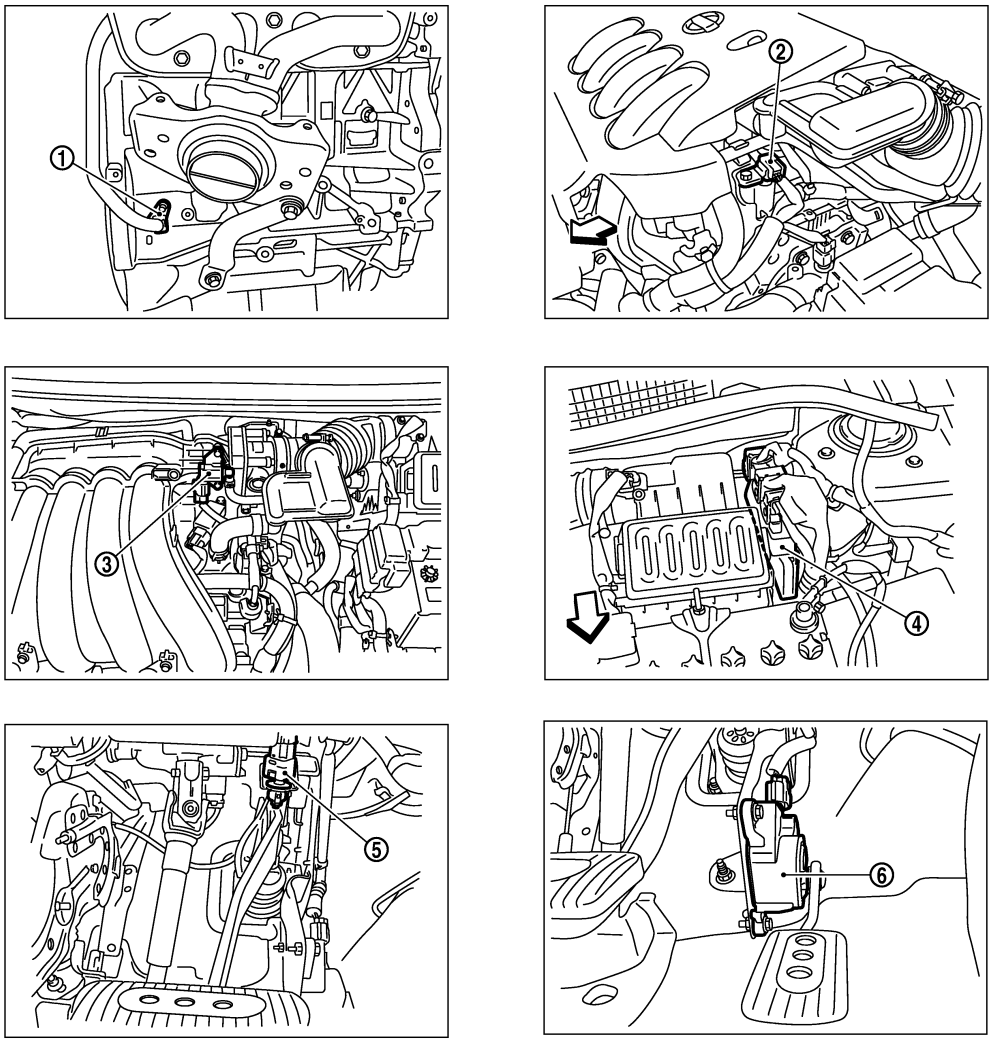
BBIA0735E

1. Intake valve timing control solenoid valve
2. Knock sensor
3. IPDM E/R
4. Fuel pump fuse
5. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
6. Fuel level sensor unit and fuel pump
7. Fuel pressure regulator
8. Fuel level sensor
9. Fuel tank temperature sensor
10. Ignition coil
11. Fuel injector



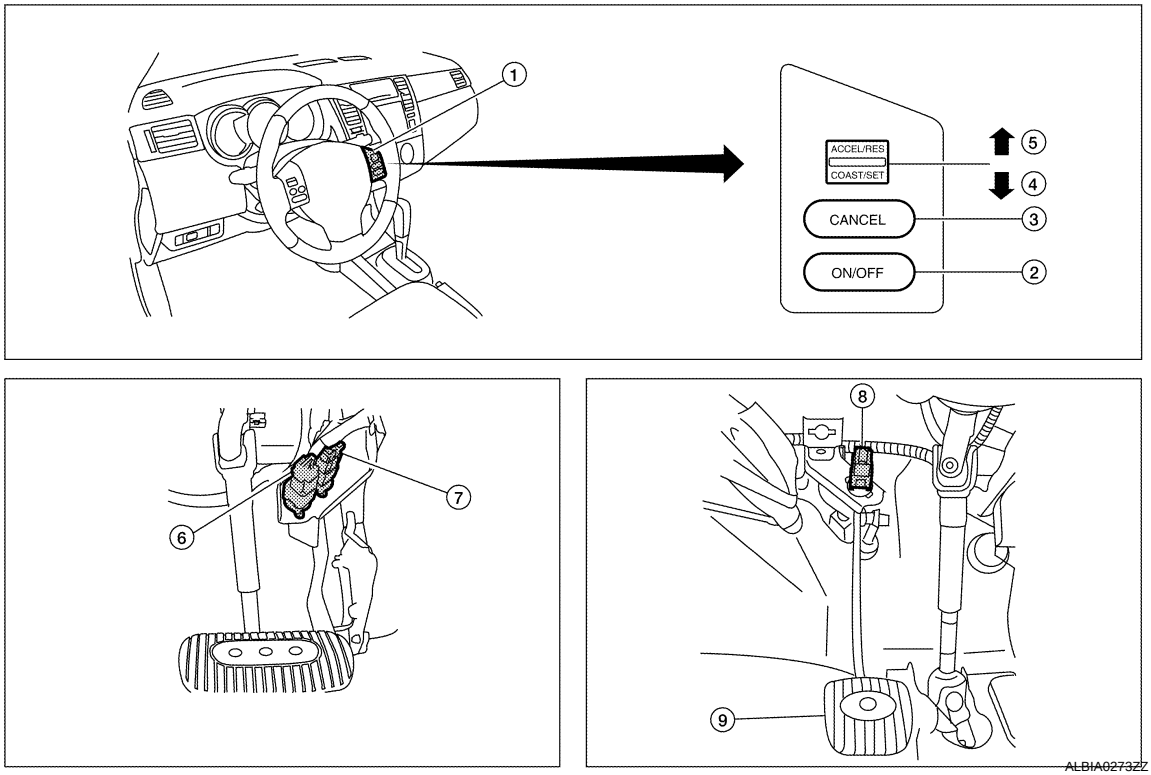
BBIA0733E

1. Heated oxygen sensor 1
2. Three way catalyst (Manifold)
3. Heated oxygen sensor 2
4. Three way catalyst (Under floor)
5. Muffler
6. Heated oxygen sensor 1 harness connector
7. Heated oxygen sensor 2 harness connector



PBIA9902J

1. Crankshaft position sensor (POS)
2. Comshaft position sensor (PHASE)
3. EVAP canistor purge volume control solenoid valve
4. ECM
5. Stop lamp switch
6. Accelerator pedal position sensor



1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELEATE switch
6. Stop lamp switch
7. ASCD brake switch
8. ASCD clutch switch
9. Cluch pedal

Component Description

INFOID:0000000001161738

Component	Reference
ASCD steering switch	EC-930, "Description"
ASCD clutch switch	EC-933, "Description"
ASCD brake switch	EC-933, "Description"
ASCD indicator	EC-968, "Description"
Stop lamp switch	EC-945, "Description"
Electric throttle control actuator	EC-885, "Description"

CAN COMMUNICATION

System Description

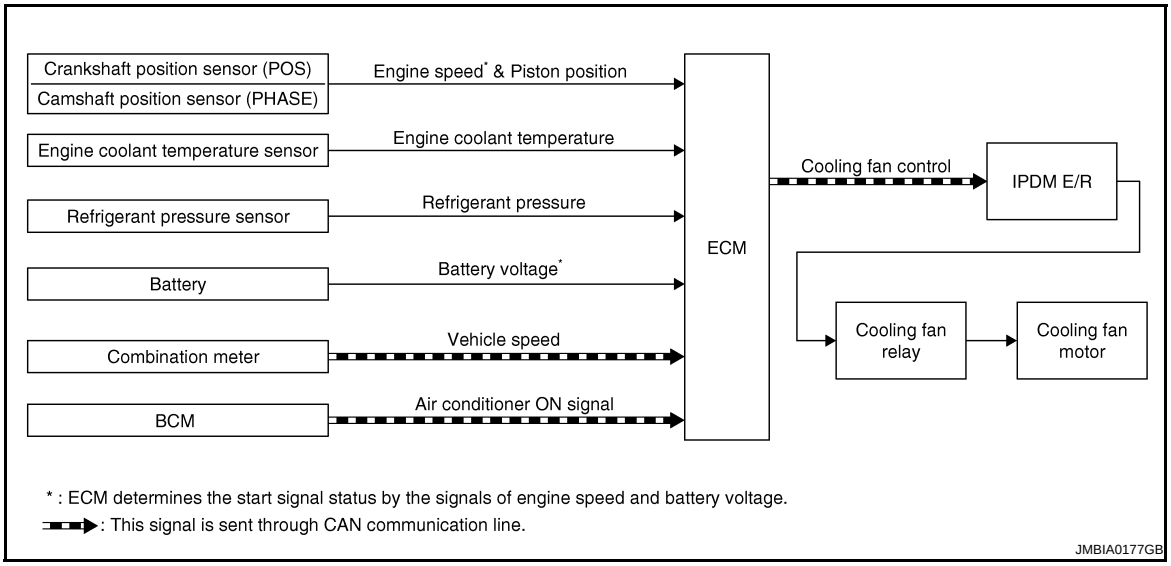
INFOID:0000000001161739

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-14, "CAN Communication Control Circuit", about CAN communication for detail..

COOLING FAN CONTROL

System Diagram

INFOID:0000000001161740



System Description

INFOID:0000000001161741

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.

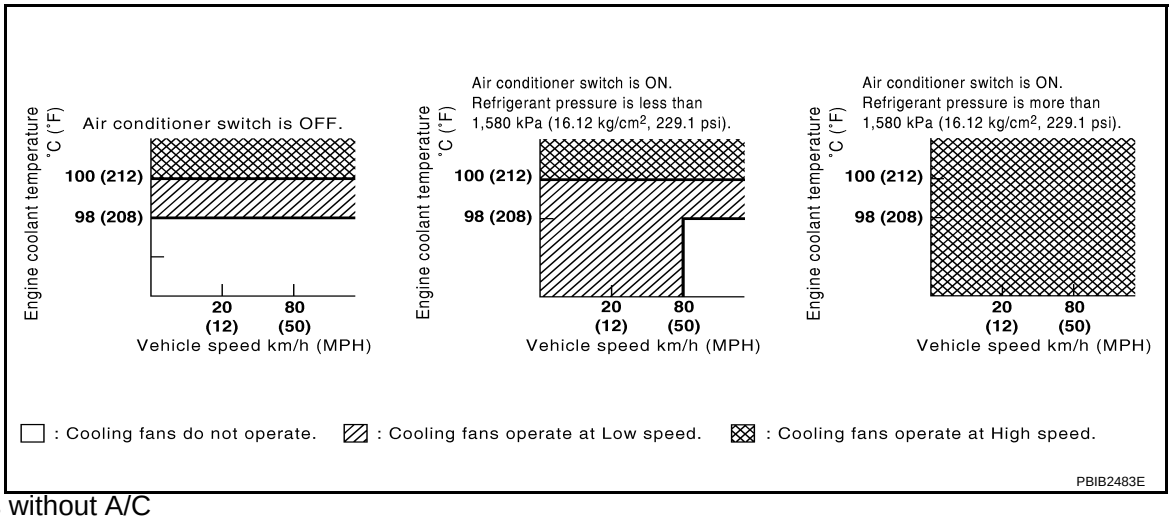
*2: This signal is sent to ECM through CAN communication line.

SYSTEM DESCRIPTION

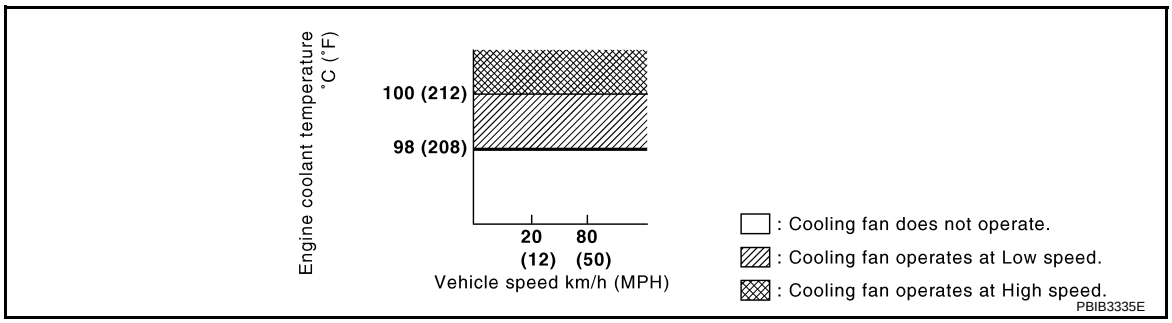
ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pressure, air conditioner ON signal. Then control system has 3-step control [HIGH/LOW/OFF].

Cooling Fan Operation

Models with A/C



Models without A/C



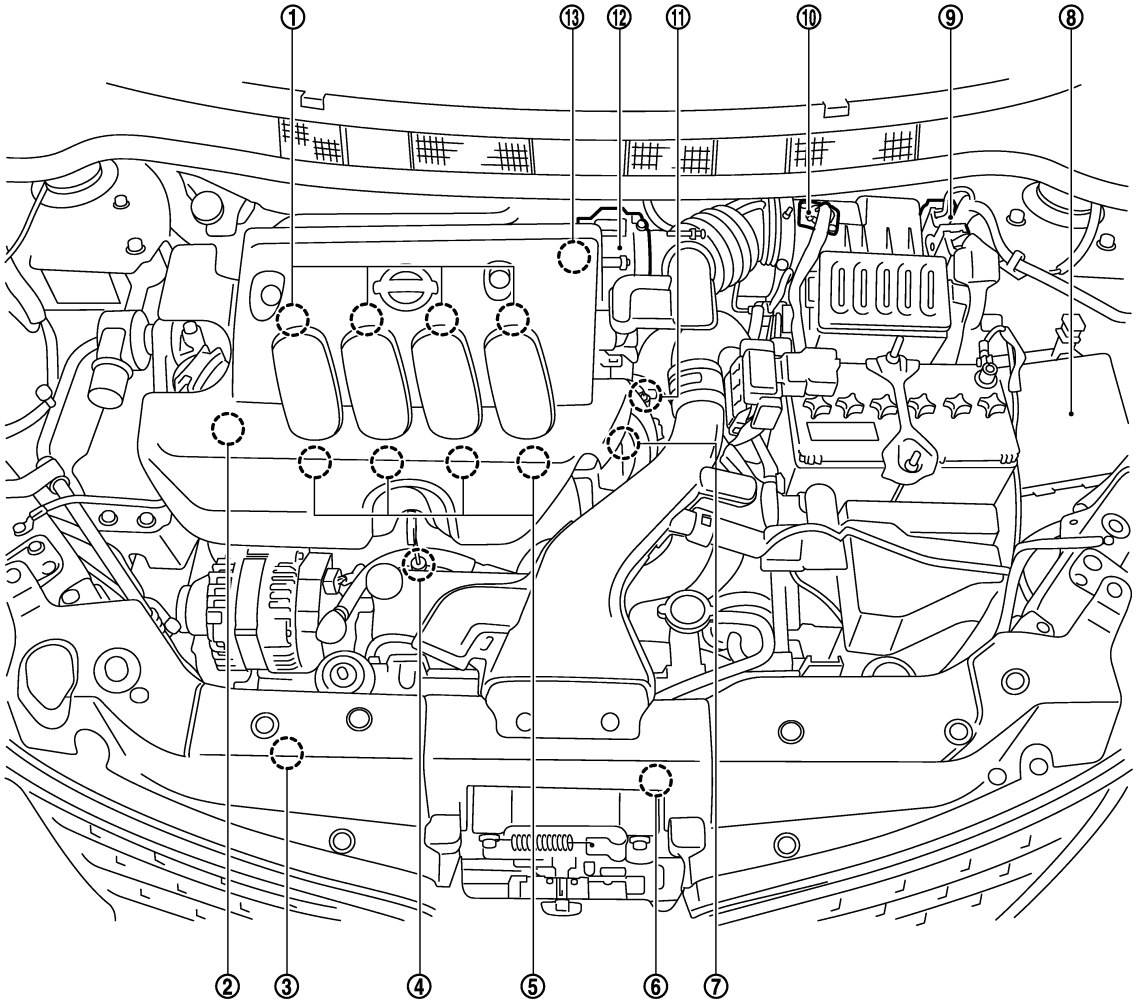
Cooling Fan Relay Operation

The ECM controls cooling fan relays through CAN communication line.

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

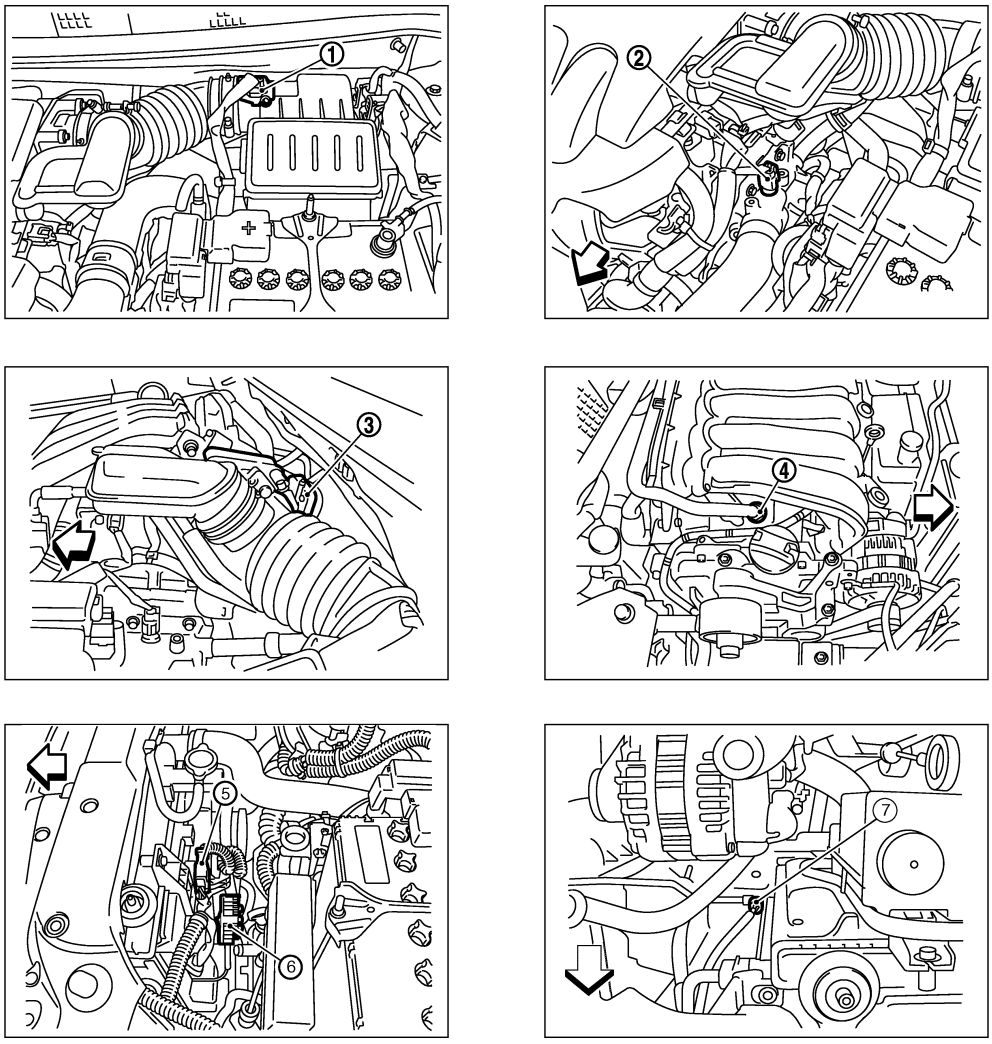
Component Parts Location

INFOID:0000000001603914



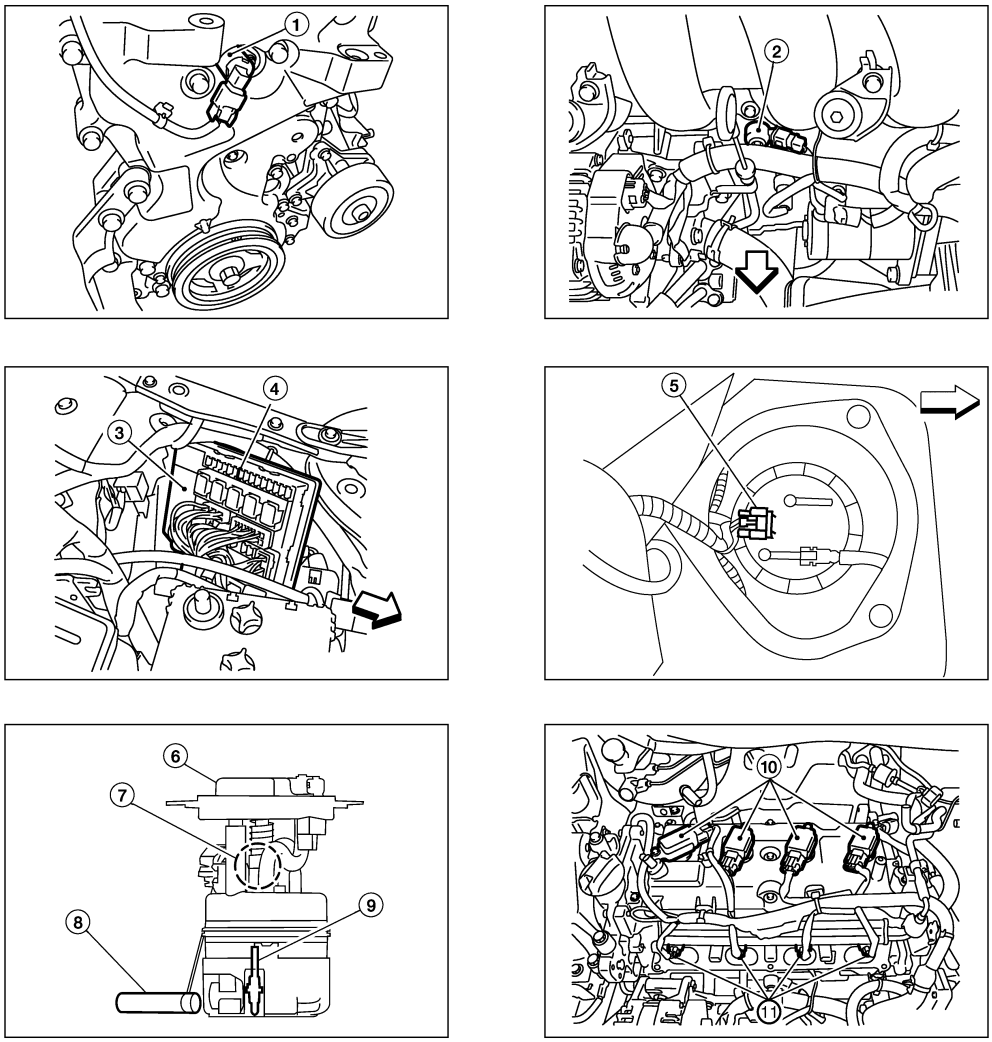
PBIB3261E

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



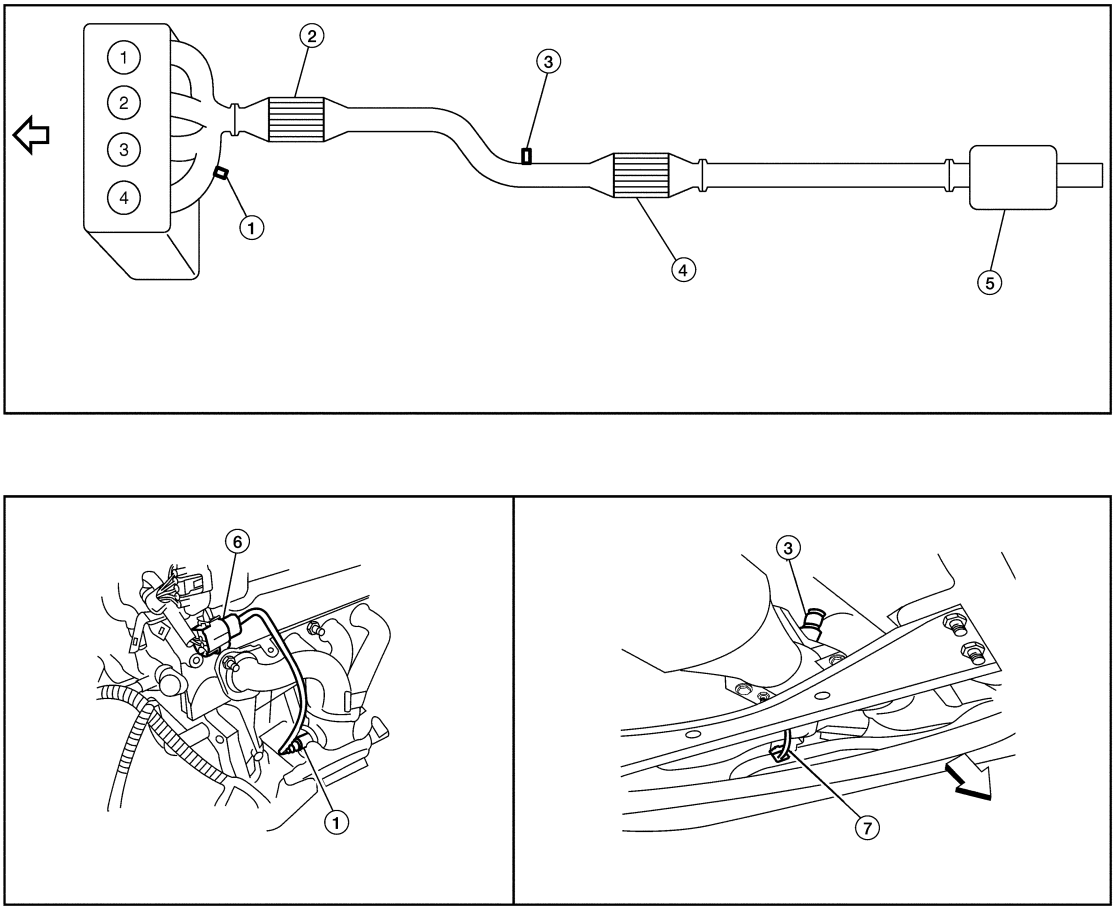
BBIA0724E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator (with built in throttle position sensor, throttle control motor)
4. PCV valve
5. Cooling fan motor
6. Resistor
7. Refrigerant pressure sensor



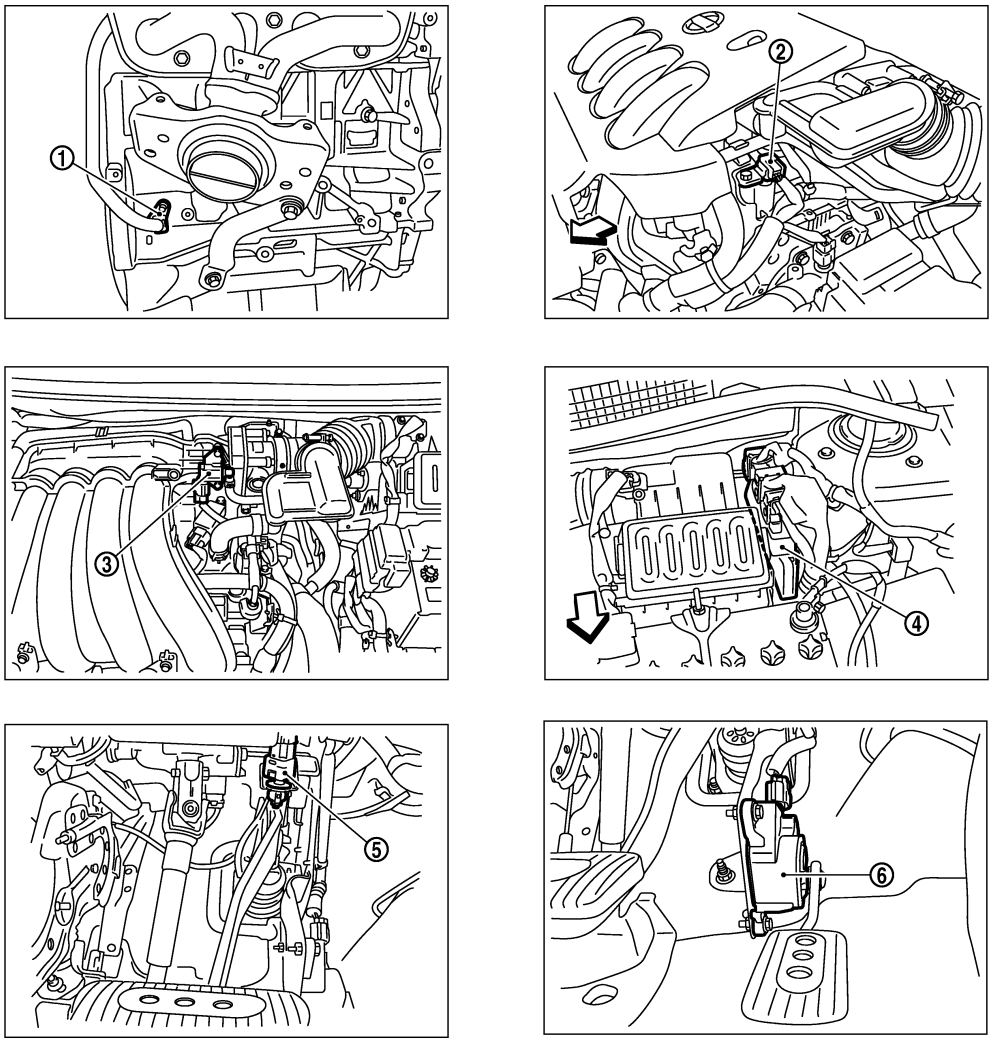
BBIA0735E

1. Intake valve timing control solenoid valve
2. Knock sensor
3. IPDM E/R
4. Fuel pump fuse
5. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
6. Fuel level sensor unit and fuel pump
7. Fuel pressure regulator
8. Fuel level sensor
9. Fuel tank temperature sensor
10. Ignition coil
11. Fuel injector



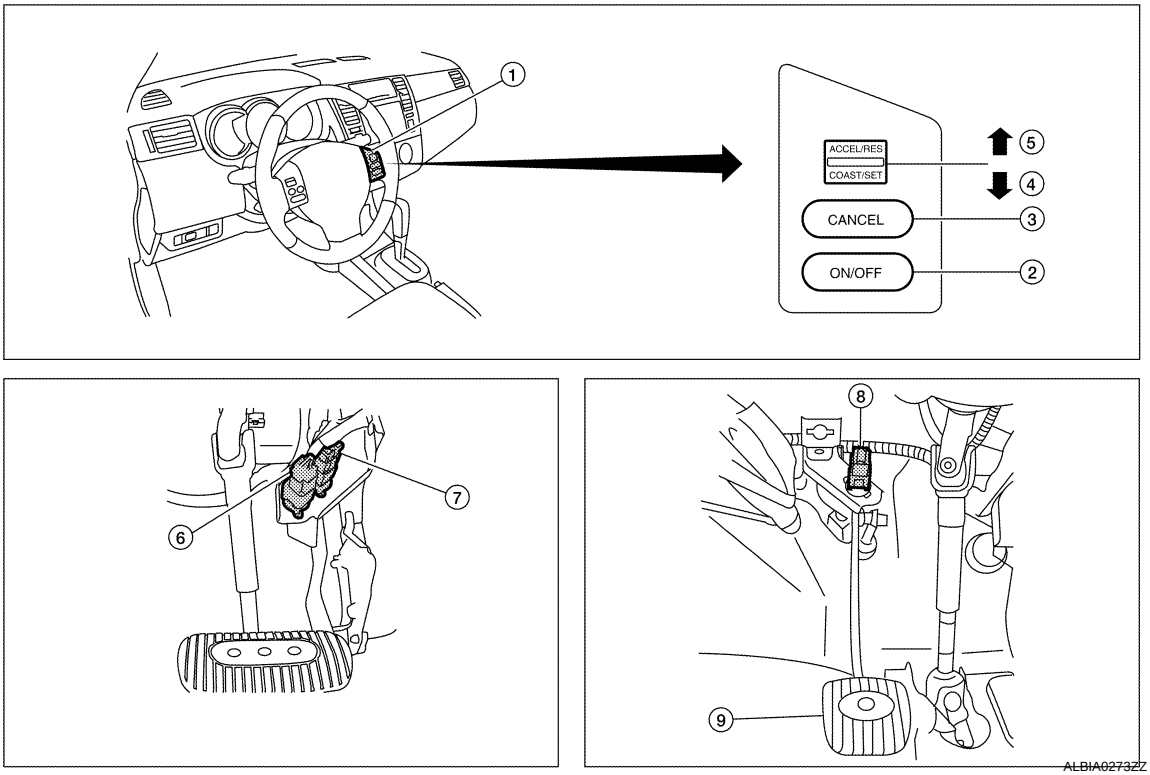
BBIA0733E

1. Heated oxygen sensor 1
2. Three way catalyst (Manifold)
3. Heated oxygen sensor 2
4. Three way catalyst (Under floor)
5. Muffler
6. Heated oxygen sensor 1 harness connector
7. Heated oxygen sensor 2 harness connector



PBIA9902J

1. Crankshaft position sensor (POS)
2. Comshaft position sensor (PHASE)
3. EVAP canistor purge volume control solenoid valve
4. ECM
5. Stop lamp switch
6. Accelerator pedal position sensor



1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELEATE switch
6. Stop lamp switch
7. ASCD brake switch
8. ASCD clutch switch
9. Cluch pedal

Component Description

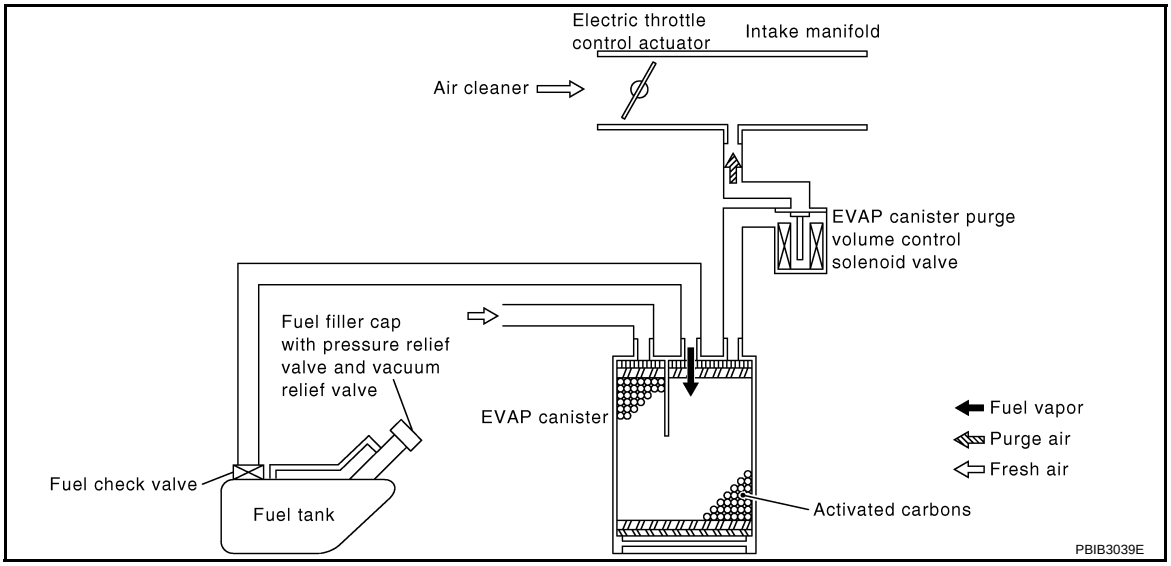
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Component	Reference
Camshaft position sensor (PHASE)	EC-866, "Description"
Crankshaft position sensor (POS)	EC-862, "Description"
Cooling fan motor	EC-737, "System Diagram"
Engine coolant temperature sensor	EC-807, "Description"
Refrigerant pressure sensor	EC-988, "Description"

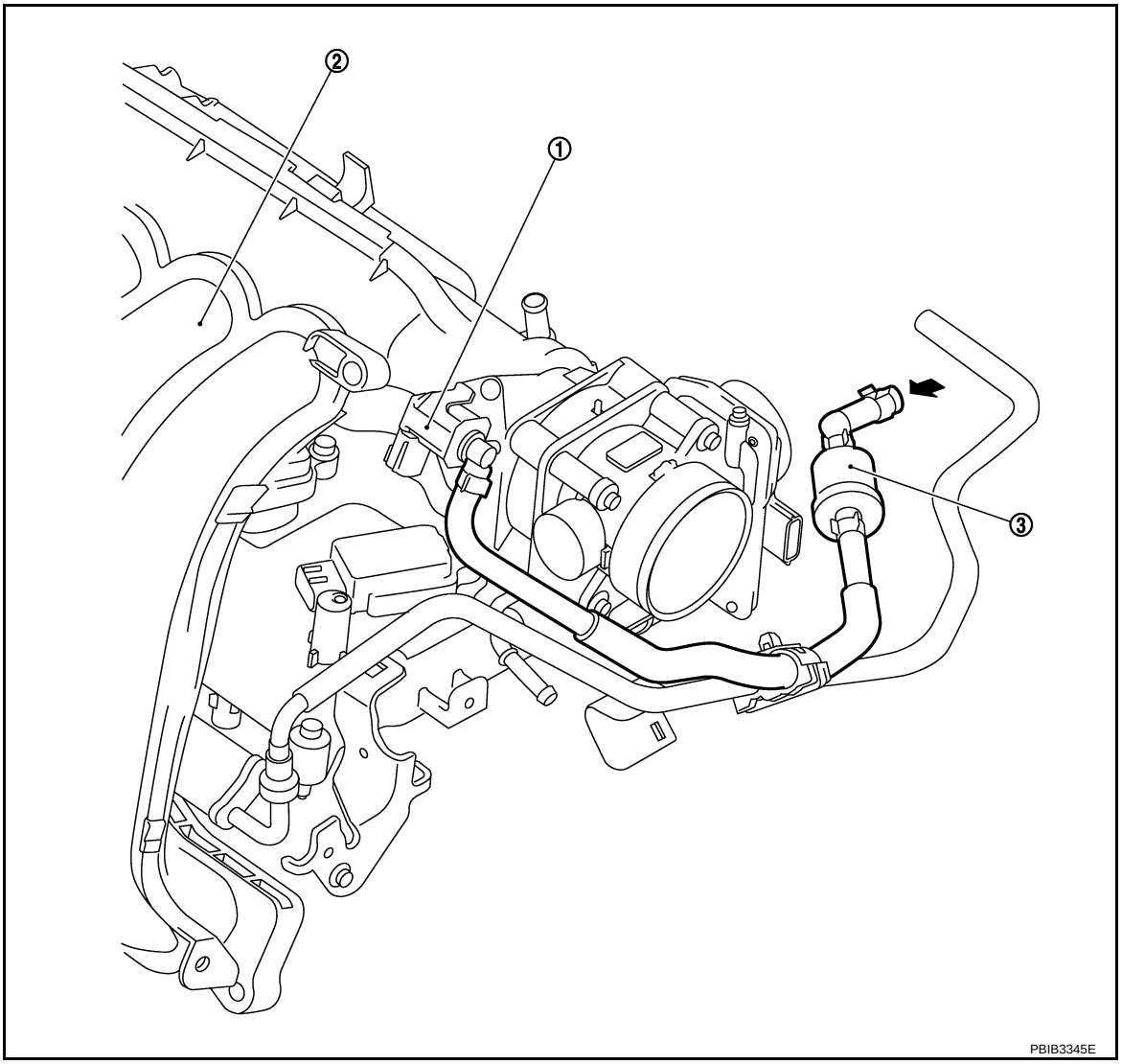
EVAPORATIVE EMISSION SYSTEM

System Diagram

INFOID:0000000001161744

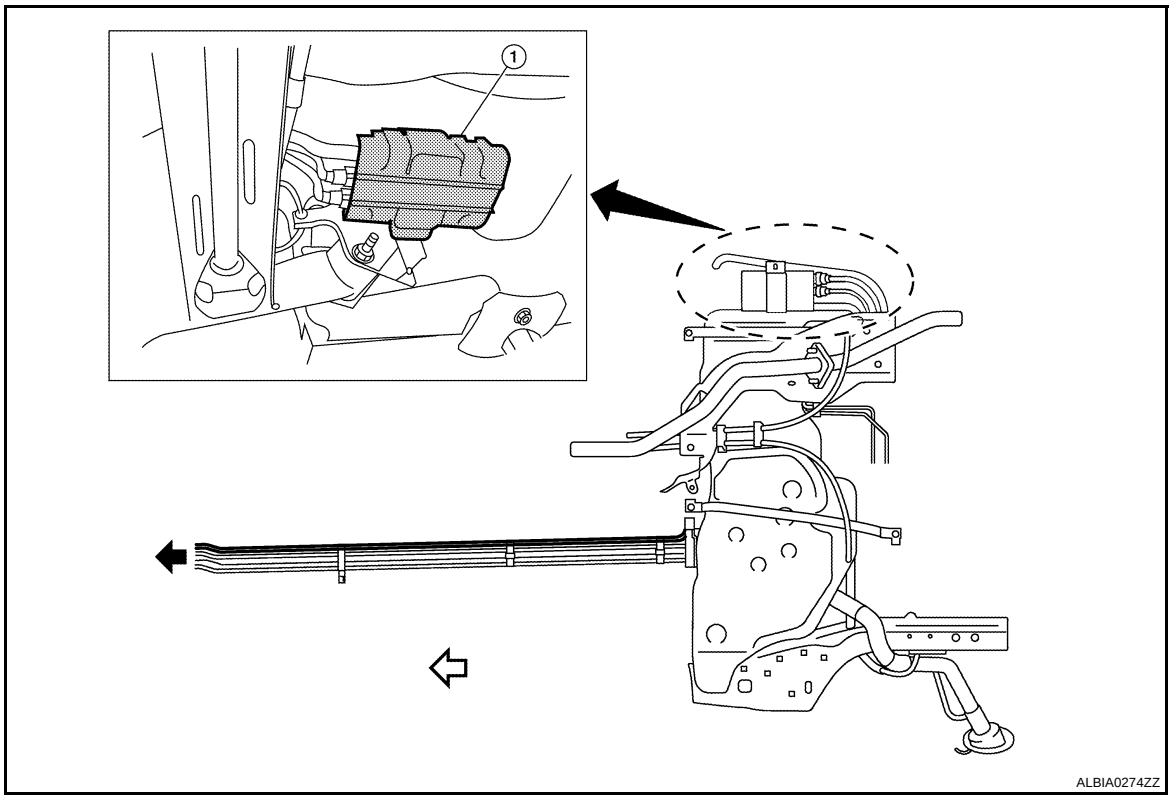


EVAPORATIVE EMISSION LINE DRAWING



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

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



1. EVAP canister
3.

System Description

INFOID:0000000001161745

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		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Combination meter*2	Vehicle speed		

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

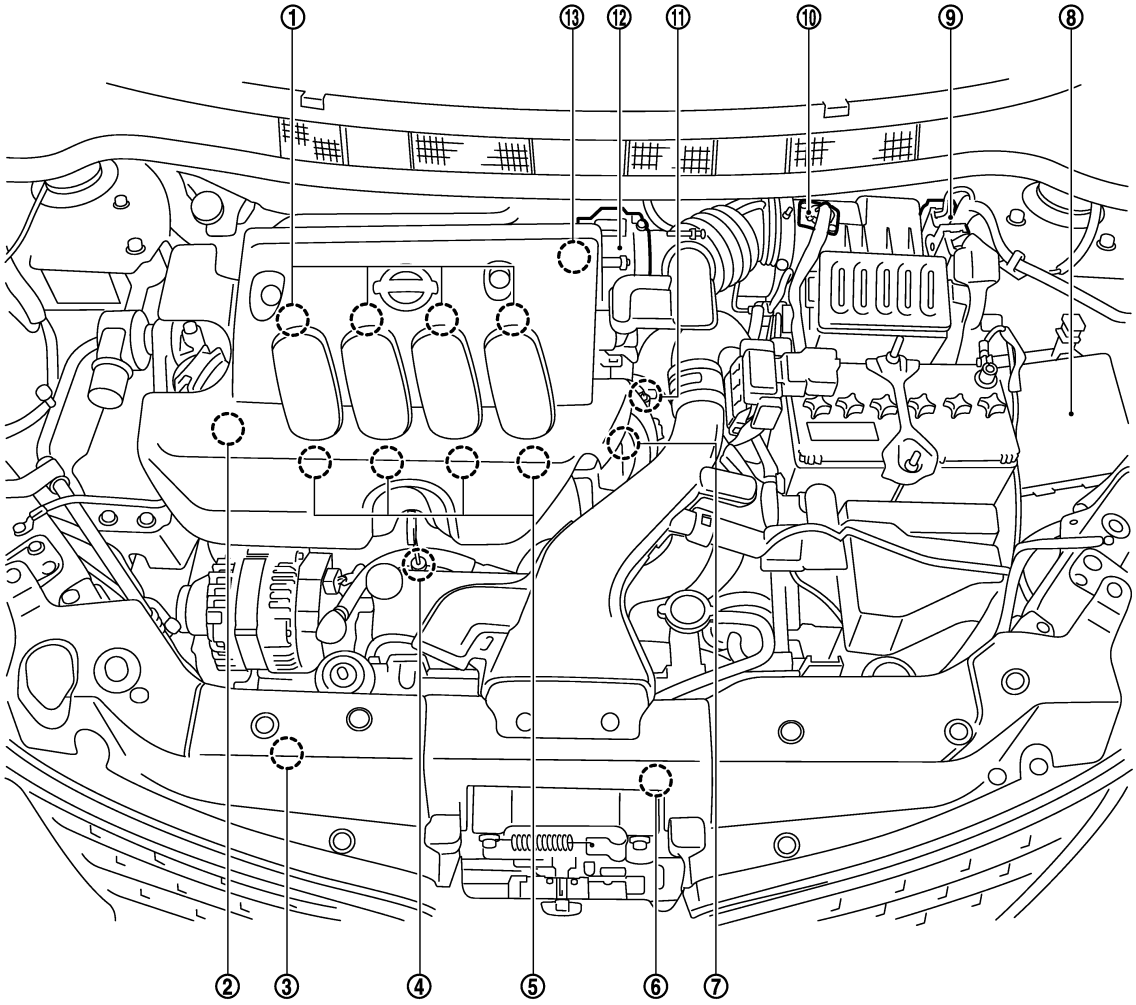
*2: This signal is sent to the ECM through CAN communication line.

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

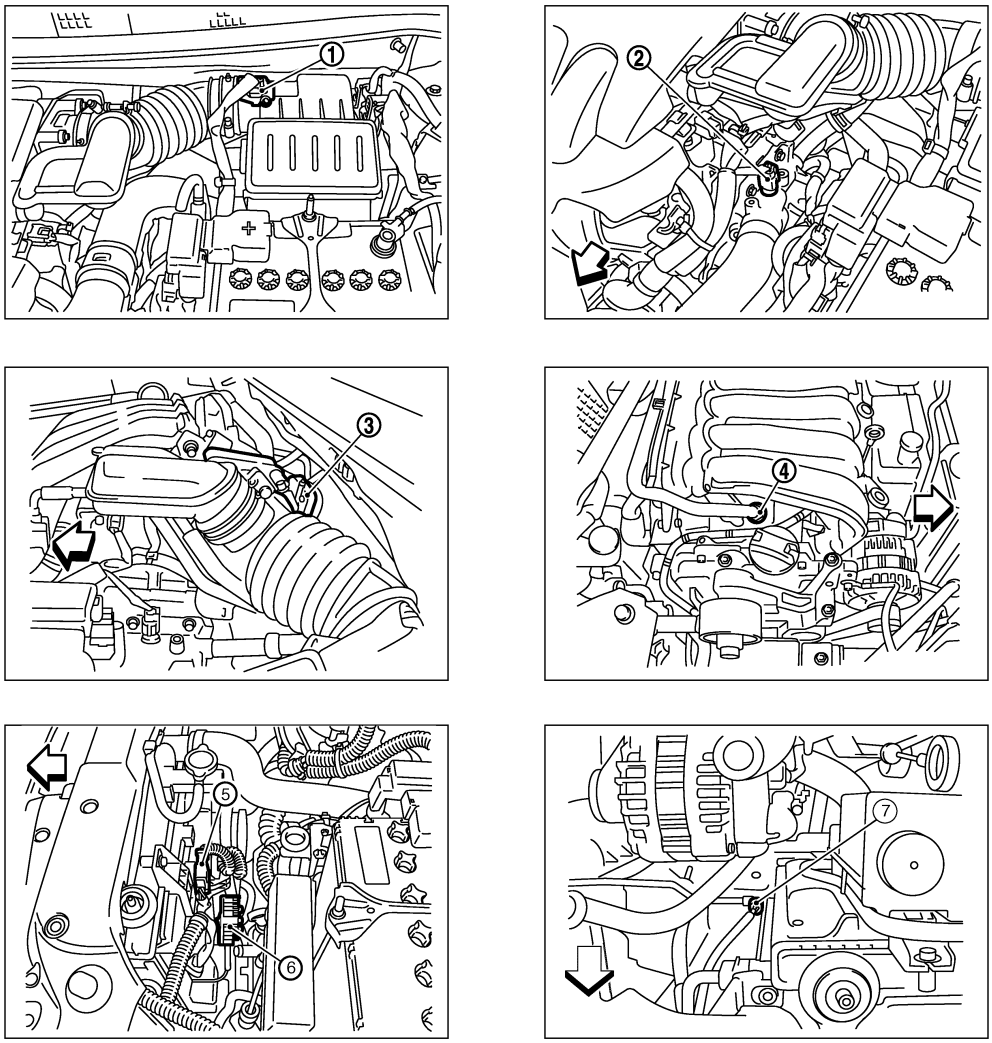
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PBIB3261E

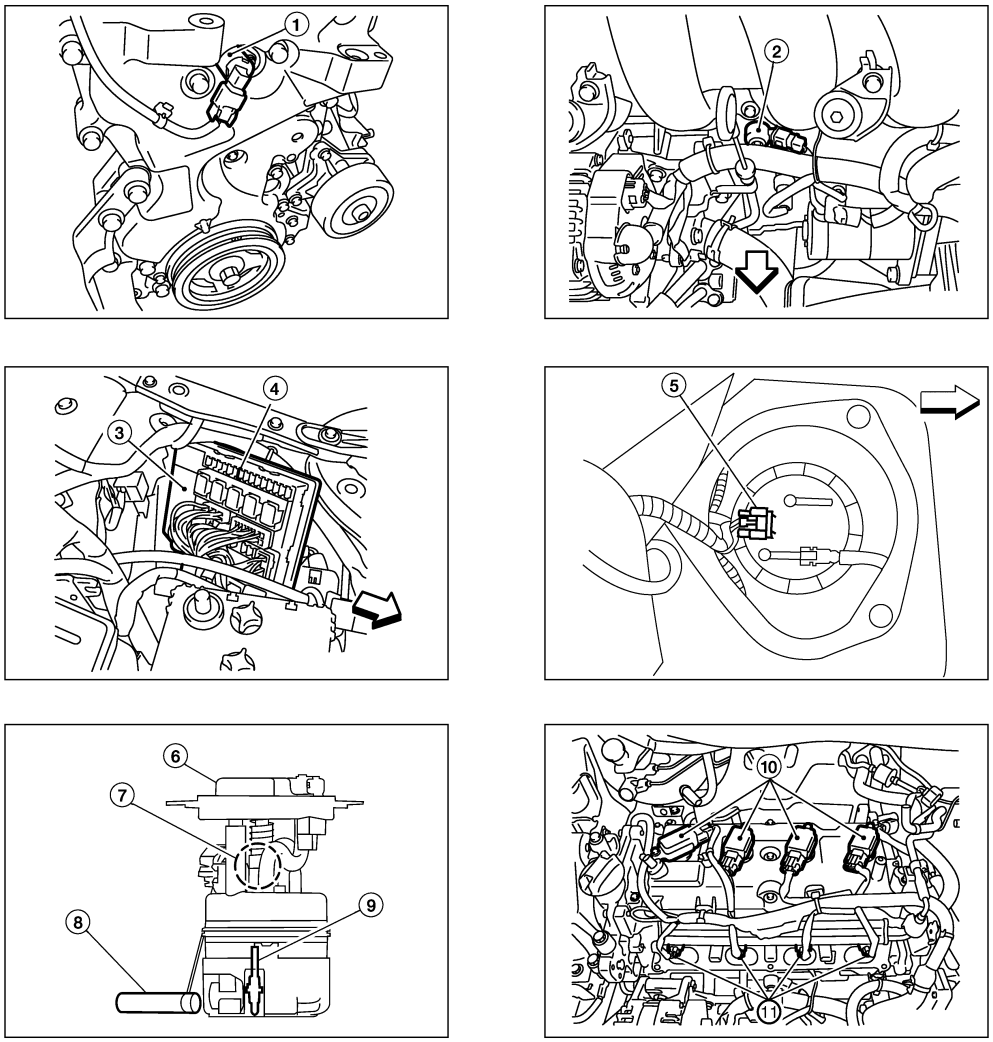
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM

10. Mass air flow sensor (with intake temperature sensor)
11. Engine coolant temperature sensor
12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. EVAP canister purge volume control solenoid valve



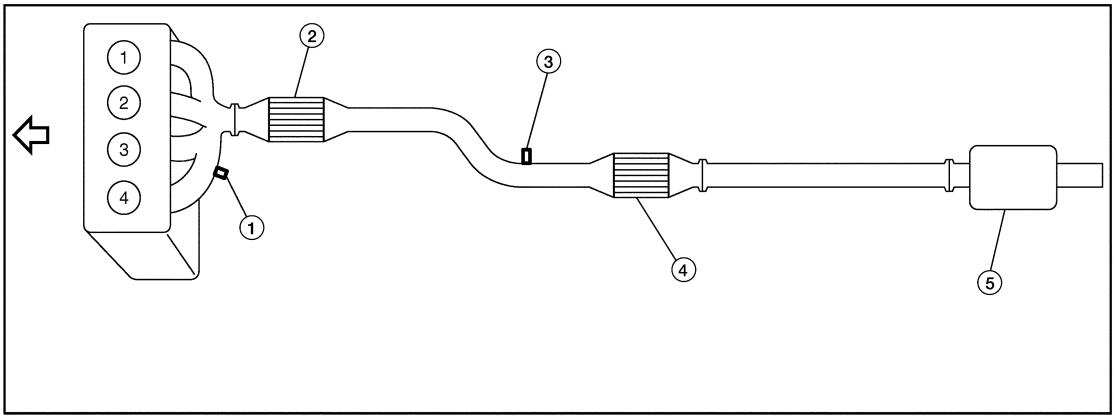
BBIA0724E

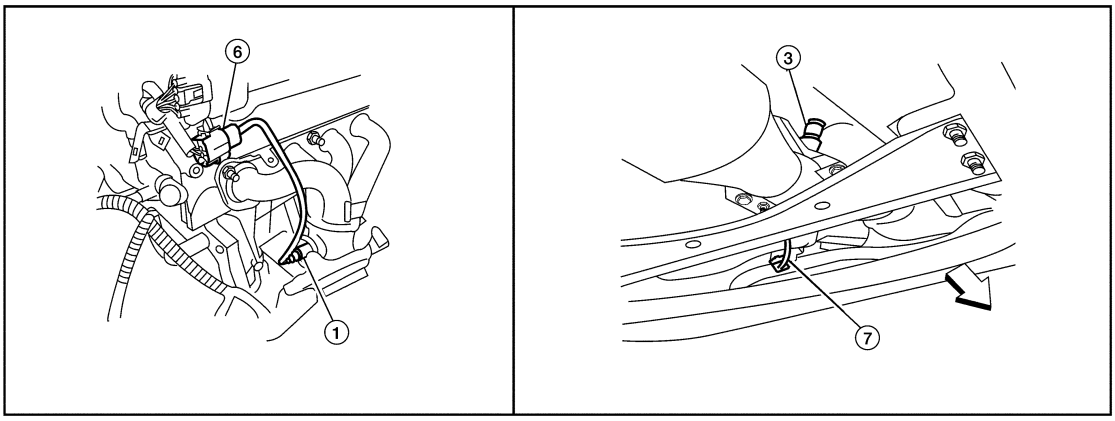
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator (with built in throttle position sensor, throttle control motor)
4. PCV valve
5. Cooling fan motor
6. Resistor
7. Refrigerant pressure sensor



BBIA0735E

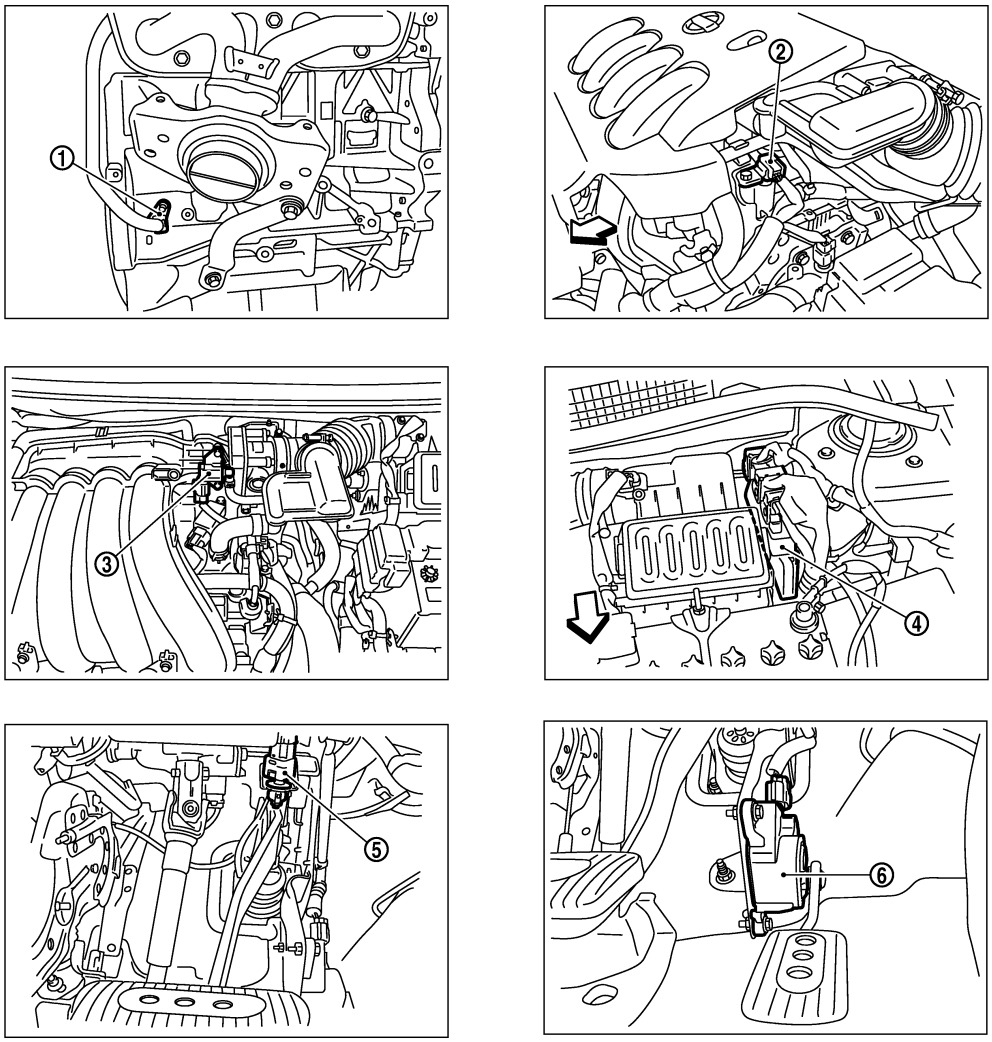
1. Intake valve timing control solenoid valve
2. Knock sensor
3. IPDM E/R
4. Fuel pump fuse
5. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
6. Fuel level sensor unit and fuel pump
7. Fuel pressure regulator
8. Fuel level sensor
9. Fuel tank temperature sensor
10. Ignition coil
11. Fuel injector





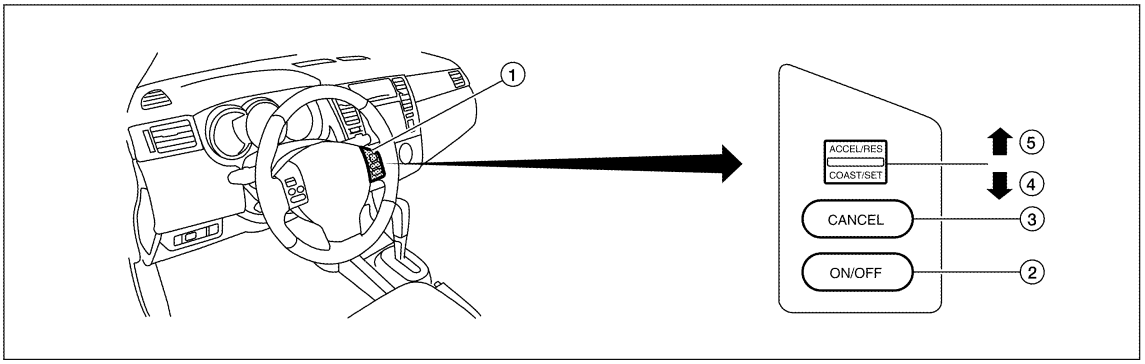
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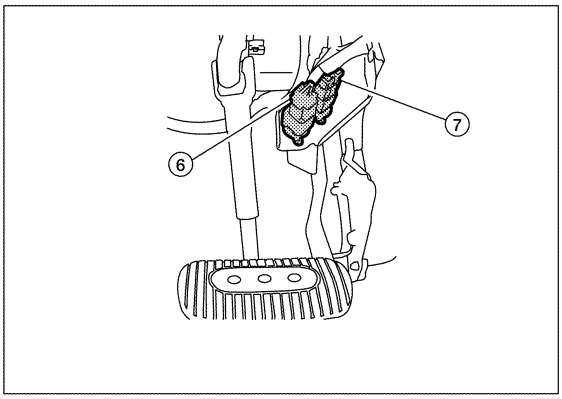
1. Heated oxygen sensor 1
2. Three way catalyst (Manifold)
3. Heated oxygen sensor 2
4. Three way catalyst (Under floor)
5. Muffler
6. Heated oxygen sensor 1 harness connector
7. Heated oxygen sensor 2 harness connector

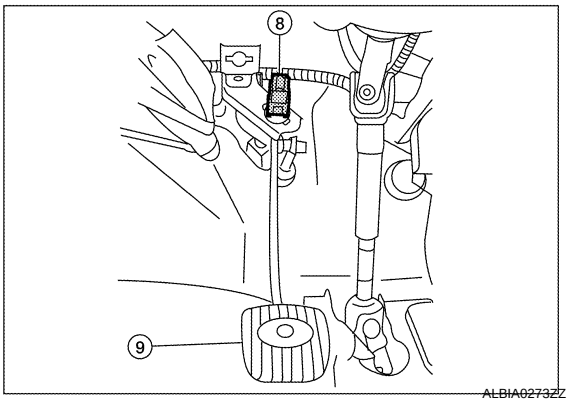


PBIA9902J

1. Crankshaft position sensor (POS)
2. Comshaft position sensor (PHASE)
3. EVAP canistor purge volume control solenoid valve
4. ECM
5. Stop lamp switch
6. Accelerator pedal position sensor







ALBIA0273ZZ

1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELEATE switch
6. Stop lamp switch
7. ASCD brake switch
8. ASCD clutch switch
9. Cluch pedal

Component Description

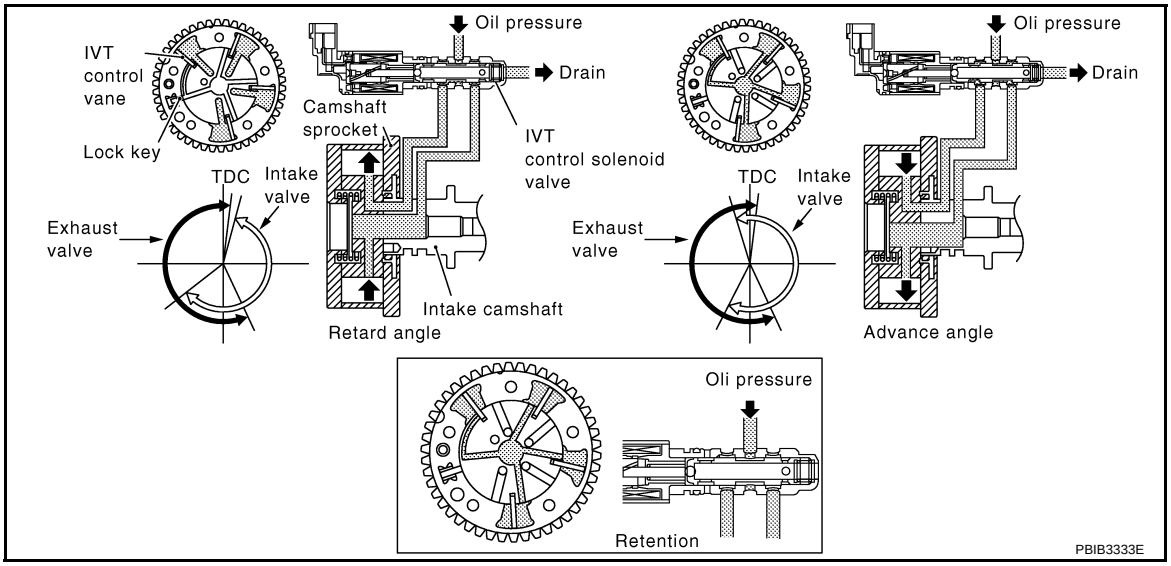
INFOID:0000000001161747

Component	Reference
Accelerator pedal position sensor	EC-959, "Description"
Camshaft position sensor (PHASE)	EC-866, "Description"
Crankshaft position sensor (POS)	EC-862, "Description"
Engine coolant temperature sensor	EC-807, "Description"
EVAP canister purge volume control solenoid valve	EC-875, "Description"
Heated oxygen sensor 1	EC-813, "Description"
Mass air flow sensor	EC-799, "Description"
Throttle position sensor	EC-810, "Description"
Vehicle speed sensor	EC-878, "Description"

INTAKE VALVE TIMING CONTROL

System Diagram

INFOID:0000000001161748



System Description

INFOID:0000000001161749

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		
Combination meter*	Vehicle speed		

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

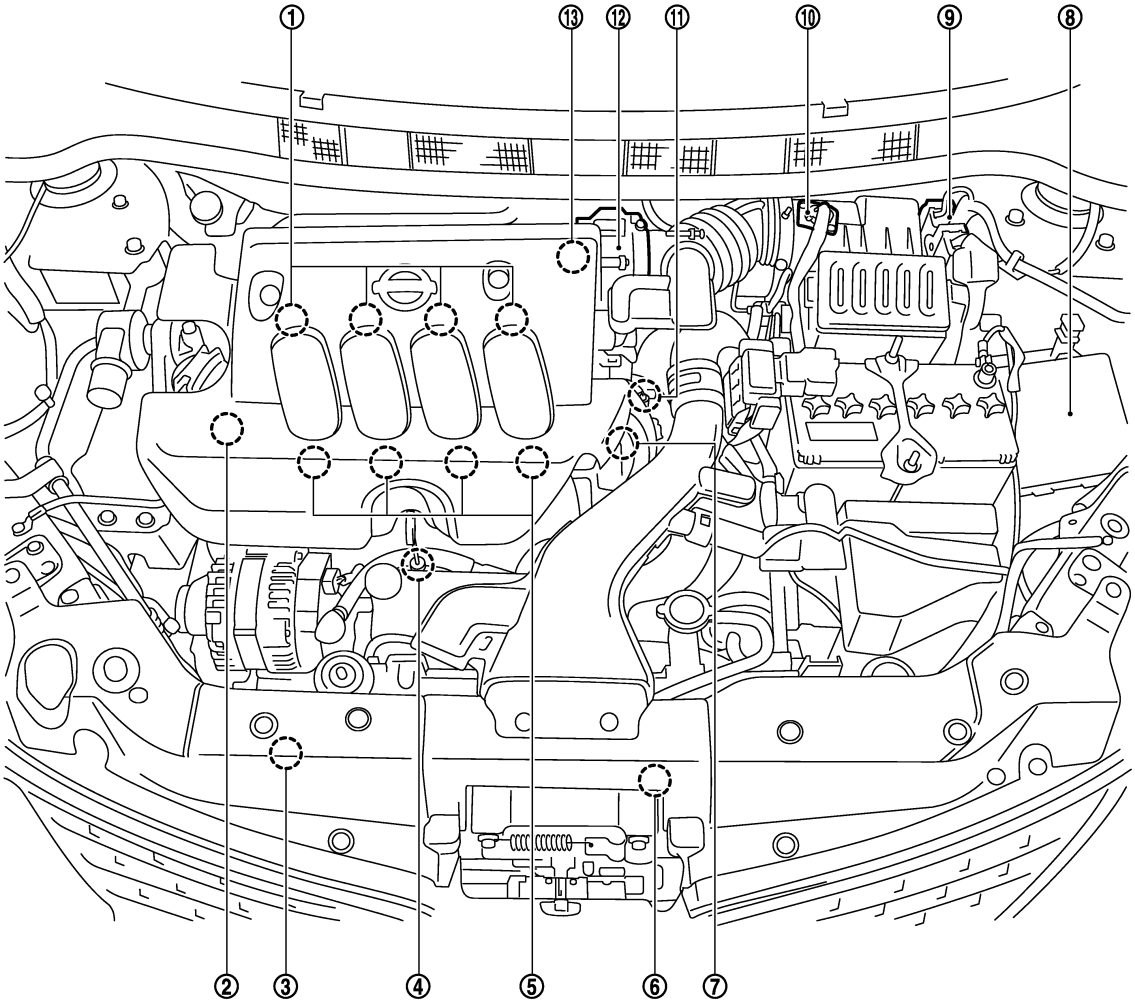
SYSTEM DESCRIPTION

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

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

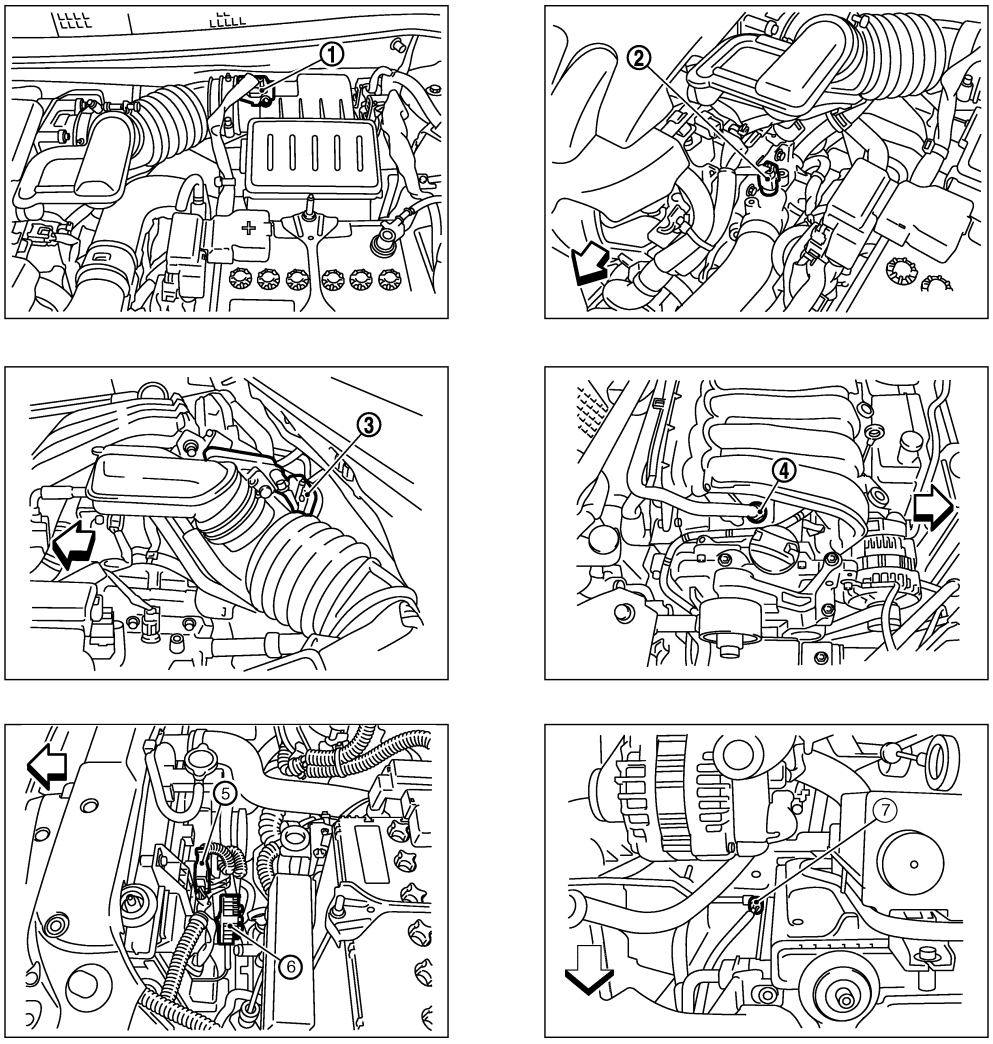
Component Parts Location

INFOID:0000000001603916



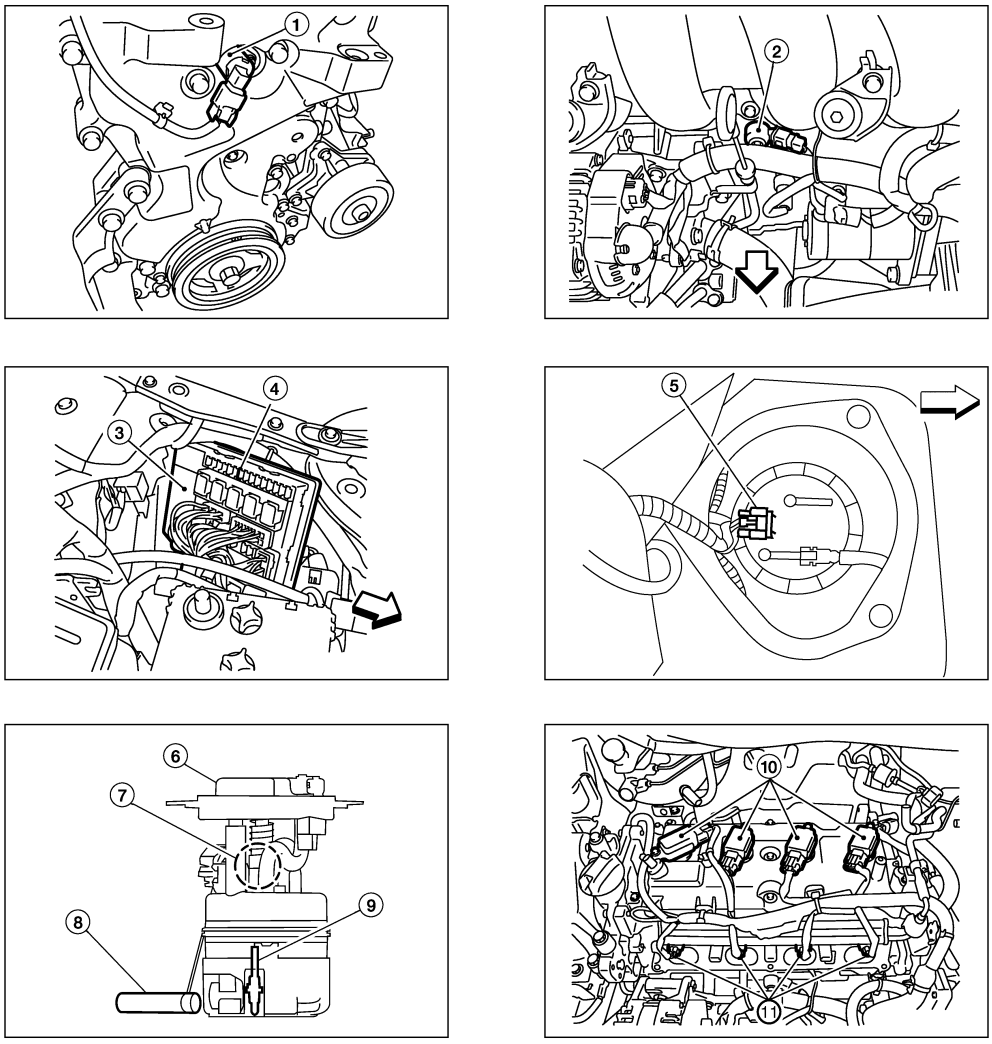
PBIB3261E

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



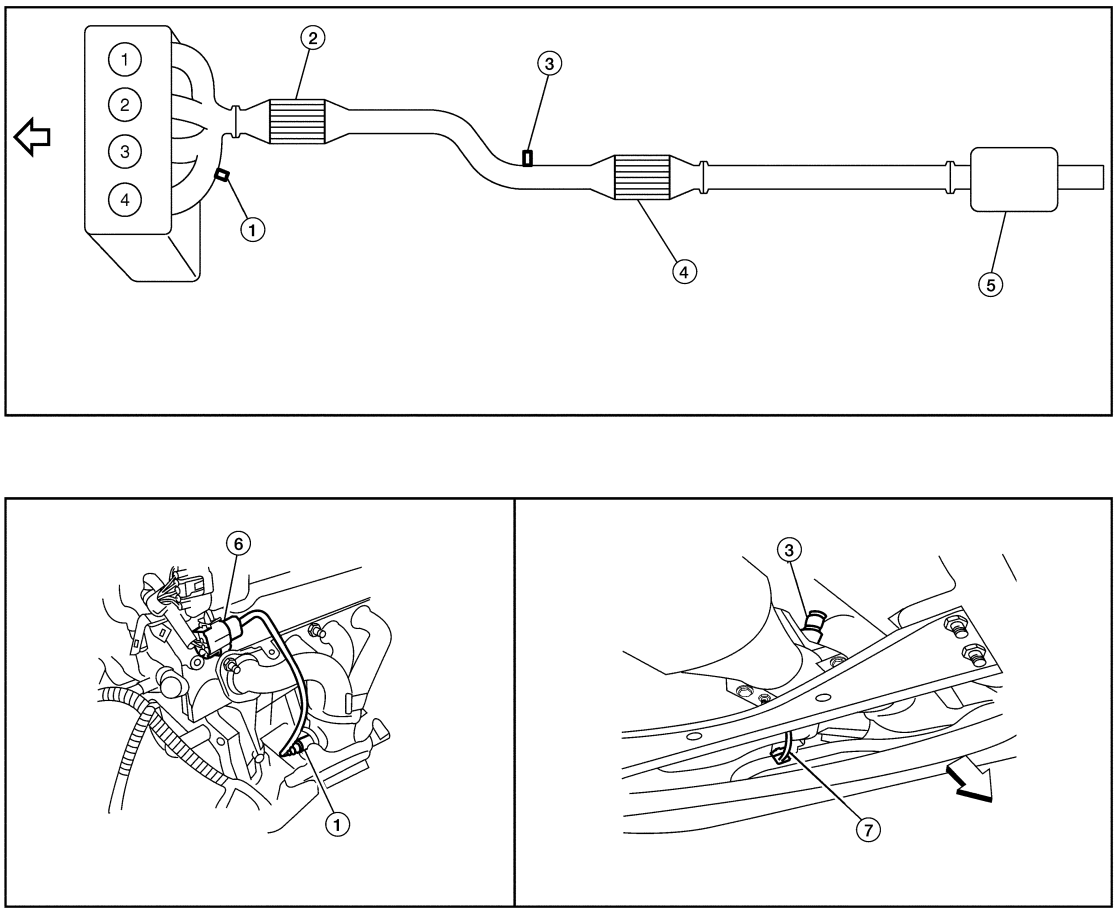
BBIA0724E

1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator (with built in throttle position sensor, throttle control motor)
4. PCV valve
5. Cooling fan motor
6. Resistor
7. Refrigerant pressure sensor



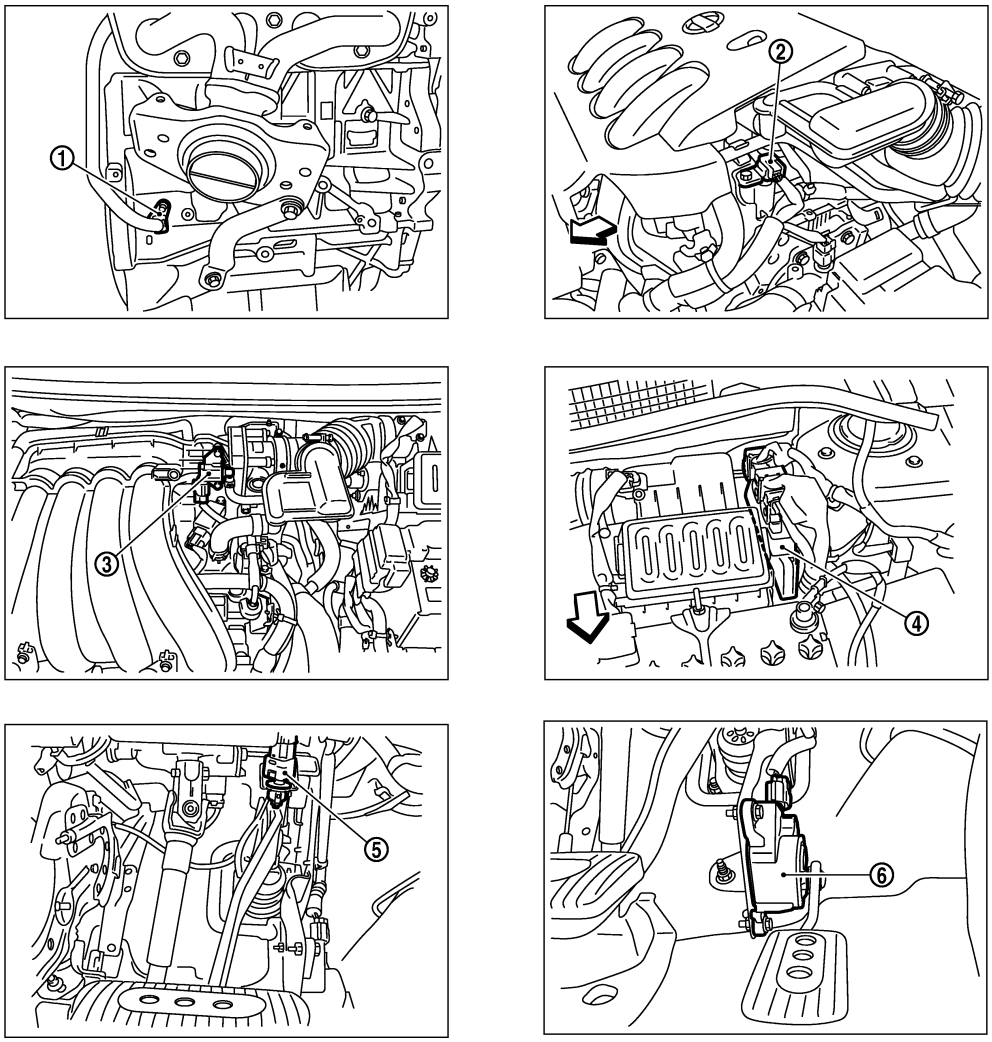
BBIA0735E

1. Intake valve timing control solenoid valve
2. Knock sensor
3. IPDM E/R
4. Fuel pump fuse
5. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
6. Fuel level sensor unit and fuel pump
7. Fuel pressure regulator
8. Fuel level sensor
9. Fuel tank temperature sensor
10. Ignition coil
11. Fuel injector



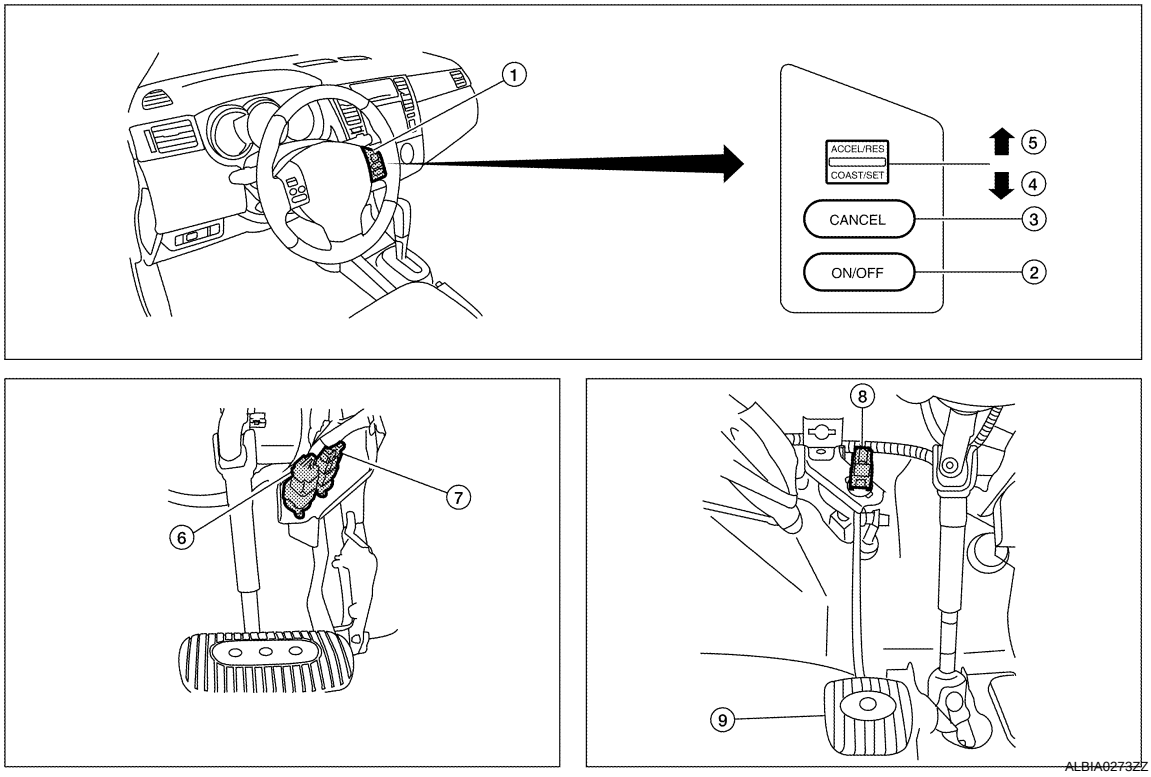
BBIA0733E

1. Heated oxygen sensor 1
2. Three way catalyst (Manifold)
3. Heated oxygen sensor 2
4. Three way catalyst (Under floor)
5. Muffler
6. Heated oxygen sensor 1 harness connector
7. Heated oxygen sensor 2 harness connector



PBIA9902J

1. Crankshaft position sensor (POS)
2. Comshaft position sensor (PHASE)
3. EVAP canistor purge volume control solenoid valve
4. ECM
5. Stop lamp switch
6. Accelerator pedal position sensor



1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. SET/COAST switch
5. RESUME/ACCELEATE switch
6. Stop lamp switch
7. ASCD brake switch
8. ASCD clutch switch
9. Cluch pedal

Component Description

INFOID:0000000001161751

Component	Reference
Camshaft position sensor (PHASE)	EC-866, "Description"
Crankshaft position sensor (POS)	EC-862, "Description"
Engine coolant temperature sensor	EC-807, "Description"
Intake valve timing control solenoid valve	EC-753, "System Diagram"
Vehicle speed sensor	EC-878, "Description"

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000001161752

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
Calibration ID	Service $09 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	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 (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 EC-1017, "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 EC-1020, "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 EC-685, "Work Flow". Then perform DTC CONFIRMATION PROCEDURE or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

Freeze Frame Data and 1st Trip Freeze Frame Data

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen, not on the GST.
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/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	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items
3	1st trip freeze frame data	

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

How to Read DTC and 1st Trip DTC

With CONSULT-III

With GST

CONSULT-III or GST (Generic Scan Tool) Examples: P0340, P1148, P1706, 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, 1148, 1706, 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.

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

No Tools

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. 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 15031-5.

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

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

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

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

NOTE:

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

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

NOTE:

If 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	1	Heated oxygen sensor 1	P1133
		Heated oxygen sensor 1	P1143
		Heated oxygen sensor 1	P1144
		Heated oxygen sensor 2	P0139
		Heated oxygen sensor 2	P1146
		Heated oxygen sensor 2	P1147
HO2S HTR	1	Heated oxygen sensor 1 heater	P0135
		Heated oxygen sensor 2 heater	P0141

*: 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:

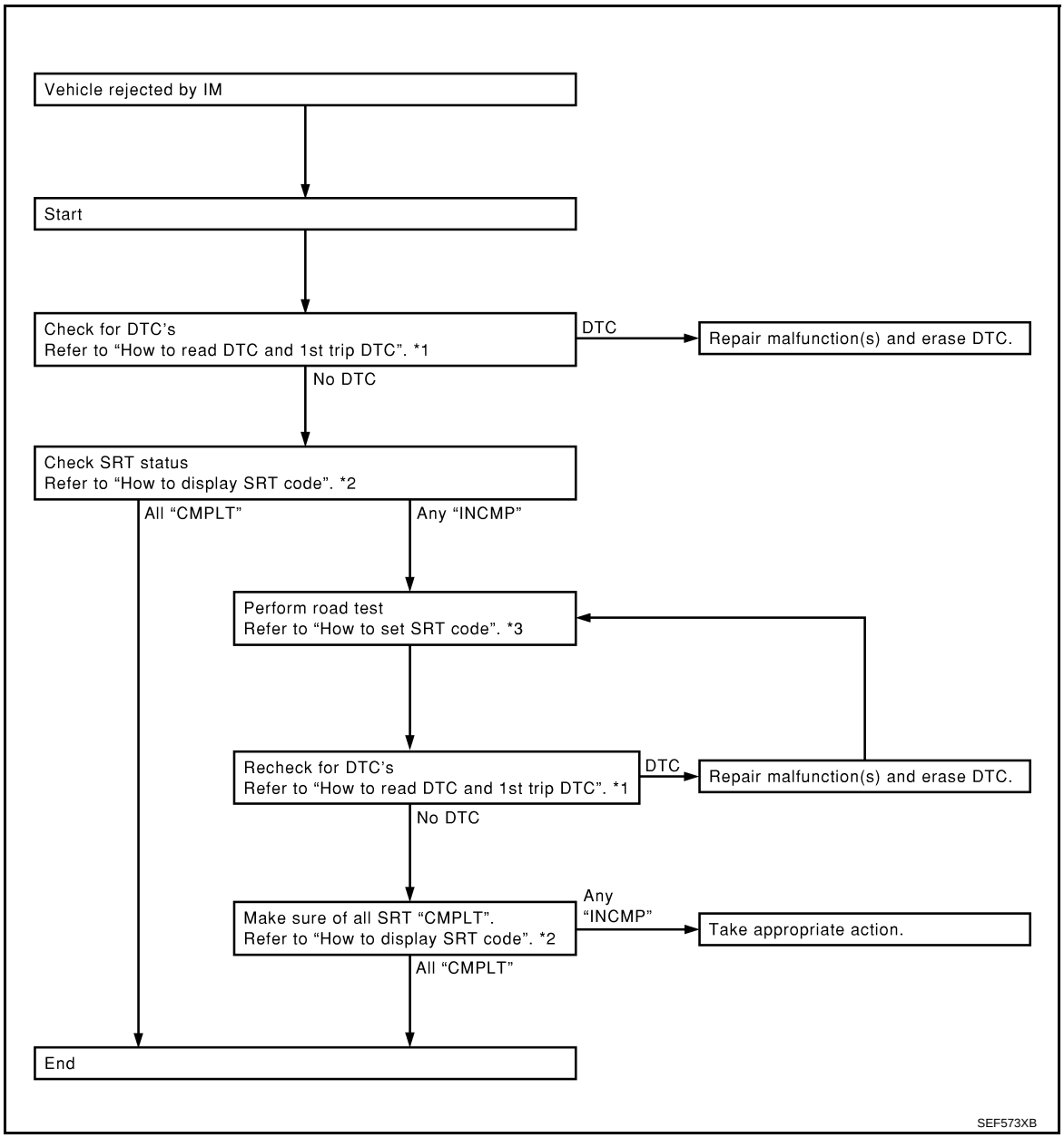
- The SRT will indicate “CMPLT” at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires “CMPLT” of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to “CMPLT” of SRT, the self-diagnosis memory 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 code” *3 “How to Set SRT Code”

How to Display SRT Code

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.

WITH GST

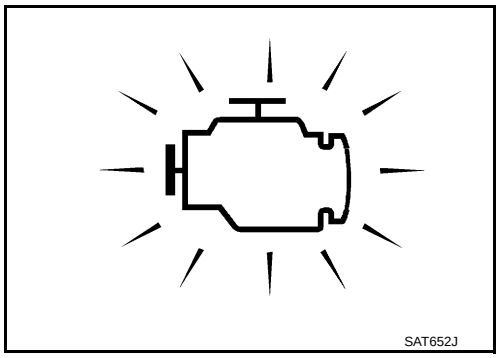
Selecting Service $01 with GST (Generic Scan Tool)

MALFUNCTION INDICATOR (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, check MI circuit. Refer to MWI-15, "WARNING LAMPS/INDICATOR LAMPS : 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 four 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 	HEATED OXYGEN SENSOR 1 MONITOR	This function allows the fuel mixture condition (lean or rich), monitored by heated oxygen sensor 1, to be read.

Diagnostic Test Mode I — Bulb Check

In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check MI circuit. Refer to MWI-15, "WARNING LAMPS/INDICATOR LAMPS : System Diagram".

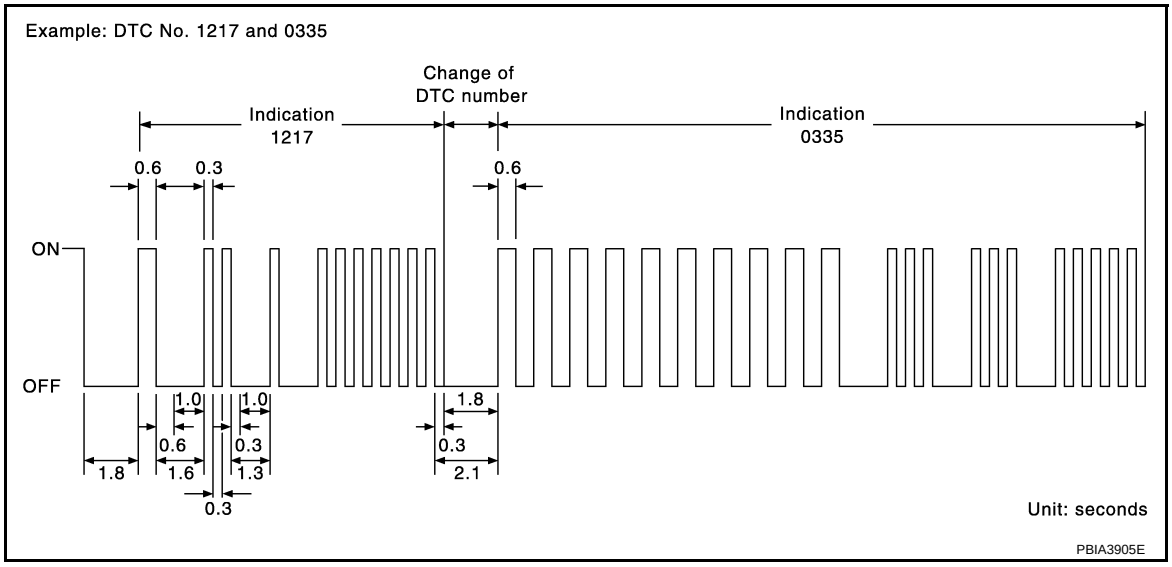
Diagnostic Test Mode I — Malfunction Warning

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. The “zero” is indicated by the number of ten flashes. 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 EC-1020, "DTC Index".)
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.**

Diagnostic Test Mode II — Heated Oxygen Sensor 1 Monitor

In this mode, the MI displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor 1.

MI	Fuel mixture condition in the exhaust gas	Air fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop system

*: Maintains conditions just before switching to open loop.

To check the heated oxygen sensor 1 function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.
Next run engine at about 2,000 rpm for about 2 minutes under no load conditions. Then make sure that the MI comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no load.

MI FLASHING WITHOUT DTC

If the ECM is in Diagnostic Test Mode II, MI may flash when engine is running. In this case, check ECM diagnostic test mode. How to switch the diagnostic test (function) modes, and details of the above functions are described later. Refer to “How to Switch Diagnostic Test Mode”.
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

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.**

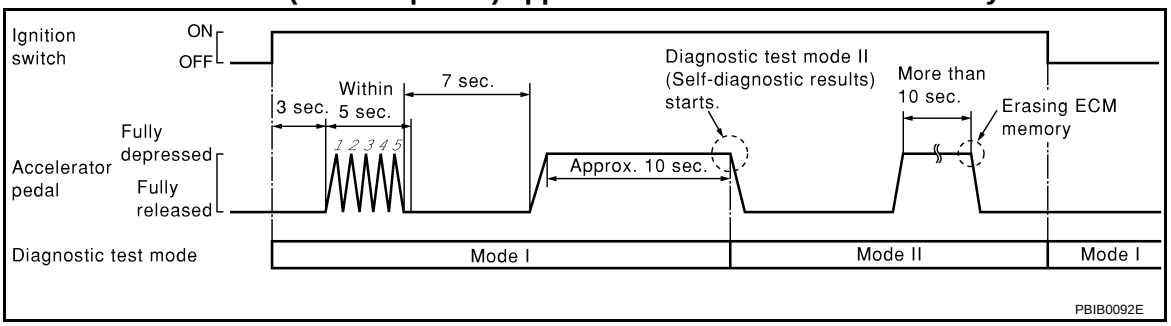
HOW to SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

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.

a. Fully depress the accelerator pedal.

b. 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 (HEATED OXYGEN SENSOR 1 MONITOR)

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 (Heated oxygen sensor 1 monitor).

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.

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

Summary Chart

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

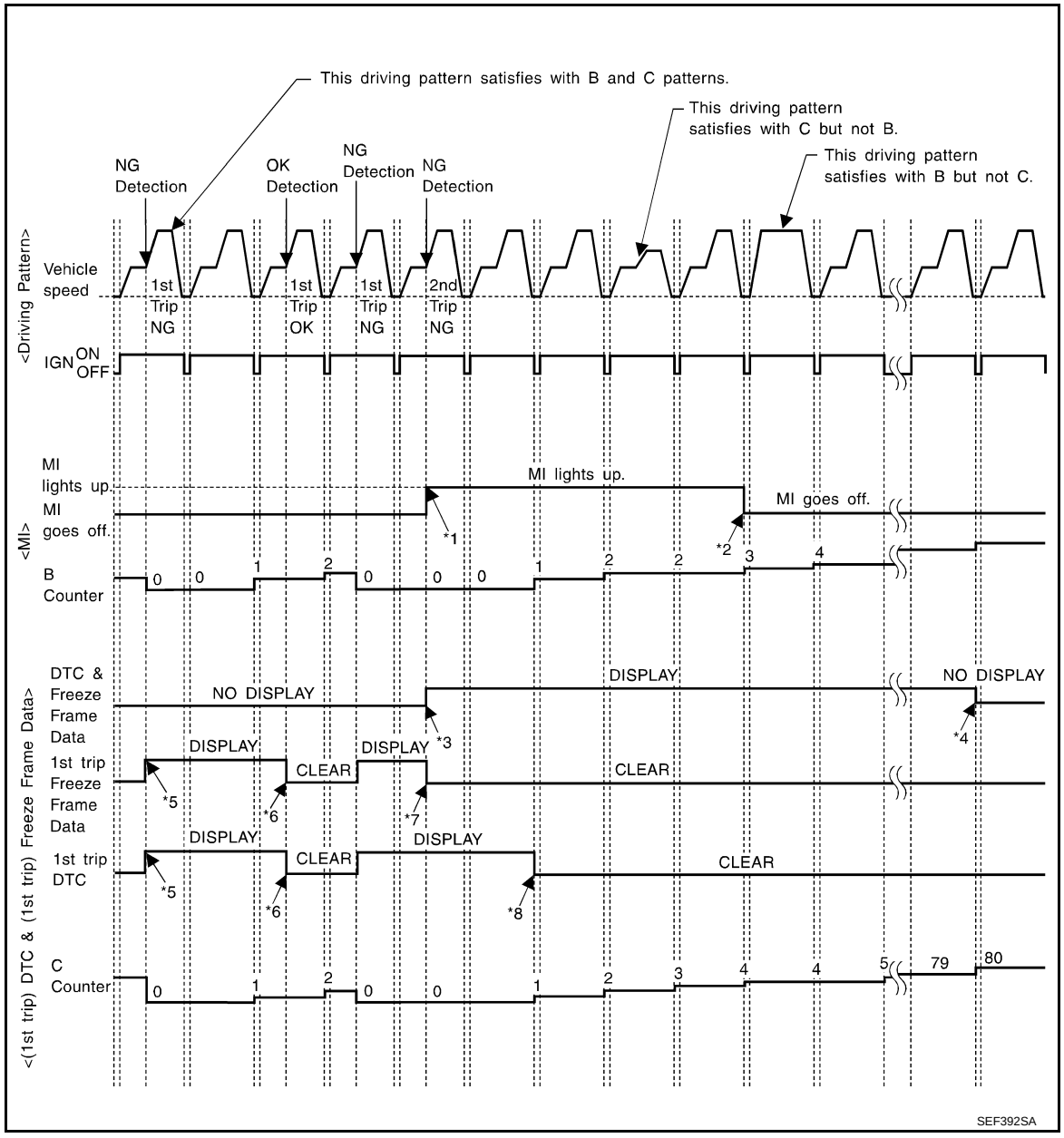
For details about patterns B and C under “Fuel Injection System” and “Misfire”, see “EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”.

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

*1: Clear timing is at the moment OK is detected.

*2: Clear timing is when the same malfunction is detected in the 2nd trip.

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



*1: When the same malfunction is detected in two consecutive trips, 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 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

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

*6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

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

*8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

Explanation for Driving Patterns for “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System”
<Driving Pattern B>
Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

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

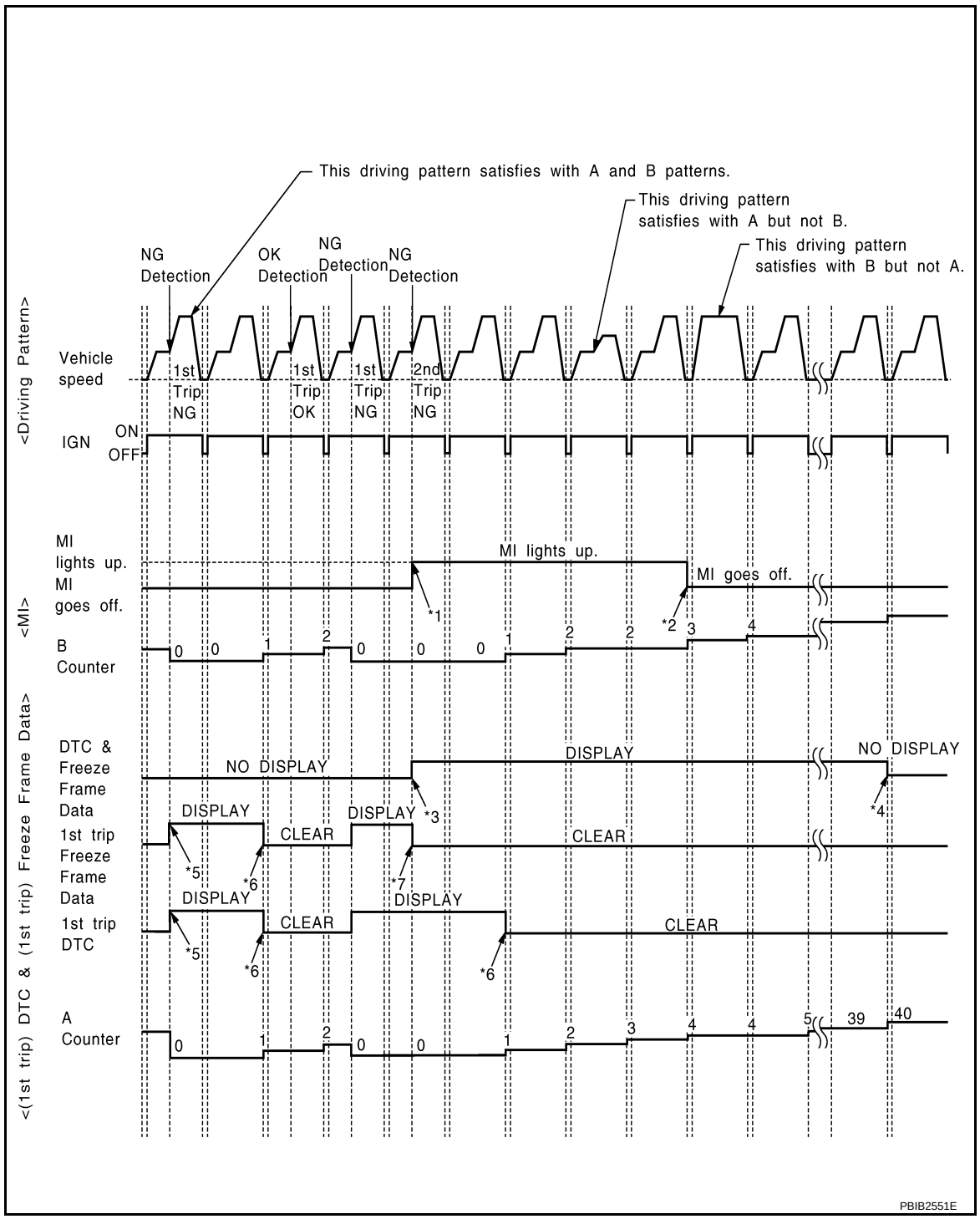
<Driving Pattern C>
Driving pattern C means the vehicle operation as follows:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature (T) condition:

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

Example:
If the stored freeze frame data is as follows:
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)
To be satisfied with driving pattern C, the vehicle should run under the following conditions:
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

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

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



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

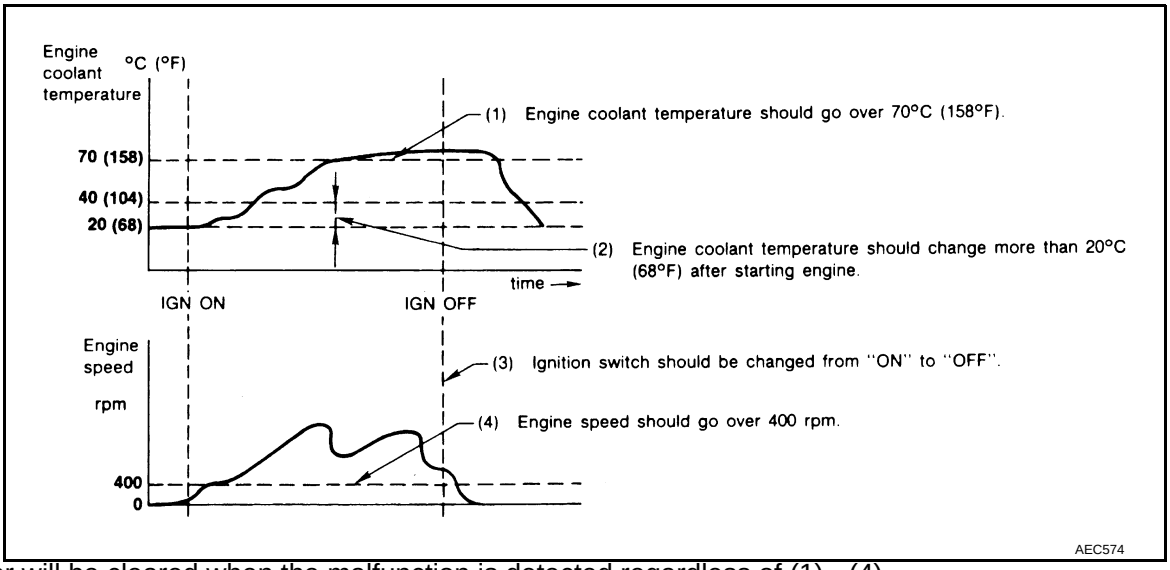
*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*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 B) without the same malfunction.

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

Explanation for Driving Patterns Except for “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System”
<Driving Pattern A>



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

<Driving Pattern B>
Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

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

CONSULT-III Function

INFOID:0000000001161753

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.
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		×	×	×	×		
		Heated oxygen sensor 1		×		×		×	×
		Heated oxygen sensor 2		×		×		×	×
		Wheel sensor		×	×	×			
		Accelerator pedal position sensor		×		×			
		Throttle position sensor		×		×			
		Intake air temperature sensor		×	×	×			
		Knock sensor		×					
		EPS control unit				×			
		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				×			
		ASCD steering switch		×		×			
		ASCD break switch		×		×			
		ASCD cluch switch		×		×			
ENGINE CONTROL 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		×		×	×		
		Heated oxygen sensor 1 heater		×		×		×	
		Heated oxygen sensor 2 heater		×		×		×	
		Intake valve timing control solenoid valve		×		×	×		
		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-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-760, "Diagnosis Description".

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	• THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	• THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing mixture ratio self-learning value
TARGET IDLE RPM ADJ*	• IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	• IDLE CONDITION	When adjusting target ignition timing

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

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-1020, "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 EC-1020, "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 atathe 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.

*: 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.
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.
HO2S1 (B1)	V	• The signal voltage of the heated oxygen sensor 1 is displayed.	
HO2S2 (B1)	V	• The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S1 MNTR (B1)	RICH/LEAN	• Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control: RICH: means the mixture became “rich”, and control is being affected toward a leaner mixture. LEAN: means the mixture became “lean”, and control is being affected toward a rich mixture.	• After turning ON the ignition switch, “RICH” is displayed until air-fuel mixture ratio feedback control begins. • When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
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			
MAIN SW	ON/OFF	• Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW	ON/OFF	• Indicates [ON/OFF] condition from CANCEL switch signal.	
THRTL SEN 1-B1	V	• The throttle position sensor signal voltage is displayed.	• THRTL SEN 2-B1 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
THRTL SEN 2-B1			

Monitored item	Unit	Description	Remarks
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.	
RESUME/ACC SW	ON/OFF	• Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.	
SET SW	ON/OFF	• Indicates [ON/OFF] condition from SET/COAST switch signal.	
BRAKE SW1	ON/OFF	• Indicates [ON/OFF] condition from ASCD brake switch signal or ASCD clutch switch signal.	
BRAKE SW2	ON/OFF	• Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT	NON/CUT	• Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
LO SPEED CUT	NON/CUT	• Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low, and ASCD operation is cut off.	
CRUISE LAMP	ON/OFF	• Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP	ON/OFF	• Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
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.	
PW/ST SIGNAL	ON/OFF	• [ON/OFF] condition of the power steering system (determined by the signal sent from EPS control unit) is indicated.	
LOAD SIGNAL	ON/OFF	• Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW	ON/OFF	• Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW	ON/OFF	• Indicates [ON/OFF] condition from the heater fan switch signal.	
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.
CAL/LD VALUE	%	• “Calculated load value” in the current airflow divided by peak airflow.	

Monitored item	Unit	Description	Remarks
IGN TIMING	g·m/s	• Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor.	
PURG VOL C/V	%	• Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
INT/V TIM (B1)	°CA	• Indicates [°CA] of intake camshaft advance angle.	
INT/V SOL-B1	%	• The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. • The advance angle becomes larger as the value increases.	
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.	
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	
HO2S1 HTR (B1)	ON/OFF	• Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM accordining to the input signals.	
HO2S2 HTR (B1)	ON/OFF	• Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
VEHICLE SPEED	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
IDL A/V LEARN	YET/CMPLT	• Display the condition of Idle Air Volume Learning YET: Idle air volume learning has not been performed yet. CMPLT: Idle air volume learning has already been performed successfully.	
TRVL AFTER MI	km/h or mph	• Distance traveled while MI is activated.	
O2SEN HTR DTY	%	• Indicates the heated oxygen sensor 1 heater control value computed by the ECM according to the input signals.	
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.	

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 • Heated oxygen 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.	• Perform Idle Air Volume Learning.
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch OFF • Shift lever:Neutral • 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
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

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

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode
For details, refer to EC-760, "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

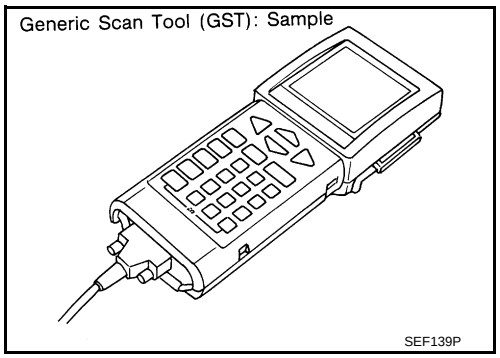
Test mode	Test item	Condition	Reference page
HO2S1	HO2S1 (B1) P0133	Refer to corresponding trouble diagnosis for DTC.	EC-817
	HO2S1 (B1) P0134		EC-823
	HO2S1 (B1) P1143		EC-823
	HO2S1 (B1) P1144		EC-901
HO2S2	HO2S2 (B1) P0139		EC-835
	HO2S2 (B1) P1146		EC-906
	HO2S2 (B1) P1147		EC-912

Diagnosis Tool Function

INFOID:0000000001161754

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with ISO 15031-5 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.

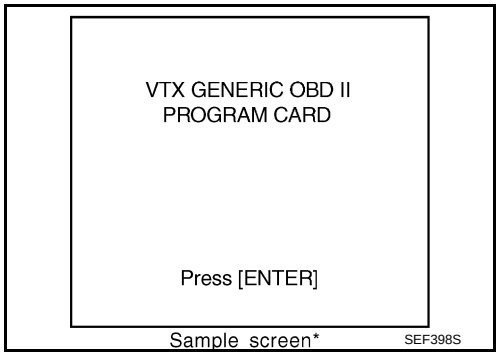


FUNCTION

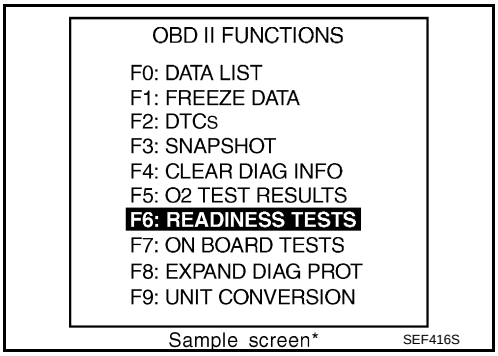
Diagnostic Service		Function
Service $01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
Service $02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-1020, "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:0000000001161755

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:0000000001161756

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 (0.983 - 1.043 bar, 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
- 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 EC-689, "BASIC INSPECTION : Special Repair Requirement".
2. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode with CONSULT-III.
3. Make sure that monitor items are within the SP value.

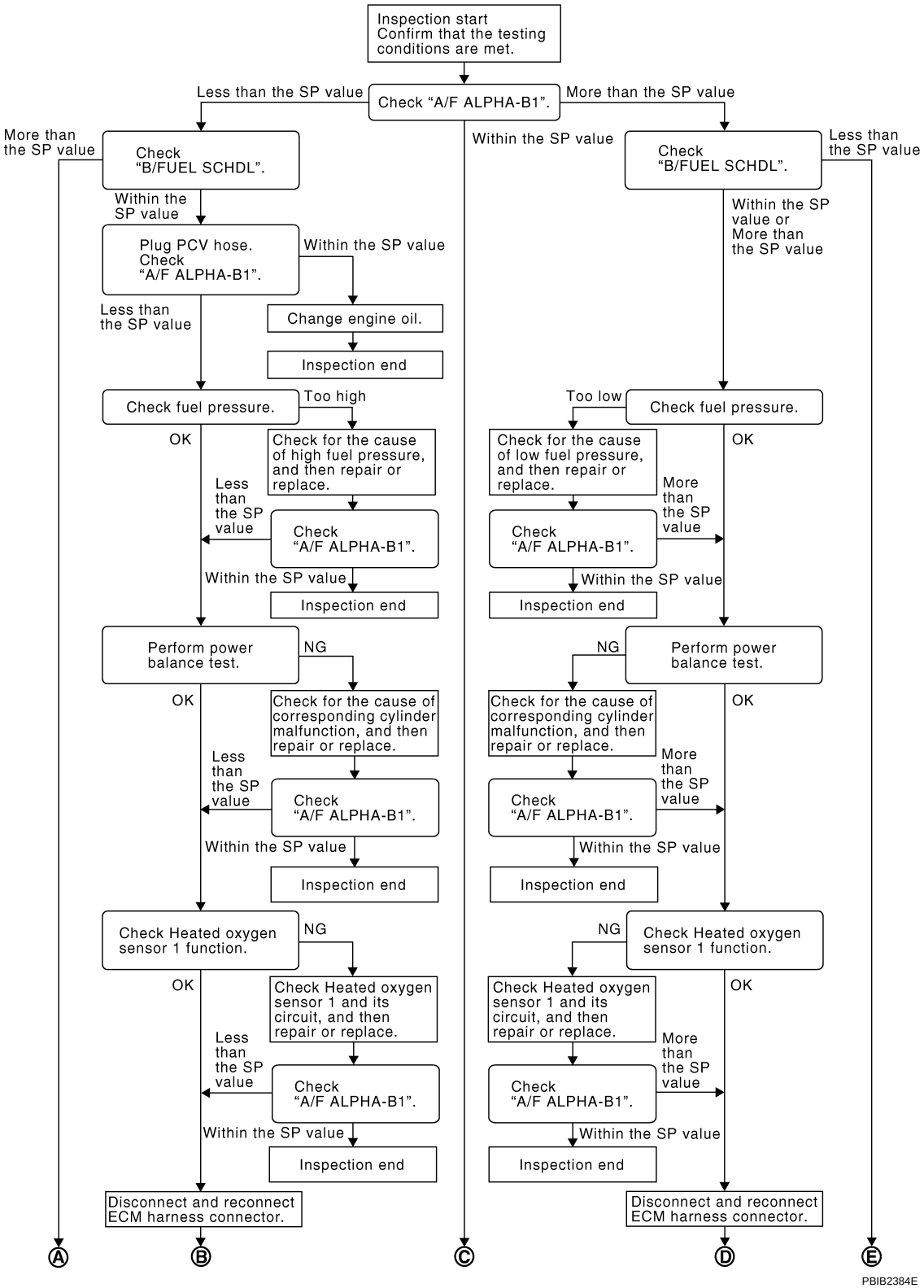
Is the inspection result normal?

YES >> END
NO >> Go to EC-782, "Diagnosis Procedure".

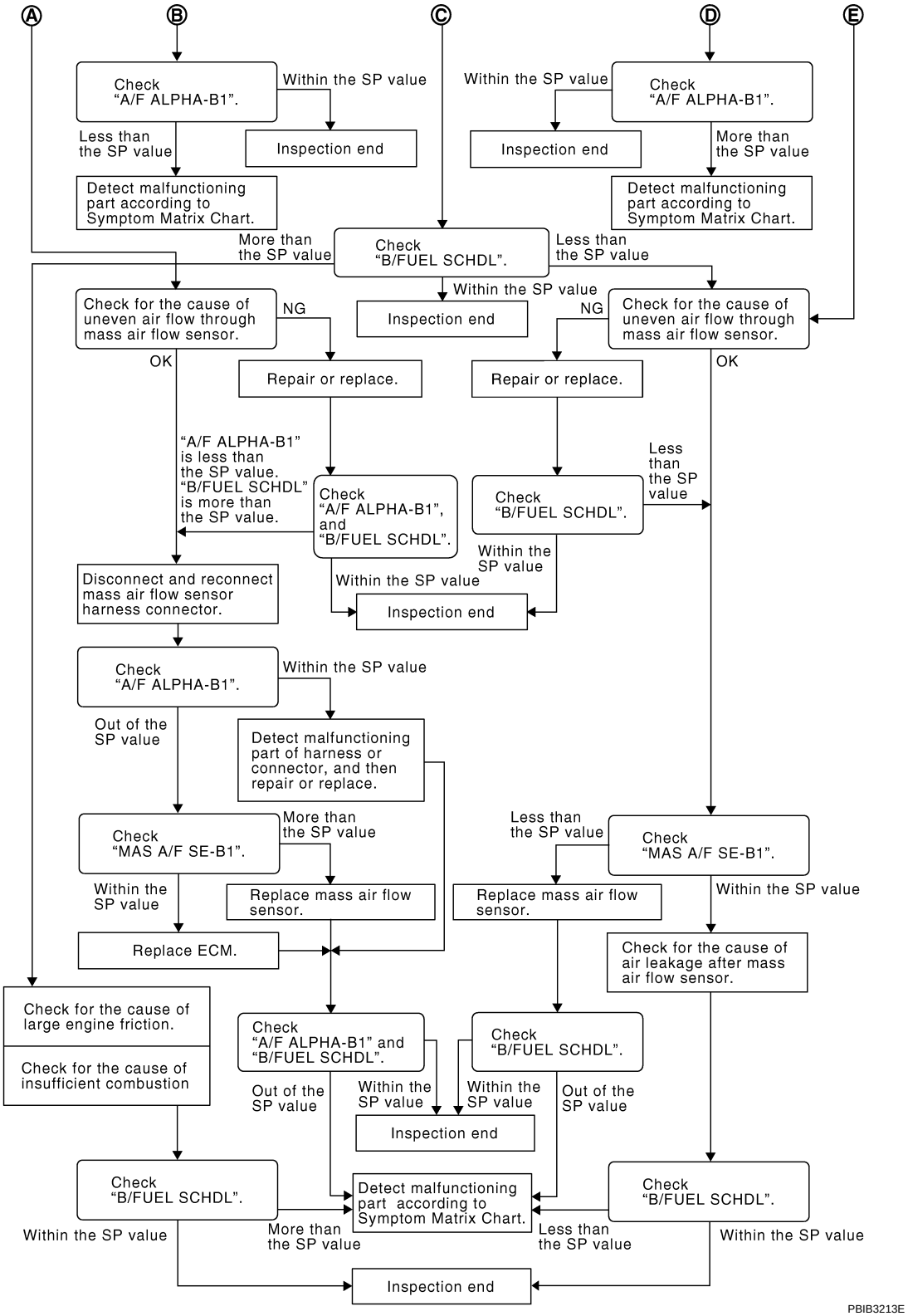
Diagnosis Procedure

INFOID:0000000001161757

OVERALL SEQUENCE



PBIB2384E



DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1"

With CONSULT-III

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-781, "Component Function Check".
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the 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 EC-1035, "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 EC-981, "Component Function Check".)
2. Fuel injector and its circuit (Refer to EC-975, "Component Function Check".)
3. Intake air leakage
4. Low compression pressure (Refer to EM-151, "Checking Compression Pressure".)

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 HEATED OXYGEN SENSOR 1 FUNCTION

1. Run engine at about 2,000 rpm for about 2minutes under no load.
2. Select “HO2S MNTR (B1)”, in “DATA MONITOR” mode.
3. Running engine at 2,000 rpm under no load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.

1 time : RICH → LEAN → RICH
2 times : RICH → LEAN → RICH → LEAN → RICH

Is the inspection result more than 5 times during 10 seconds?

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

13. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT

Check heated oxygen sensor 1 and its circuit, refer to.

>> 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 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 EC-1024, "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 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 EC-799, "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 EC-692, "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 EC-1024, "Symptom Table".

30. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-1024, "Symptom Table".

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000001161758

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 E15. Refer to Ground Inspection in GI-58, "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 harness connector terminals as follows.

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
E16	93	F10	10	Battery voltage
			11	
		E16	108	

Is the inspection result normal?

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

4.DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No. 55)
- Harness for open or short between ECM and fuse

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

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

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

ECM		Ground	Continuity
Connector	Terminal		
F10	10	Ground	Existed
	11		
E16	108		

3. Also check harness for short to power.

Is the inspection result normal?

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

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F8, E8
- 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		
E43	3	Ground	Battery voltage

Is the inspection result normal?

YES >> Go to EC-981, "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 harness connector terminals as follows.

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
E16	105	E16	108	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 15.
NO-1 >> Battery voltage does not exist: GO TO 9.
NO-2 >> Battery voltage exists for more than a few seconds: GO TO 12.

9.CHECK ECM POWER SUPPLY CIRCUIT-IV

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

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F10	32	E16	108	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 11.

10.CHECK ECM POWER SUPPLY CIRCUIT-V

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

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E16	105	E43	4	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 power in harness or connectors.

11. CHECK ECM POWER SUPPLY CIRCUIT-VI

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

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F10	32	E43	7	Existed

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

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

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

13. CHECK 20A FUSE

1. Disconnect 20A fuse (No. 53) 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 E15. Refer to Ground Inspection in GI-58, "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		
F10	10	Ground	Existed
	11		
E16	108		

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 F8, E8
- 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-55, "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:0000000001161759

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:0000000001161760

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 1st trip DTC.

Is 1st trip DTC detected?

YES >> EC-793, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161761

Go to LAN-22, "Trouble Diagnosis Flow Chart".

U1010 CONTROL UNIT (CAN)

Description

INFOID:0000000001161762

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:0000000001161763

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 EC-794, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161764

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 EC-794, "DTC Logic".
5. Check DTC.

With GST

1. Turn ignition switch ON.
2. Select “Service $04” with GST.
3. Perform DTC CONFIRMATION PROCEDURE.
   See EC-794, "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 EC-692, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

P0011 IVT CONTROL

DTC Logic

INFOID:0000000001161765

DTC DETECTION LOGIC

NOTE:
If DTC P0011 is displayed with DTC P1111, first perform the trouble diagnosis for EC-882, "DTC 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.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10V and 16V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

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

ENG SPEED	1,200 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 4.2 msec
Shift lever	N position

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

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

Is 1st trip DTC detected?

YES >> Go to EC-796, "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	2,000 - 3,175 rpm (A constant rotation is maintained.)
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?

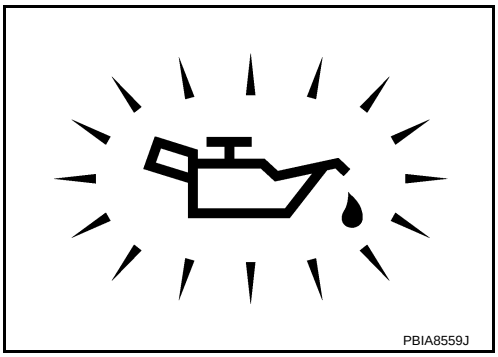
YES >> Go to EC-796, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161766

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-15, "Inspection".
NO >> GO TO 2.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-797, "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 EC-865, "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 EC-868, "Component Inspection".

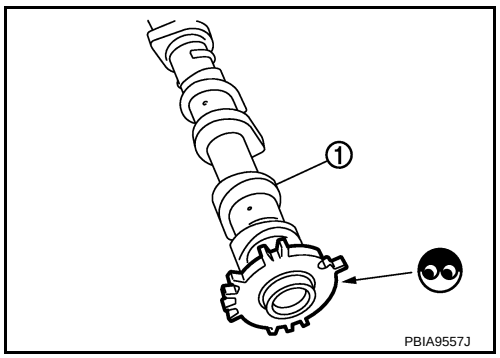
Is the inspection result normal?

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-177, "Removal and Installation".
NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to LU-15, "Inspection".

Is the inspection result normal?

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

8. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001161767

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)

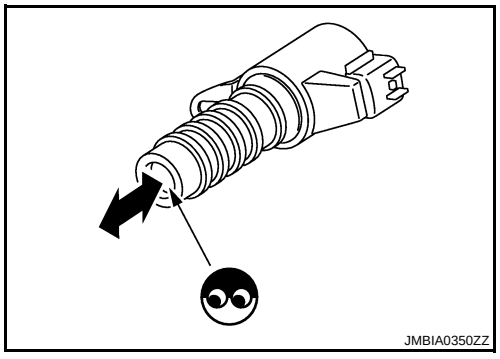
Is the inspection result normal?

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?

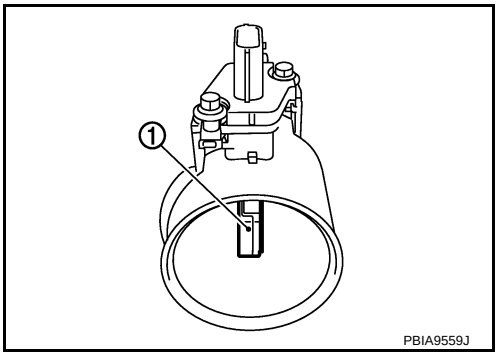
YES >> INSPECTION END
NO >> Replace intake valve timing control solenoid valve.

P0102, P0103 MAF SENSOR

Description

INFOID:0000000001161768

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:0000000001161769

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
P0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

Which DTC is detected?

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

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

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

Is DTC detected?

YES >> Go to EC-800, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-I

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

Is DTC detected?

YES >> Go to EC-800, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-II

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

Is DTC detected?

YES >> Go to EC-800, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161770

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 E15. Refer to Ground Inspection in GI-58, "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		
F31	2	Ground	Battery voltage

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 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	
F31	3	F11	52	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

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

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	4	F11	45	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 MASS AIR FLOW SENSOR

Refer to EC-801, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace mass air flow sensor.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001161771

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.)	0.9 - 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.

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
Connector	Terminal	Connector	Terminal		
F11	45 (MAF sensor)	F11	52	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 >> 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.)	0.9 - 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.

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		
F11	45 (MAF sensor)	F11	52	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
	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		
F11	45 (MAF sensor)	F11	52	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?

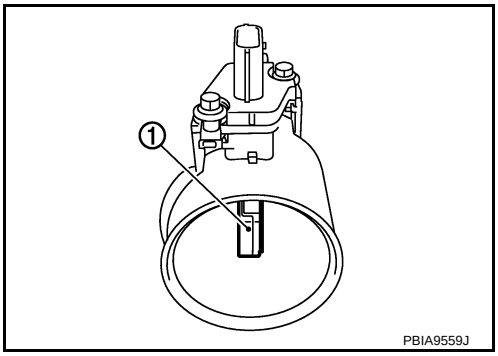
YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor.

P0112, P0113 IAT SENSOR

Description

INFOID:0000000001161772

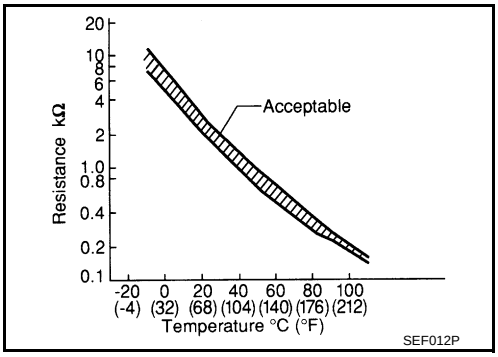
The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response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



<Reference data>

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

*: These data are reference values and are measured between ECM terminal 46 (Intake air temperature sensor) and 55.



DTC Logic

INFOID:0000000001161773

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. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-805, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161774

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
F31	5	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.

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	
F31	6	F11	55	Existed

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

Is the inspection result normal?

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

4.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-805, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001161775

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
5 and 6	Temperature °C (°F)	25 (77)	1.800 - 2.200 kΩ

Is the inspection result normal?

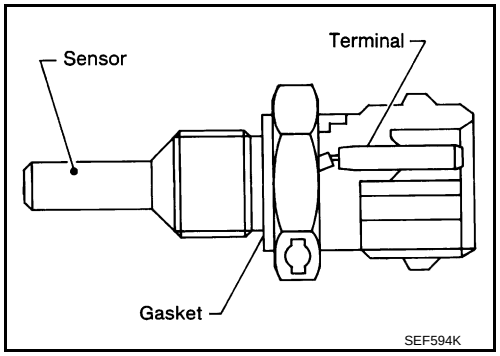
YES >> INSPECTION END
NO >> Replace mass air flow sensor (with intake air temperature sensor).

P0117, P0118 ECT SENSOR

Description

INFOID:0000000001161776

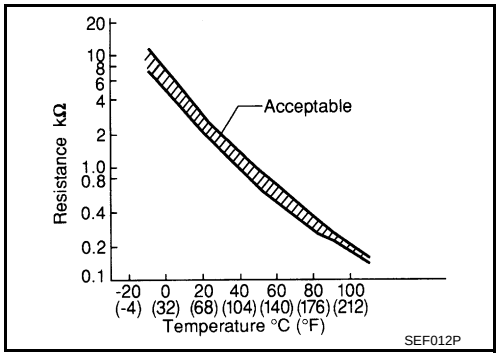
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 38 (Engine coolant temperature sensor) and 44.



DTC Logic

INFOID:0000000001161777

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

Is DTC detected?

YES >> Go to EC-808, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161778

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
F6	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	
F6	2	F11	44	Existed

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

Is the inspection result normal?

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

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-808, "Component Inspection".

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

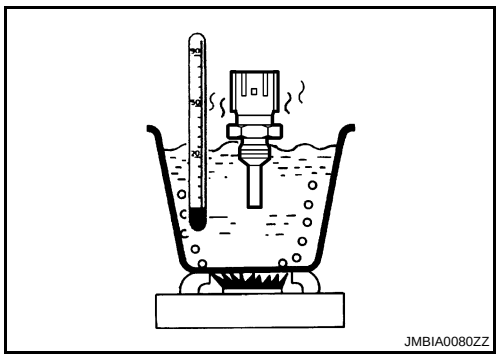
Component Inspection

INFOID:0000000001161779

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)	2.1 - 2.9 kΩ
		50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

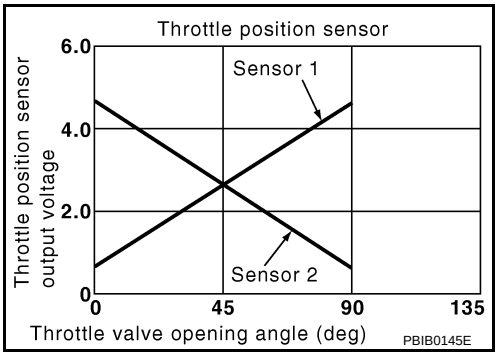
YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor.

P0122, P0123 TP SENSOR

Description

INFOID:0000000001161780

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:0000000001161781

DTC DETECTION LOGIC

NOTE:
If DTC P0122 or P0123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-928, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	• Harness or connectors (TP sensor 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 2)
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 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to EC-810, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161782

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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

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		
F7	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 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	
F7	4	F11	36	Existed

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

Is the inspection result normal?

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

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

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	3	F11	34	Existed

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

Is the inspection result normal?

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

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-812, "Component Inspection".

Is the inspection result normal?

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

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-812, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001161783

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-694, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to 1st position.
6. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
F11	33 (TP sensor 1 signal)	F11	36	Accelerator pedal	Fully released	More than 0.36V
					Fully depressed	Less than 4.75V
	34 (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 EC-812, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001161784

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-694, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-694, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

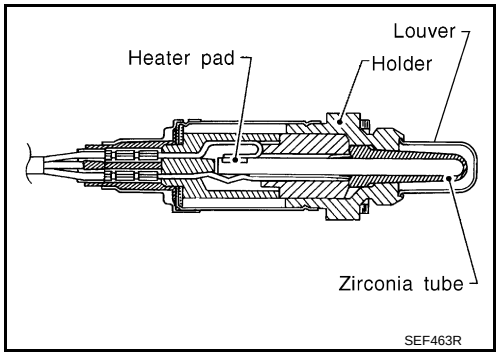
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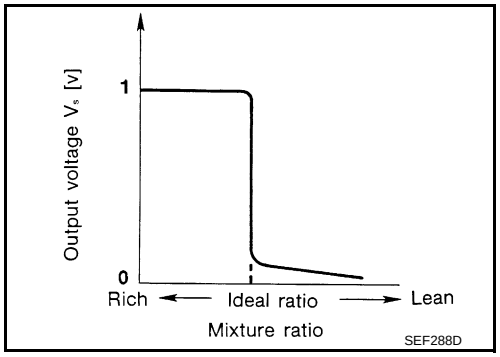
P0132 HO2S1

Description

INFOID:0000000001161785

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



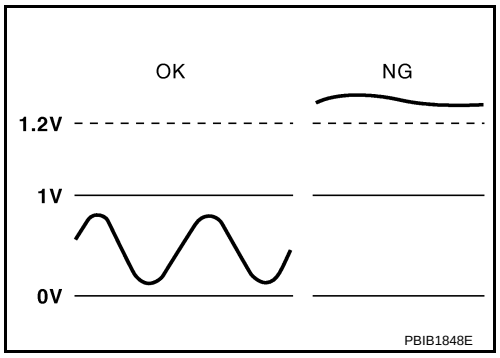


DTC Logic

INFOID:0000000001161786

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 is not inordinately high.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	heated oxygen sensor 1 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen 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.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for 2 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC is detected?

YES >> Go to EC-814, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161787

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1. Refer to EM-159, "Removal and Installation".

>> GO TO 3.

3.CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	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 HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	4	F11	49	existed

2. Check harness continuity between HO2S1 harness connector or ECM harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F12	4	F11	49	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 HO2S1 CONNECTOR FOR WATER

Check heated oxygen sensor 1 connector for water.

Is the inspection result normal?

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

6. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-815, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace heated oxygen sensor 1.

7. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001161788

1. INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

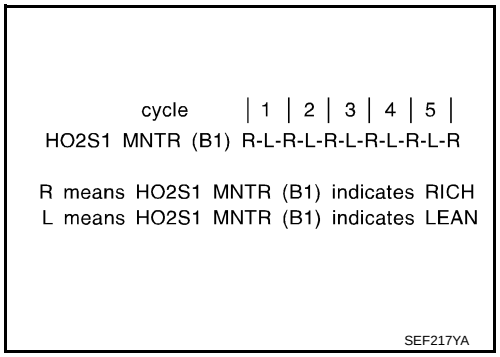
YES >> GO TO 2.
NO >> GO TO 3.

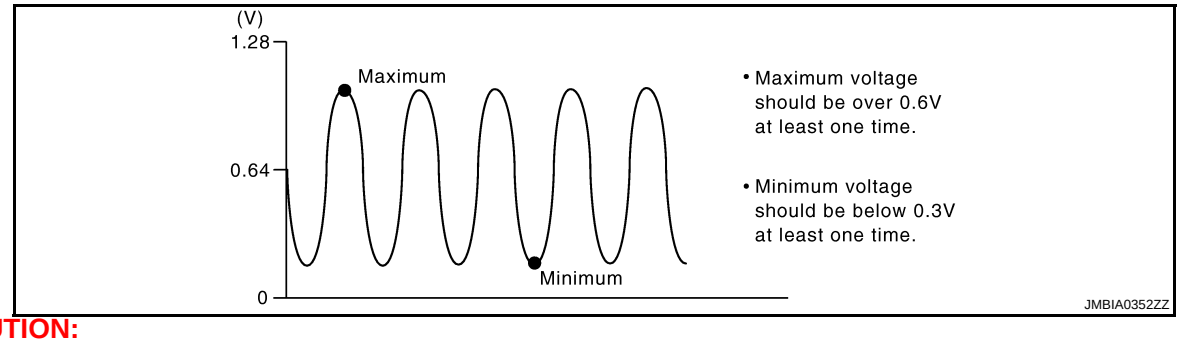
2. CHECK HEATED OXYGEN SENSOR 1

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.
6. Check the following.

- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.





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.**

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector terminals as foloows under the following condition.

ECM		ground		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

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.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

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.**

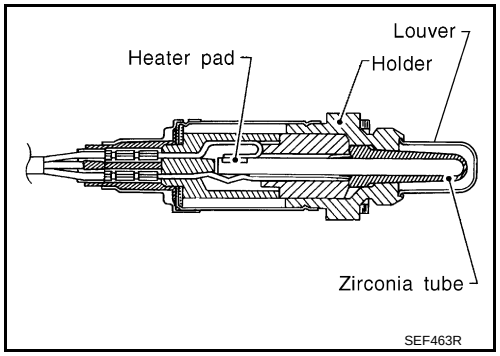
>> INSPECTION END

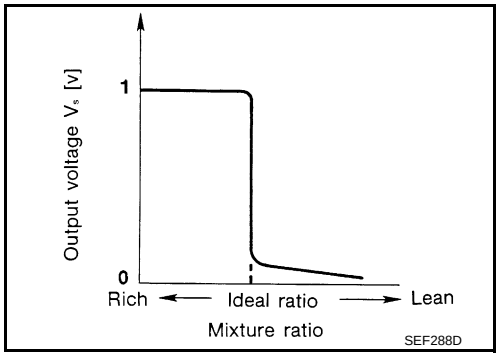
P0133 HO2S1

Description

INFOID:0000000001161789

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



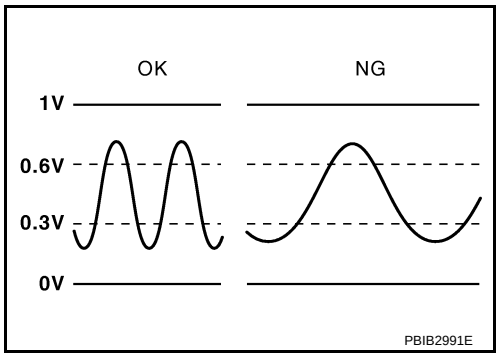


DTC Logic

INFOID:0000000001161790

DTC DETECTION LOGIC

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



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0133	Heated oxygen sensor 1 circuit slow response	• The response of the voltage signal from the sensor takes more than the specified time.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen sensor 1 • Fuel pressure • Fuel injector • Intake air leaks • Exhaust gas leaks • PCV valve • 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:

Always perform at a temperature above -10°C (14°F).

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 3.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P0133” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.
   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 40 to 50 seconds.)
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	1,300 - 3,500 rpm
VHCL SPEED SE	More than 80 km/h (50 MPH)
B/FUEL SCHDL	3 - 15 msec
Shift lever	Suitable position

   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Touch “SELF-DIAG RESULTS”.

Which displayed on COUSULT-III screen?

OK >> INSPECTION END.
NG >> Go to EC-819, "Diagnosis Procedure".

3. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set volmeter probes between ECM harness connector terminals as follows.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-819, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001161791

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

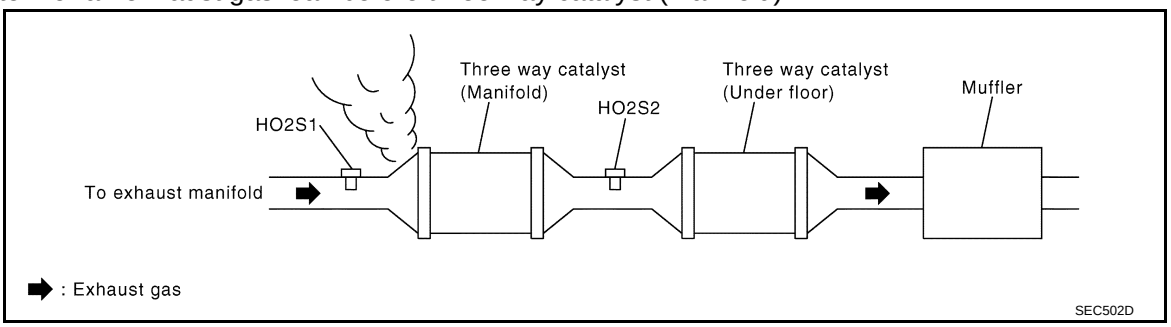
2.RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten the heated oxygen sensor 1. Refer to EM-159, "Removal and Installation".

>> GO TO 3.

3.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (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 EC-696, "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 EC-844, "DTC Logic" or EC-848, "DTC Logic".
NO >> GO TO 6.

6.CHECK HEATED OXYGEN SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	56	Existed

5. 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 HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	4	F11	49	Existed

2. Check the continuity between HO2S1 harness connector or ECM harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F12	4	F11	49	Ground	Not existed

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 MASS AIR FLOW SENSOR

Check mass air flow sensor.
Refer to EC-801, "Component Inspection".

Is the inspection result normal?

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

9.CHECK PCV VALVE

Refer to EC-987, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace PCV valve.

10.CHECK HEATED OXYGEN SENSOR 1

Perform EC-820, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace heated oxygen sensor 1.

11.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001161792

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 1

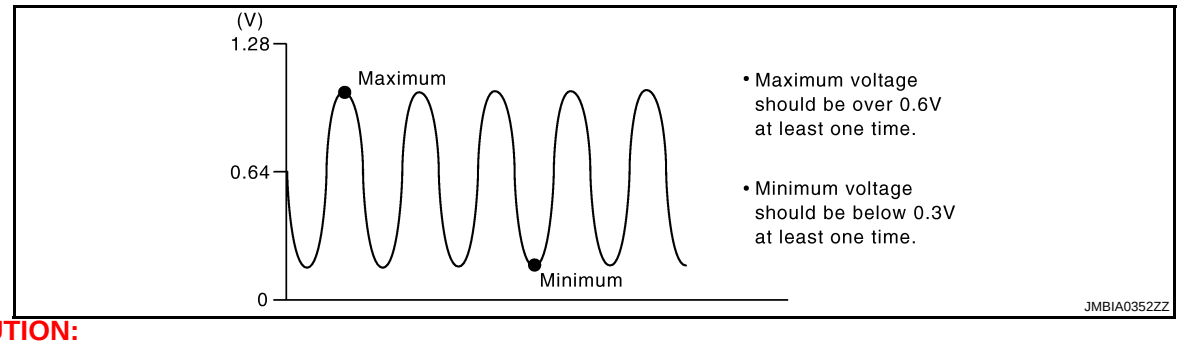
With CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.
6. Check the following.

- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds 1.0V.

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R				

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA



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.**

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 shignal)	F11	56	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

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.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

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.**

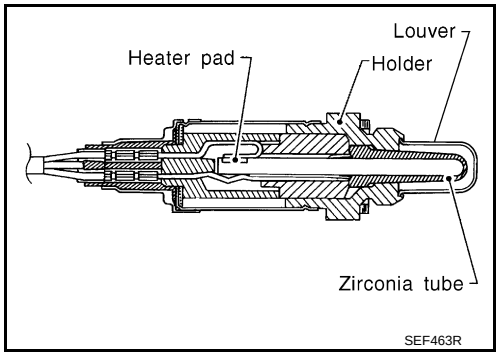
>> INSPECTION END

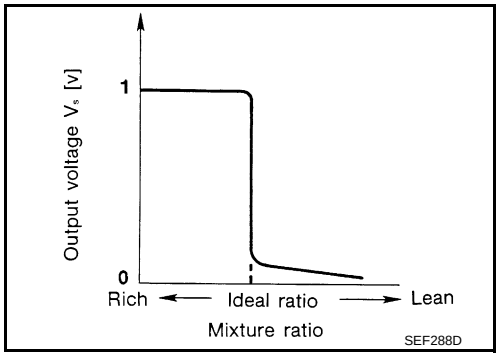
P0134 HO2S1

Description

INFOID:0000000001161793

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



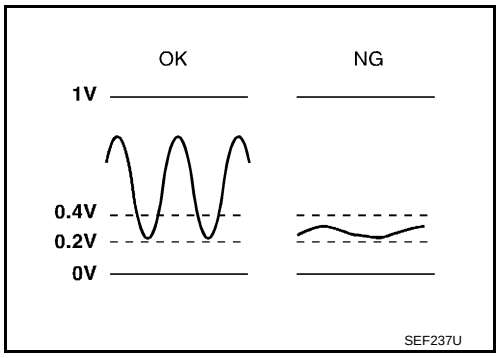


DTC Logic

INFOID:0000000001161794

DTC DETECTION LOGIC

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 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
P0134 0134	Heated oxygen sensor 1 circuit no activity detected	The voltage from the sensor is constantly approx. 0.3V.	• Harness or connectors (The sensor circuit is open or shorted.) • Heated oxygen 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 3.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P0134” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.
   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 40 to 50 seconds.)
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	1,300 - 3,500 rpm
VHCL SPEED SE	More than 80 km/h (50 MPH)
B/FUEL SCHDL	3 - 15 msec
Shift lever	Suitable position

If “TESTING” is not displayed after 5 minutes, retry from step 2.

7. Touch “SELF-DIAG RESULTS”.

Which displayed on COUSULT-III screen?

OK >> INSPECTION END.
NG >> Go to EC-824, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM harness connector terminals as follows.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Engine speed held at 2,000 rpm constant under no load.	• The voltage dose not remain in the range of 0.2 to 0.4.

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-824, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001161795

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.

2. Disconnect ECM harness connector.
3. Check harness continuity between ECM harness connector and HO2S1 harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	56	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 HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	4	F11	49	Existed

2. Check harness continuity between ECM harness connector or HO2S1 harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F12	4	F11	49	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 HEATED OXYGEN SENSOR 1

Refer to EC-825, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace heated oxygen sensor 1.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001161796

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

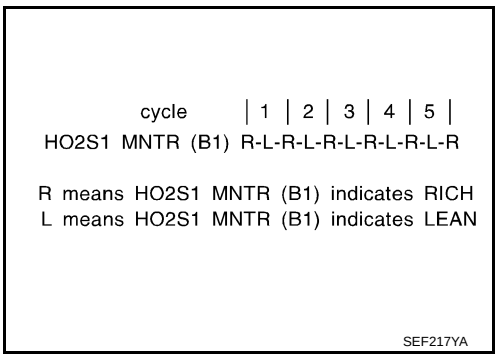
YES >> GO TO 2.
NO >> GO TO 3.

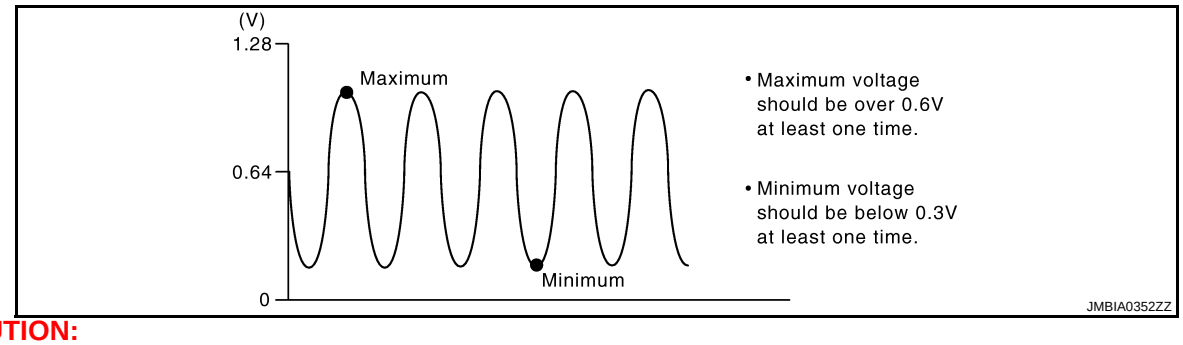
2.CHECK HEATED OXYGEN SENSOR 1

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.

6. Check the following.
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.





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.**

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	E11	56	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

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.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.
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

P0135 HO2S1 HEATER

Description

INFOID:0000000001161797

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF duty control of the heated oxygen sensor 1 heater corresponding to the engine speed and engine coolant temperature. The duty percent varies with engine coolant temperature when engine is started.

DTC Logic

INFOID:0000000001161798

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0135	Heated oxygen sensor 1 heater control circuit low	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	• Harness or connectors (The heated oxygen sensor 1 heater circuit is open or shorted.) • Heated oxygen 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. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-828, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161799

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between HO2S1 sensor 1 harness connector and ground.

HO2S1		Ground	Voltage
Connector	Terminal		
F12	2	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No. 54)
- Harness for open or short between heated oxygen sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK HO2S1 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	3	F10	3	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 1 HEATER

Refer to EC-829, "Component Inspection".

Is the inspection result normal?

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

6.REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

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

Perform GI-55, "Intermittent Incident".

>> Repair or replace.

Component Inspection

INFOID:0000000001161800

1.CHECK HEATED OXYGEN SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect HO2S1 harness connector.
3. Check resistance between HO2S1 terminals as follows.

Terminals	Resistance [at 25°C (77°F)]
2 and 3	3.4 - 4.4 Ω
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 1

Replace heated oxygen 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.**

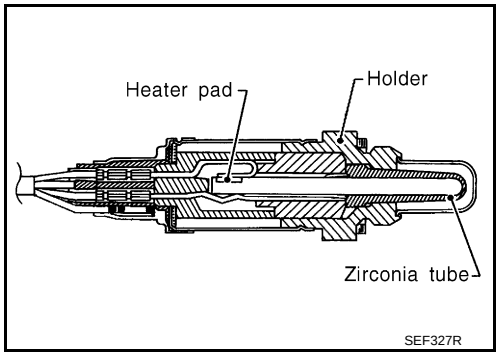
>> INSPECTION END

P0138 HO2S2

Description

INFOID:0000000001161801

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 heated oxygen 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.

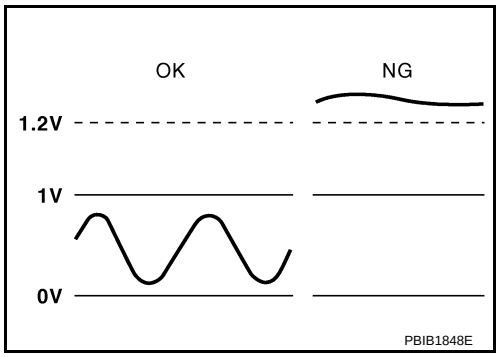


DTC Logic

INFOID:0000000001161802

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time.
To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high 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	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

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 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 2 minutes.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-832, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161803

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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	
F13	1	F11	59	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	
F13	4	F11	50	Existed

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

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F13	4	F11	50	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 EC-833, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001161804

1. INSPECTION START

Do you have CONSULT-III?

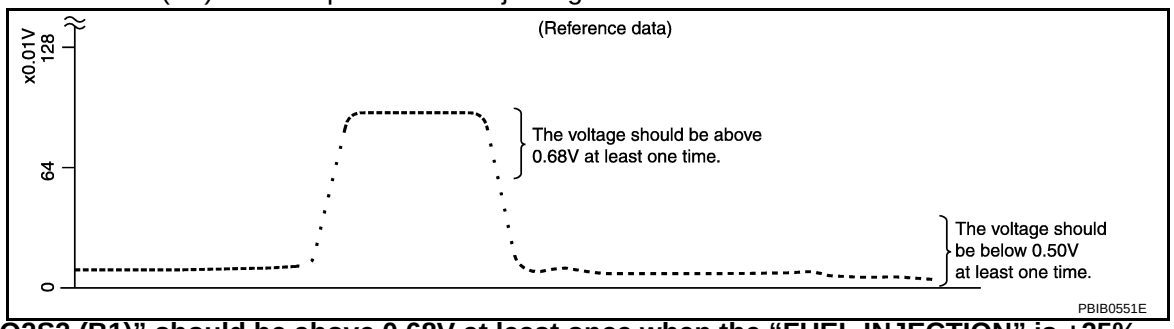
Do you have CONSULT-III?

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 0.50V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

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

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	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 0.50V at least once during this procedure.

Is the inspection result normal?

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

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	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 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	Coasting from 80 km/h (50 MPH) in 4th gear position	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Always drive vehicle at a safe speed.

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.**

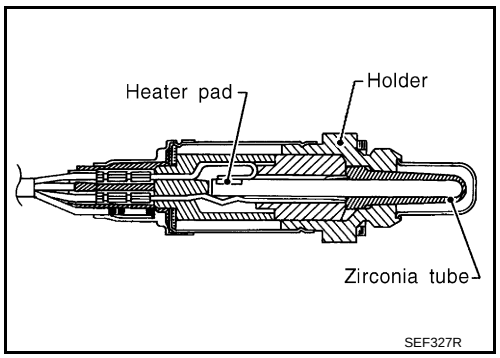
>> INSPECTION END

P0139 HO2S2

Description

INFOID:0000000001161805

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 heated oxygen 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.

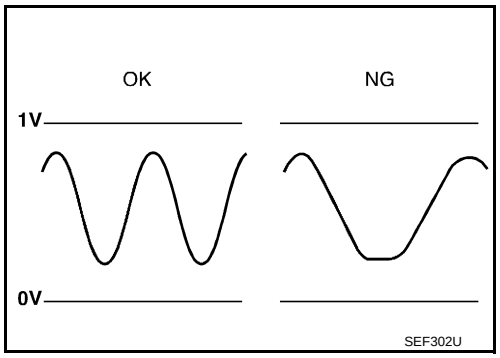


DTC Logic

INFOID:0000000001161806

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139	Heated oxygen sensor 2 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.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 11.

2.PRECONDITIONING

"COMPLETED" will appear on CONSULT-III screen when all tests "COND1", "COND2" and "COND3" are completed.
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION
For 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 PERFORM PROCEDURE FOR COND1 - II.

>> GO TO 3.

3. PERFORM PROCEDURE FOR COND1-I

Start engine and warm it up to normal operating temperature.

>> GO TO 4.

4. PERFORM PROCEDURE FOR COND1-II

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 5.

5. PERFORM PROCEDURE FOR COND1-III

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) P0139” 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 9.
NO >> GO TO 6.

6. PERFORM PROCEDURE FOR COND1-IV

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 4.
COND1: COMPLETED COND2: INCOMPLETED>>GO TO 7.
COND1: COMPLETED COND2: COMPLETED>>GO TO 8.

7. 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 8.
COND2: COMPLETED COND3: COMPLETED>>GO TO 9.

8. PERFORM PROCEDURE FOR COND3-I

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 9.

9. PERFORM PROCEDURE FOR COND3-II

Touch “SELF DIAGRESULTS”.

Which displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-838, "Diagnosis Procedure".
CAN NOT BE DIAGNOSED>>GO TO 10.

10. PERFORM PROCEDURE FOR COND3-III

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.

11. PREFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-837, "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 EC-838, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001161807

1. PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

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

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	Revving up to 4,000 rpm under no load at least 10 times	A change of voltage should be more than 0.12 V for 1 second during this procedure.

Is the inspection result normal?

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

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	Keeping engine speed at idle for 10 minutes	A change of voltage should be more than 0.12 V for 1 second during this procedure.

Is the inspection result normal?

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

3. PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	Coasting from 80 km/h (50 MPH) in D position (CVT), 3rd gear position (M/T)	A change of voltage should be more than 0.12 V for 1 second during this procedure.

iAlways drive vehicle at a safe speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-838, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001161808

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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 EC-696, "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 EC-844, "DTC Logic" or EC-848, "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	
F13	1	F11	59	Existed

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

Is the inspection result normal?

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

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	4	F11	50	Existed

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

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F13	4	F11	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-839, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001161809

1. INSPECTION START

Do you have CONSULT-III?

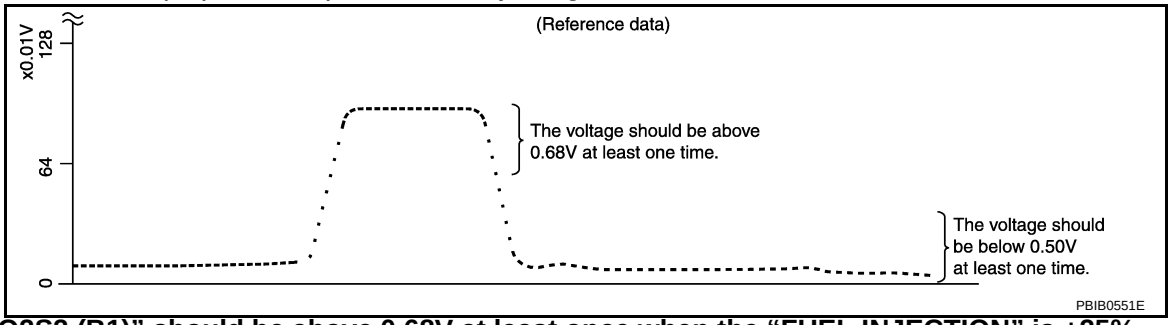
Do you have CONSULT-III?

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 0.50V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.

3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	E11	59	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 0.50V at least once during this procedure.

Is the inspection result normal?

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

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	E11	59	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 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	E11	59	Coasting from 80 km/h (50 MPH) in 4th gear position	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Always drive vhicle at a safe speed.

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

P0141 HO2S2 HEATER

Description

INFOID:0000000001161810

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
Above 3,600	OFF
Below 3,600 rpm after the following conditions are met. • Engine: After warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

DTC Logic

INFOID:0000000001161811

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0141	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) • Heated oxygen sensor 2 heater

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. Turn ignition switch ON.
2. Wait at least 5 seconds.
3. Check 1st trip DTC.

Is 1st tip DTC detected?

YES >> Go to EC-841, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161812

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
F13	2	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No. 54)
- 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	
F13	3	F10	5	Existed

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

Is the inspection result normal?

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

5.CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-843, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001161813

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 [at 25°C (77°F)]
2 and 3	3.3 - 4.4 Ω
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

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000001161814

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 heated oxygen 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
Heated oxygen 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 • Heated oxygen 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 EC-696, "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 EC-845, "Diagnosis Procedure".
NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

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

Is 1st trip DTC detected?

YES >> Go to EC-845, "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?

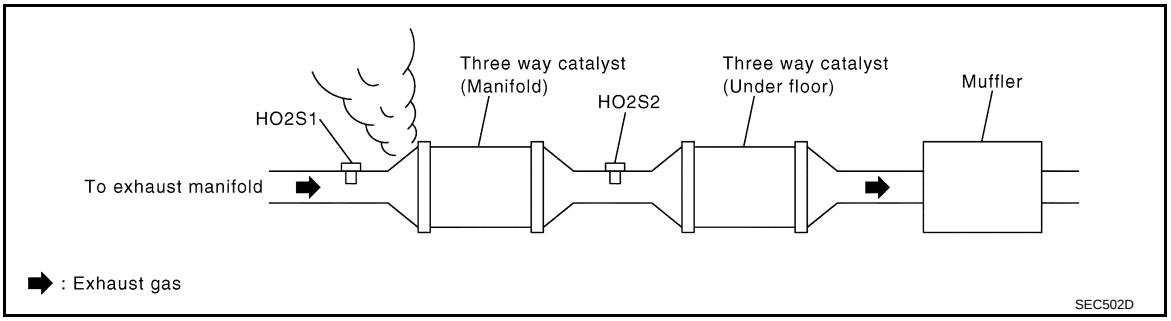
YES >> Go to EC-845, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161815

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 HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT

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

HO2S1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	4	F11	49	Existed

5. Check the continuity between heated oxygen sensor 1 harness connector or ECM harness connector and ground.

HO2S1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F12	4	F11	49	Ground	Not existed

6. Also check harness for short to power.

Is the inspection result normal?

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

4. CHECK FUEL PRESSURE

Check fuel pressure. Refer to EC-1035, "Inspection".

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.
   For specification, refer to EC-1038, "Mass Air Flow Sensor".

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.
   For specification, refer to EC-1038, "Mass Air Flow Sensor".

Is the measurement value within the specification?

YES >> GO TO 7.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-799, "DTC Logic".

7. CHECK FUNCTION OF FUEL INJECTOR

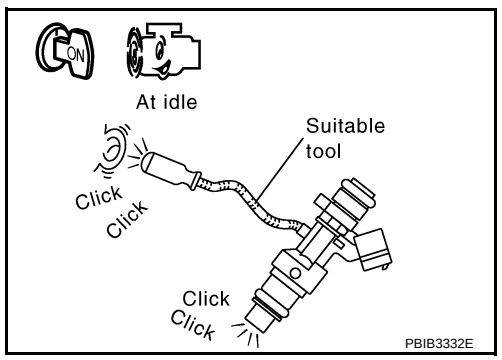
With CONSULT-III

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.



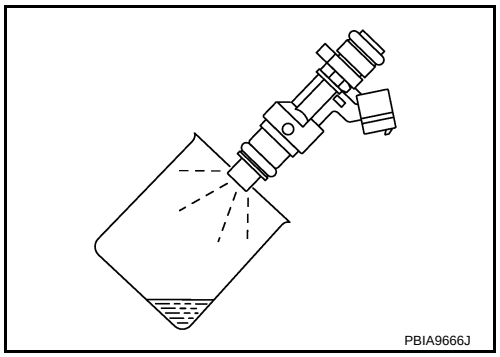
Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-975, "Component Function Check".

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-162, "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-55, "Intermittent Incident".

>> INSPECTION END

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000001161816

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 heated oxygen 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
Heated oxygen 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.)	• Heated oxygen 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 EC-696, "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 EC-849, "Diagnosis Procedure".
NO >> Remove spark plugs and check for fouling, etc.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Start engine and let it idle for at least 10 minutes.

Is 1st trip DTC detected?

YES >> Go to EC-849, "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?

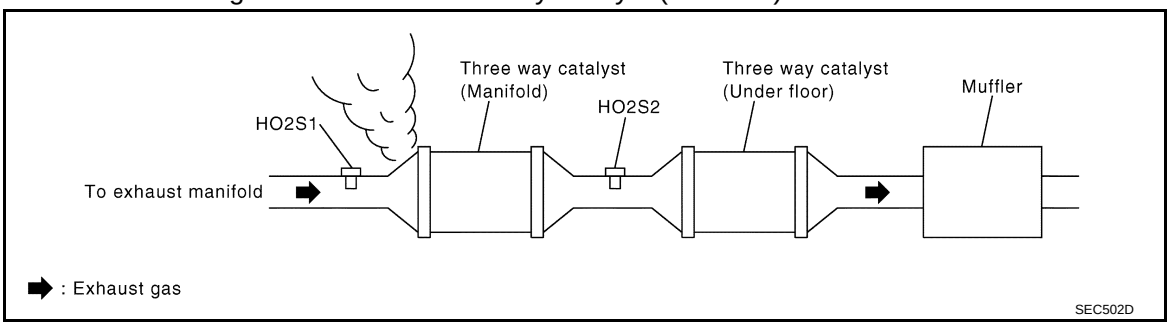
YES >> Go to EC-849, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161817

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 HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT

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

HO2S1 sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	4	F11	49	Existed

5. Check the continuity between heated oxygen sensor 1 harness connector or ECM harness connector and ground.

HO2S1 sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F12	4	F11	49	Ground	Not existed

6. Also check harness for short to power.

Is the inspection result normal?

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

4. CHECK FUEL PRESSURE

Check fuel pressure. Refer to EC-1035, "Inspection".

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.
   For specification, refer to EC-1038, "Mass Air Flow Sensor".

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in “Service $01” with GST.
   For specification, refer to EC-1038, "Mass Air Flow Sensor".

Is the measurement value within the specification?

YES >> GO TO 7.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-799, "DTC Logic".

7. CHECK FUNCTION OF FUEL INJECTOR

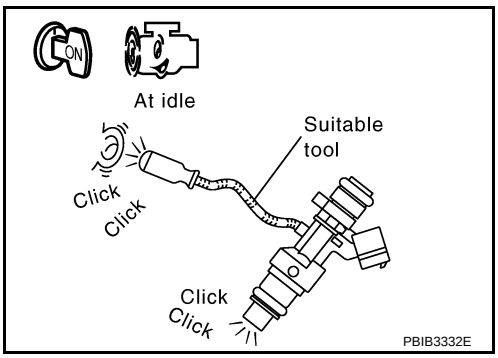
With CONSULT-III

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 EC-975, "Component Function Check".

8. CHECK FUELINJECTOR

1. Remove fuel injector assembly. Refer to EM-162, "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-55, "Intermittent Incident".

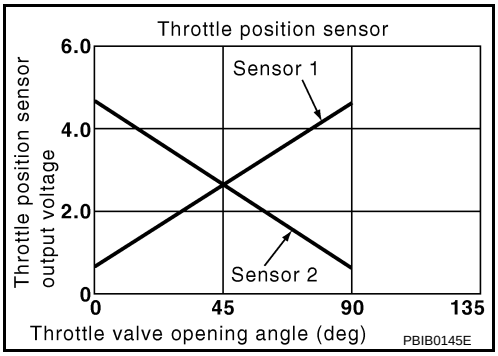
>> INSPECTION END

P0222, P0223 TP SENSOR

Description

INFOID:0000000001161818

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:0000000001161819

DTC DETECTION LOGIC

NOTE:
If DTC P0222 or P0223 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-928, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	• Harness or connectors (TP sensor 1 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1)
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 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to EC-852, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161820

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
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		
F7	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 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	
F7	4	F11	36	Existed

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

Is the inspection result normal?

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

4. CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	1	F11	33	Existed

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

Is the inspection result normal?

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

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-854, "Component Inspection".

Is the inspection result normal?

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

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-854, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001161821

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-694, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to 1st position.
6. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
F11	33 (TP sensor 1 signal)	F11	36	Accelerator pedal	Fully released	More than 0.36V
					Fully depressed	Less than 4.75V
	34 (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 EC-854, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001161822

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-694, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-694, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

INFOID:0000000001161823

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 • Heated oxygen 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. Restart engine and let it idle for about 15 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-856, "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 EC-856, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161824

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?

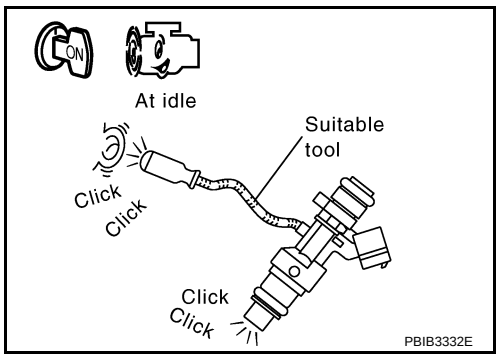
YES >> GO TO 9.
NO >> GO TO 4.

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.



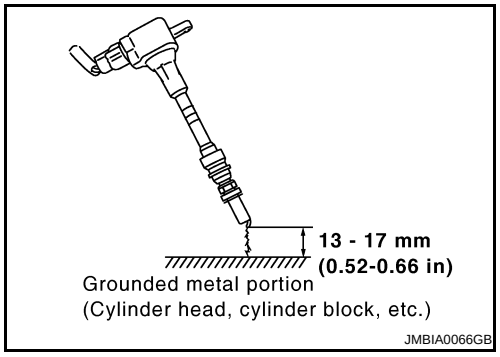
Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-976, "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 EC-981, "Component Function Check".

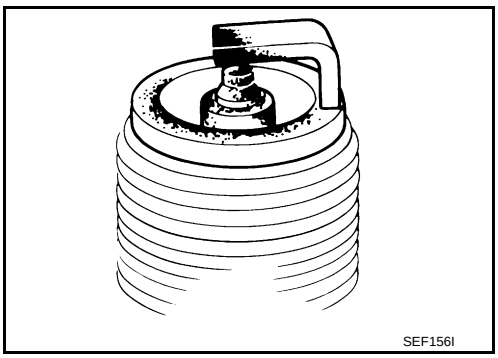
7. CHECK SPARK PLUG

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-145, "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-145, "Removal and Installation".

9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-151, "Checking Compression Pressure".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Check fuel pressure. Refer to EC-1035, "Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”.

NO >> Repair or replace.

12. CHECK IGNITION TIMING

For procedure, refer to EC-689, "BASIC INSPECTION : Special Repair Requirement".
For specification, refer to EC-1038, "Idle Speed" and EC-1038, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Follow the EC-693, "IGNITION TIMING : Special Repair Requirement".

13. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-829, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace heated oxygen sensor 1.

14. CHECK MASS AIR FLOW SENSOR

With CONSULT-III
Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-III.
For specification, refer to EC-1038, "Mass Air Flow Sensor".

With GST
Check mass air flow sensor signal in Service $01 with GST.
For specification, refer to EC-1038, "Mass Air Flow Sensor".

Is the measurement value within the specification?

YES >> GO TO 15.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-799, "DTC Logic".

15. CHECK SYMPTOM TABLE

Check items on the rough idle symptom in EC-1024, "Symptom Table".

Is the inspection result normal?

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

16. 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 EC-760, "Diagnosis Description".

>> GO TO 17.

17. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

P0327, P0328 KS

Description

INFOID:0000000001161825

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:0000000001161826

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
P0328	Knock 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.

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 run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-860, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161827

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect knock sensor harness connector and disconnect ECM harness connector.
2. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F14	2	F11	40	Existed

3. 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 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	
F14	1	F11	37	Existed

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

Is the inspection result normal?

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

4. CHECK KNOCK SENSOR

Refer to EC-861, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace knock sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001161828

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 [at 20°C (68°F)]
1 and 2	Approx. 532 - 588 kΩ

CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

Is the inspection result normal?

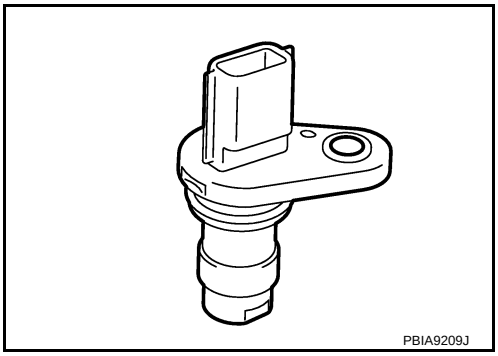
YES >> INSPECTION END
NO >> Replace knock sensor.

P0335 CKP SENSOR (POS)

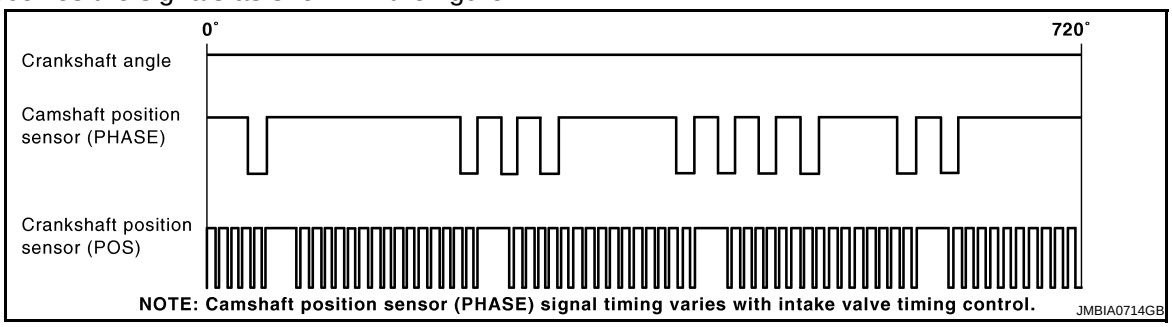
Description

INFOID:0000000001161829

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.


PBIA9209J

ECM receives the signals as shown in the figure.



DTC Logic

INFOID:0000000001161830

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (POS) circuit	• The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	• Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Refrigerant pressure sensor circuit is shorted.) (Accelerator pedal position sensor 2 circuit is shorted.) • Crankshaft position sensor (POS) • Refrigerant pressure sensor • Accelerator pedal position sensor (APPS 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 EC-863, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161831

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
F15	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 OFF.
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	
F15	1	F11	75	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
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
E16	102	APP sensor 2	E12 (LHD models) M204 (RHD models)	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 REFRIGRANT PRESSURE SENSOR

Refer to EC-988, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace refrigrant pressure sensor.

6.CHECK APP SENSOR

Refer to EC-955, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-693, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

8.CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F15	2	F11	62	Existed

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F15	3	F11	61	Existed

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

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-865, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

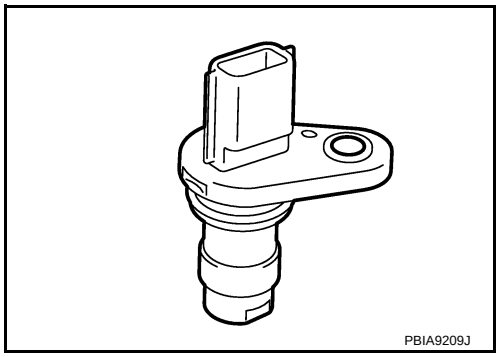
INFOID:0000000001161832

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 [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞ Ω
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

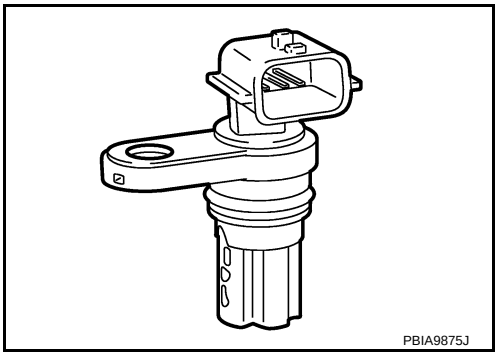
YES >> INSPECTION END
NO >> Replace crankshaft position sensor (POS).

P0340 CMP SENSOR (PHASE)

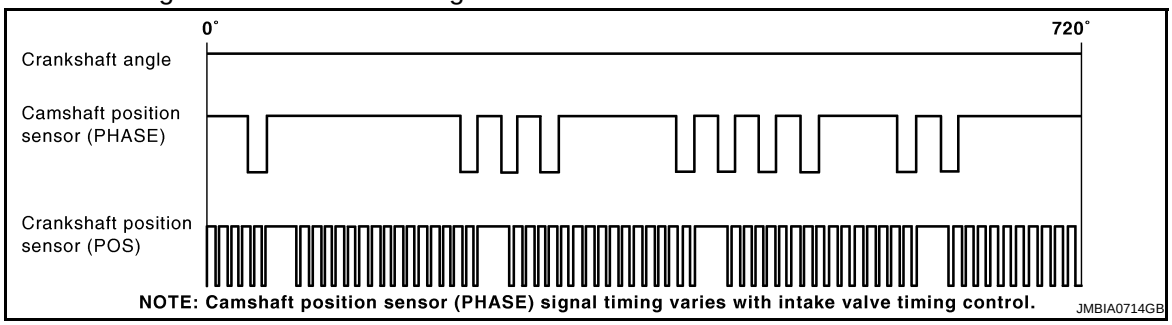
Description

INFOID:0000000001161833

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.


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Due to the changing magnetic field, the voltage from the sensor changes.
ECM receives the signals as shown in the figure.



DTC Logic

INFOID:0000000001161834

DTC DETECTION LOGIC

NOTE:
If DTC P0340 is displayed with DTC P1129, first perform the trouble diagnosis for DTC P1129. Refer to EC-928, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340	Camshaft position sensor (PHASE) circuit	• The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. • The cylinder No. signal is not sent to ECM during engine running. • The cylinder No. signal is not in the normal pattern during engine running.	• Harness or connectors (The sensor circuit is open or shorted) • Camshaft position sensor (PHASE) • Camshaft (INT) • Starter motor • Starting system circuit • Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-867, "Diagnosis Procedure".
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-867, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161835

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 E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

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

3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CMP sensor (PHASE) harness connector and ground.

CMP sensor (PHASE)		Ground	Voltage
Connector	Terminal		
F21	1	Ground	Approx. 5V

Is the inspection result normal?

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

4. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F21	2	F11	63	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 CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F21	3	F11	65	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-868, "Component Inspection".

Is the inspection result normal?

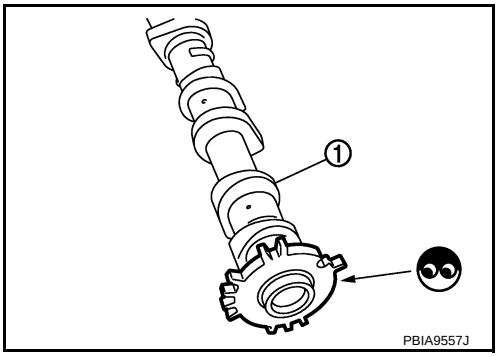
YES >> GO TO 7.
NO >> Replace camshaft position sensor (PHASE).

7.CHECK CAMSHAFT (INT)

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

Is the inspection result normal?

YES >> GO TO 8.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



8.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

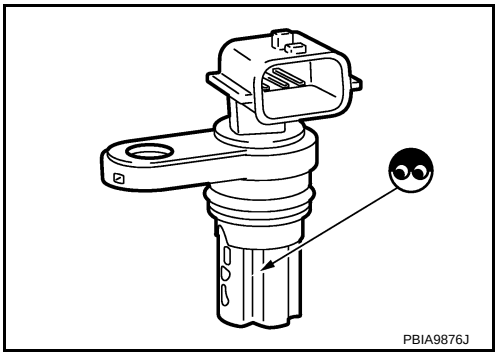
INFOID:0000000001161836

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 [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞ Ω
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace camshaft position sensor (PHASE).

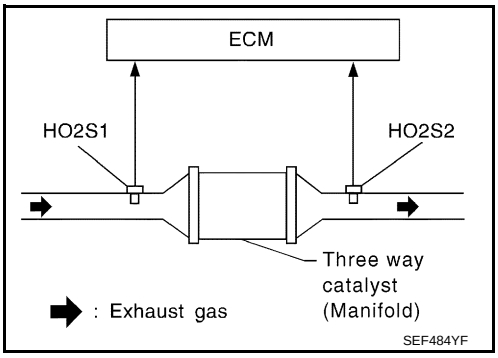
P0420 THREE WAY CATALYST FUNCTION

DTC Logic

INFOID:0000000001161837

DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of heated oxygen 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 heated oxygen 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. 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. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-III.
9. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
10. Check the indication of “CATALYST”.

Which is displayed on CONSULT-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

1. Stop engine and cool it down to less than 70°C (158°F).
2. 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 EC-872, "Diagnosis Procedure".
NO >> INSPECTION END

7. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-871, "Component Function Check".

NOTE:
Use component function check to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-872, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001161838

1. PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

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

(+)		(–)		Condition	Specification
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Keeping engine speed at 2,000 rpm constant under no load	The voltage switch periodically more than 5 times within 10 seconds.

Is the inspection result normal?

YES >> GO TO 2
NO >> Go to EC-817, "DTC Logic".

2. PERFORM COMPONENT FUNCTION CHECK-II

Without CONSULT-III

1. Set voltmeter probes between ECM harness connector terminals as follows.
2. Make sure that the voltage switching frequency (high&low) HO2S2 voltage is very less than that of HO2S1 voltage under the following condition.

(+)		(–)		Condition	Specification
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Keeping engine speed at 2,000 rpm constant under no load	Switching freqency ratio (A/B) : Less than 0.75 A : Heated oxygen sensor 2 voltage switching frequency B : Heated oxygen sensor 1 voltage switching frequency
	50 (HO2S2 signal)		59		

Is the inspection result normal?

YES >> INSPECTION END
NO >> If the ratio is greater than above (0.75), it means three way catalyst does not operate properly. Go to EC-872, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001161839

1.CHECK EXHAUST SYSTEM

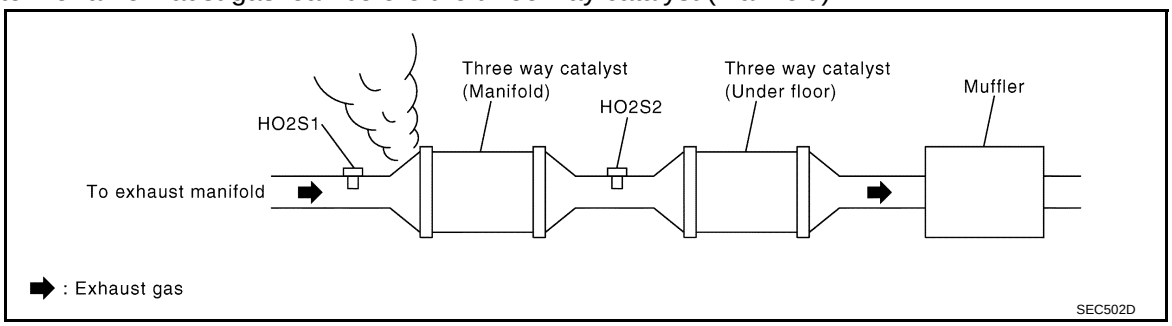
Visually check exhaust tubes and muffler for dent.

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 AND IDLE SPEED

Check the following items. Refer to EC-689, "BASIC INSPECTION : Special Repair Requirement"
For specification, refer to EC-1038, "Ignition Timing", EC-1038, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Follow the EC-693, "IGNITION TIMING : Special Repair Requirement",EC-692, "IDLE SPEED : Special Repair Requirement".

5.CHECK FUEL INJECTOR

1. Stop engine and then turn ignition switch OFF.
2. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F10	25	E16	108	Battery voltage
	29			
	30			
	31			

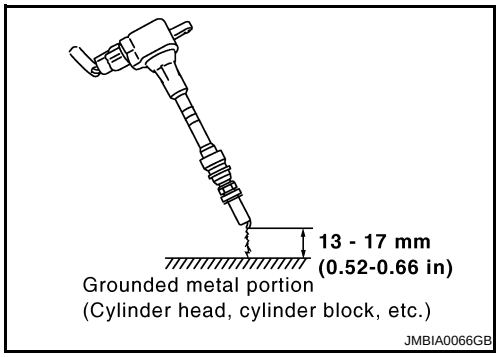
Is the inspection result normal?

YES >> GO TO 6.
NO >> Perform EC-975, "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.

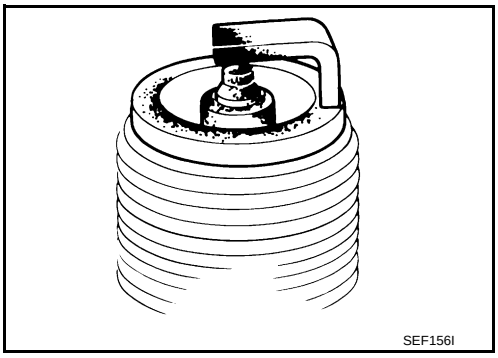
Is the inspection result normal?

YES >> GO TO 8.

NO >> Check ignition coil, power transistor and their circuits. Refer to EC-981, "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-145, "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-145, "Removal and Installation".

10. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Remove fuel injector assembly.
   Refer to EM-162, "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-55, "Intermittent Incident".

Is the trouble fixed?

YES >> INSPECTION END

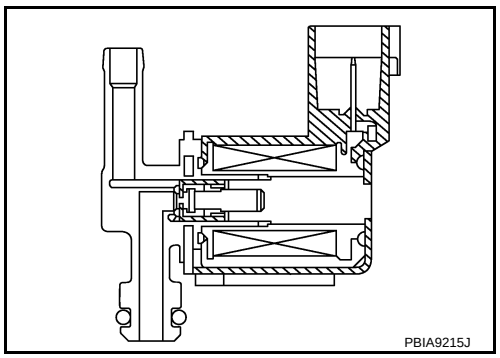
NO >> Replace three way catalyst assembly.

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:0000000001161840

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:0000000001161841

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

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 11V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 13 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-875, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161842

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		
F22	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2.CHECK 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	
F22	2	F10	9	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 3.
YES-2 >> Without CONSULT-III: GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the value opening?

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

4.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-876, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace EVAP canister purge volume control solenoid valve.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

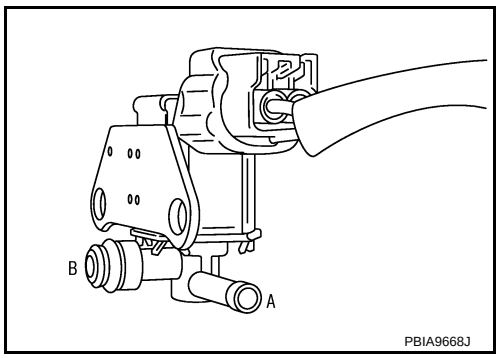
INFOID:0000000001161843

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:0000000001161844

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:0000000001161845

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 EC-793, "DTC Logic".**
- **If DTC P0500 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-794, "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) • Wheel sensor • Combination meter • ABS actuator and electric unit (control unit)

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 VEHICLE SPEED SENSOR FUNCTION

NOTE:

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

With CONSULT-III

1. Start engine.
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-III. The vehicle speed on CONSULT-III should exceed 10 km/h (6 mph) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-879, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select “DATA MONITOR” mode with CONSULT-III.
2. Warm engine up to normal operating temperature.
3. Maintain the following conditions for at least 50 consecutive seconds.

CAUTION:

Always drive vehicle at a safe speed.

ENG SPEED	1,600 - 6,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	7.2 - 31.8 msec
Shift lever	Except Neutral position
PW/ST SIGNAL	OFF

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-879, "Diagnosis Procedure".
NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-879, "Component Function Check".
Use component function check to check the overall function of the vehicle speed sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-879, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001161846

1. PERFORM COMPONENT FUNCTION CHECK

With GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed sensor signal in Service $01 with GST.
   The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-879, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001161847

1. CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-105, "CONSULT-III Function (ABS)".

Is the inspection result normal?

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

2. CHECK COMBINATION METER

Refer to MWI-22, "CONSULT-III Function (METER/M&A)".

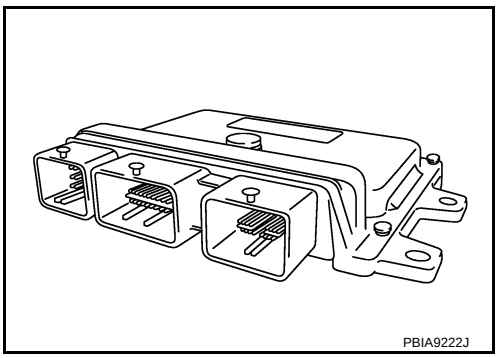
>> INSPECTION END

P0605 ECM

Description

INFOID:0000000001161848

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


PBIA9222J

DTC Logic

INFOID:0000000001161849

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 EC-881, "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. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-881, "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 10 seconds, and then turn ON.
3. Repeat step 2 for 32 times.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-881, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161850

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 EC-880, "DTC Logic".

With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. **Perform DTC CONFIRMATION PROCEDURE.**
   See EC-880, "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 EC-692, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

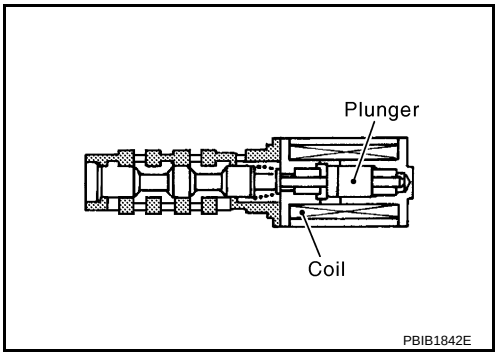
>> INSPECTION END

P1111 IVT CONTROL SOLENOID VALVE

Description

INFOID:0000000001161851

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:0000000001161852

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 EC-882, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161853

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		
F23	1	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 E8, F8
- 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	
F23	2	F11	73	Existed

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

Is the inspection result normal?

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

4.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-883, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001161854

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.

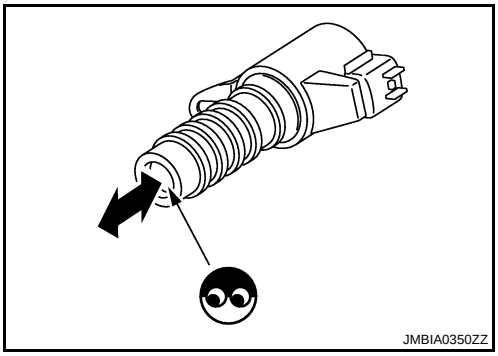
2. Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

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.

P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

INFOID:0000000001161855

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:0000000001161856

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121	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.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND B

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to 1st position and wait at least 3 seconds.
3. Set shift lever to Neutral position.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Set shift lever to 1st position and wait at least 3 seconds.
7. Set shift lever to Neutral position.
8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
9. Check DTC.

Is DTC detected?

YES >> Go to EC-885, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to 1st position and wait at least 3 seconds.
3. Set shift lever to Neutral position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.

Is DTC detected?

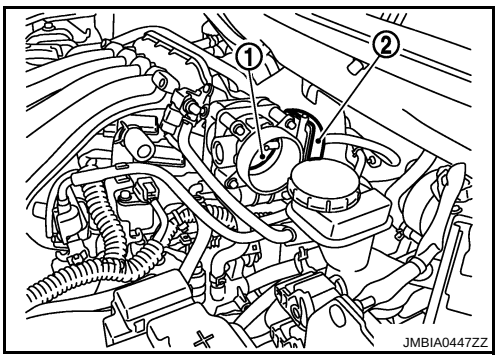
YES >> Go to EC-885, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161857

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-886, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001161858

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-694, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-694, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

P1122 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:0000000001161859

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:0000000001161860

DTC DETECTION LOGIC

NOTE:
If DTC P1122 is displayed with DTC P1121 or P1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-891, "DTC Logic" or EC-885, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122	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 11V when engine is running.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-887, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161861

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F10	2	F16	108	Ignition switch OFF	Approx. 0V
				Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 3.

3.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

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

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F10	15	E16	108	Battery voltage

Is the inspection result normal?

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

4.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

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

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E46	46	F10	15	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 E8, F8
- Harness for open or short between ECM and IPDM E/R

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

6.CHECK FUSE

1. Disconnect 15A fuse (No. 52) from IPDM E/R.
2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace 15A fuse.

7.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-III

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

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E43	8	F10	2	Existed

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

Is the inspection result normal?

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

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

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

9. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

10. 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	
F7	5	F10	1	Not existed
			4	Existed
	6		1	Existed
			4	Not existed

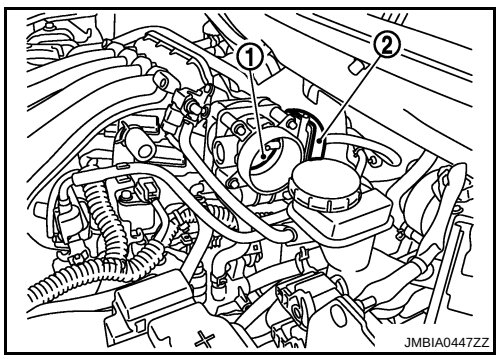
5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. 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

Is the inspection result normal?

YES >> GO TO 12.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

12. CHECK THROTTLE CONTROL MOTOR

Refer to EC-890, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 14.

13. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair or replace harness or connectors.

14. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunction electric throttle control actuator.
2. Go to EC-890, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000001161862

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
5 and 6	Approx. 1 - 15 Ω [at 25 °C (77°F)]

Is the inspection result normal?

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

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-890, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001161863

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-694, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-694, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P1124, P1126 THROTTLE CONTROL MOTOR RELAY

Description

INFOID:0000000001161864

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:0000000001161865

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124	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
P1126	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?

P1126 >> GO TO 2.
P1124 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1126

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-891, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1124

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

Is DTC detected?

YES >> Go to EC-891, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161866

1.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

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

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F10	15	E16	108	Battery voltage

Is the inspection result normal?

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

2.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

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

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E43	8	F10	15	Existed

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness connectors.

4.CHECK FUSE

1. Disconnect 15A fuse (No. 52) from IPDM E/R.
2. Check 15A fuse for blown.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace 15A fuse.

5.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F10	2	E16	108	Ignition switch OFF	Approx. 0V
				Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 6.

6.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	
E46	32	F10	2	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 E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

P1128 THROTTLE CONTROL MOTOR

Description

INFOID:0000000001161867

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:0000000001161868

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1128	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	• Harness or connectors (Throttle control motor circuit is shorted.) • Electric throttle control actuator (Throttle control motor)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-894, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161869

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect electric throttle control actuator harness connector.
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	
F7	5	F10	1	Not existed
			4	Existed
	6		1	Existed
			4	Not existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-895, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 5.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connectors.

5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-895, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000001161870

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
5 and 6	Approx. 1 - 15 Ω [at 25 °C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-895, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001161871

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-694, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-694, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

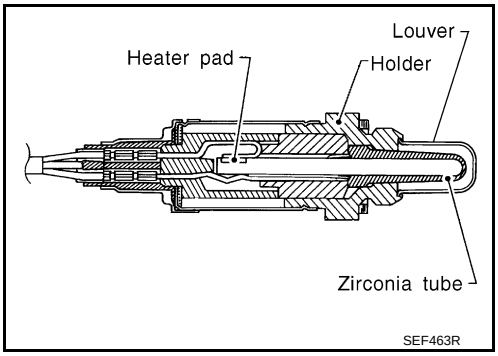
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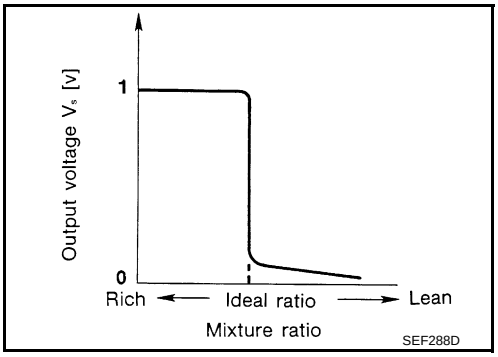
P1143 HO2S1

Description

INFOID:0000000001161872

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



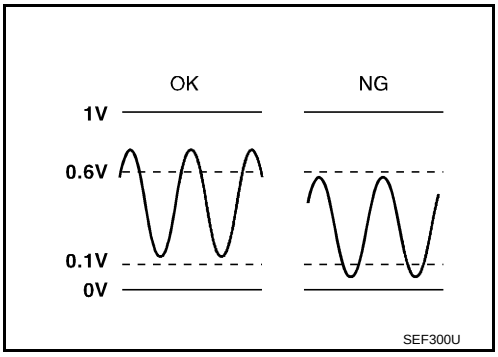


DTC Logic

INFOID:0000000001161873

DTC DETECTION LOGIC

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1143	Heated oxygen sensor 1 lean shift monitoring	The maximum and minimum voltage from the sensor are not reached to the specified voltages.	• Heated oxygen sensor 1 • Heated oxygen 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:

Always perform at a temperature above -10°C (14°F)

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 3.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P1143” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.
   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	1,375 - 2,600 rpm
VHCL SPEED SE	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	3.7 - 10.0 msec
Shift lever	Suitable position

   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Touch “SELF-DIAG RESULT”

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-897, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

With GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM harness connector terminals as follows under the following condition.

ECM		Ground		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Engine speed held at 2,000 rpm constant under no load	• The maximum voltage is over 0.6 at least 1 time. • The minimum voltage is over 0.1 at least 1 time.

NOTE:
Use component function check to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-897, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001161874

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1. Refer to EM-159, "Removal and Installation".

>> GO TO 3.

3.CLEAR THE SELF-LEARNING DATA

1. Clear mixture ratio self-learning value, refer to EC-696, "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 detected or difficult to start engine?

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-844, "DTC Logic".
No >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-829, "Component Inspection".

Is inspection result normal?

YES >> GO TO 5.
NO >> Replace heated oxygen sensor 1.

5.CHECK INTERMITTENT INCIDENT

Perform GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

>> INSPECTION END

Component Inspection

INFOID:0000000001161875

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

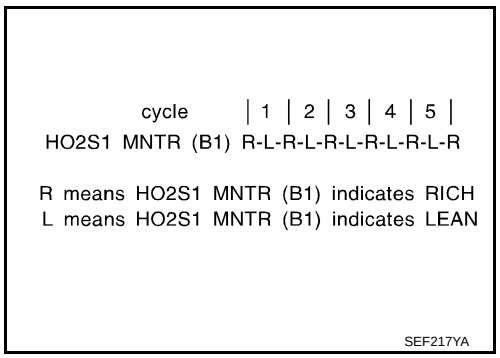
YES >> GO TO 2.
NO >> GO TO 3.

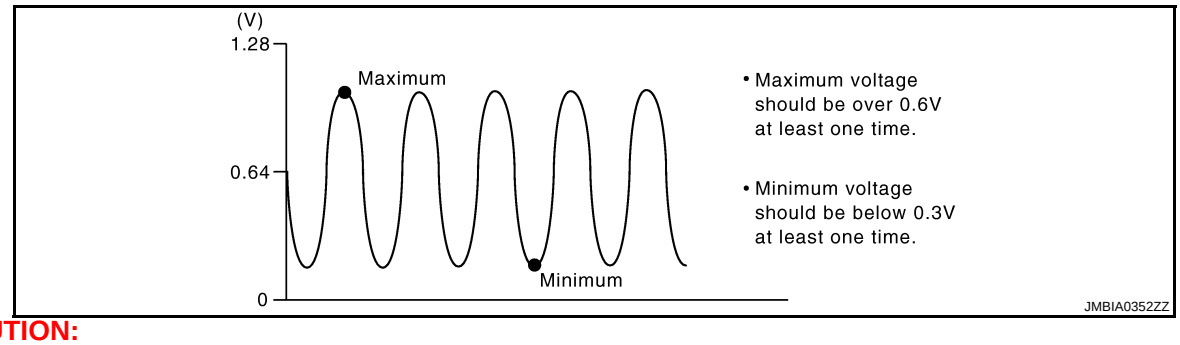
2.CHECK HEATED OXYGEN SENSOR 1

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.

6. Check the following.
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.





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.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

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.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

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.**

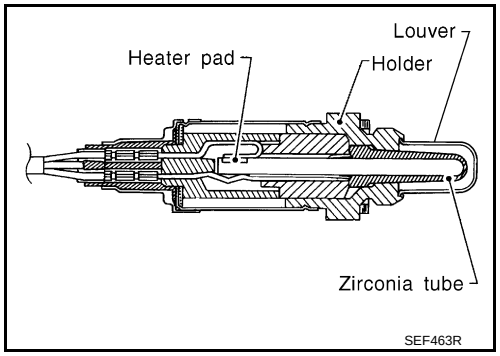
>> INSPECTION END

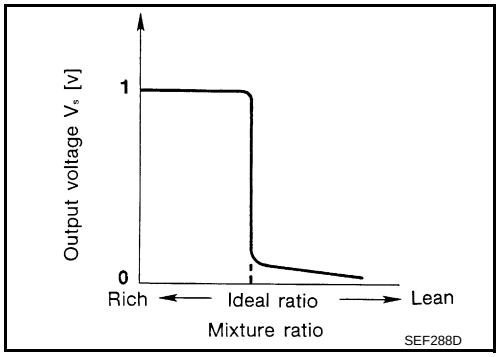
P1144 HO2S1

Description

INFOID:0000000001161876

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



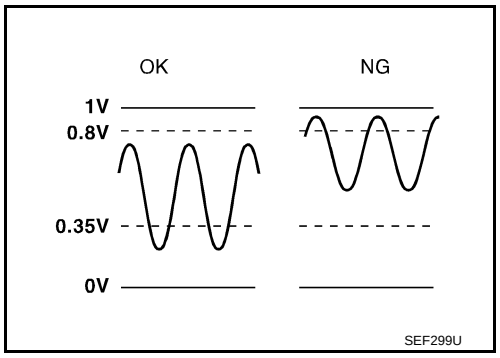


DTC Logic

INFOID:0000000001161877

DTC DETECTION LOGIC

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high and “lean” output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1144	Heated oxygen sensor 1 rich shift monitoring	The maximum and minimum voltages from the sensor are beyond the specified voltages.	• Heated oxygen sensor 1 • Heated oxygen sensor 1 heater • Fuel pressure • Fuel injector

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Always perform at a temperature above -10°C (14°F).

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 3.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P1144” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.
   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	1,375 - 2,600 rpm
VHCL SPEED SE	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	3.7 - 10.0 msec
Shift lever	Suitable position

If “TESTING” is not displayed after 5 minutes, retry from step 2.

7. Touch “SELF-DIAG RESULT”

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-902, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

With GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Engine speed held at 2,000 rpm constant under no load	• The maximum voltage is over 0.8 at least 1 time. • The minimum voltage is over 0.35 at least 1 time.

NOTE:
Use component function check to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-902, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001161878

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1. Refer to EM-159, "Removal and Installation".

>> GO TO 3.

3.CLEAR THE SELF-LEARNING DATA

1. Clear the mixture ratio self-learning value, refer to EC-696, "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 or difficult to start engine?

Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-844, "DTC Logic".
No >> GO TO 4

4.CHECK HO2S1 CONNECTOR FOR WATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. 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 1 HEATER

Refer to EC-829, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace heated oxygen sensor 1.

6.CHECK HEATED OXYGEN SENSOR 1

Refer to EC-815, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace heated oxygen sensor 1.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001161879

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

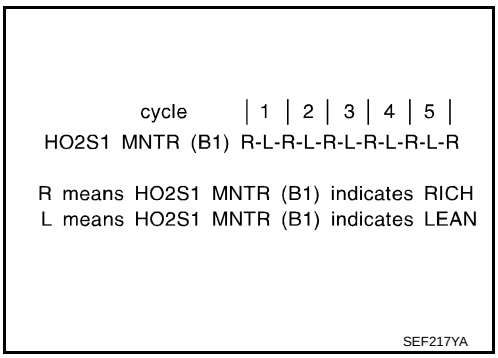
YES >> GO TO 2.
NO >> GO TO 3.

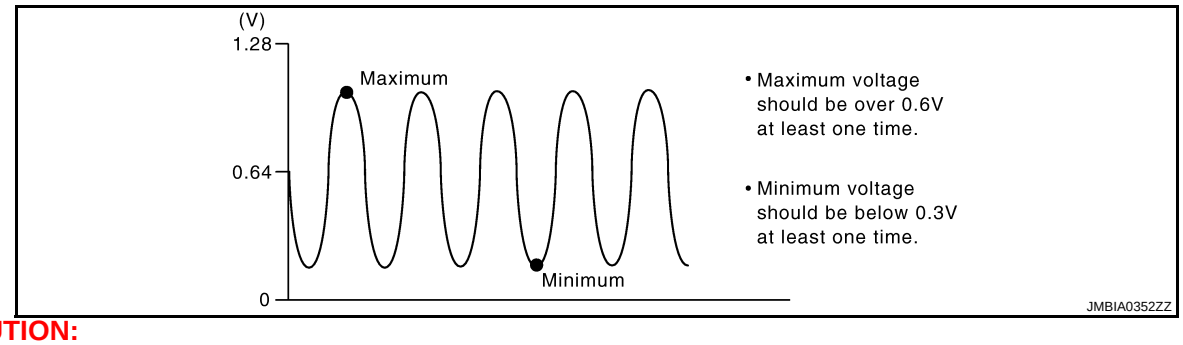
2.CHECK HEATED OXYGEN SENSOR 1

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Set “POST TRIGGER” to 100% in “DATA MONITOR” mode with CONSULT-III.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-III screen.

6. Check the following.
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown in the figure.
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.





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.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

3. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	49 (HO2S1 signal)	F11	56	Engine speed held at 2,000 rpm constant under no load	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time. • The minimum voltage is below 0.3V at least 1 time. • The voltage never exceeds 1.0V. 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

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.**

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

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.**

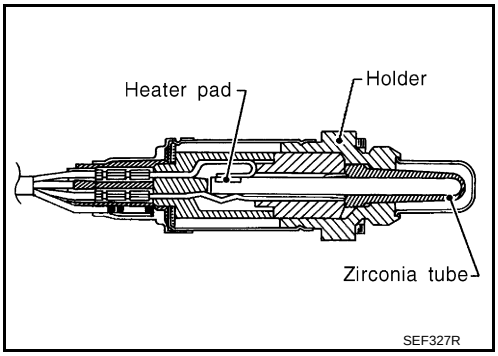
>> INSPECTION END

P1146 HO2S2

Description

INFOID:0000000001161880

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 heated oxygen 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.

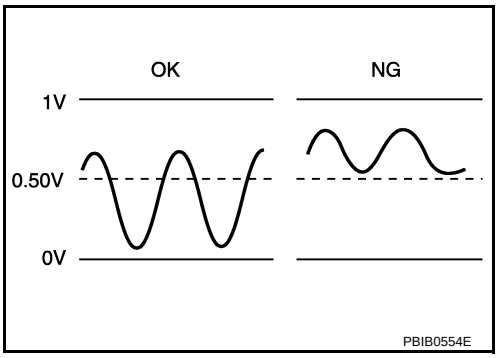


DTC Logic

INFOID:0000000001161881

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of the sensor is sufficiently low during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146	Heated oxygen sensor 2 minimum voltage monitoring	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 • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 11.

2.PRECONDITIONING

"COMPLETED" will appear on CONSULT-III screen when all tests "COND1", "COND2" and "COND3" are completed.
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **For 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 3.

3.PERFORM PROCEDURE FOR COND1-I

Start engine and warm it up to normal operating temperature.

>> GO TO 4.

4.PERFORM PROCEDURE FOR COND1-II

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 5.

5.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 9.
NO >> GO TO 6.

6.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 4.
COND1: COMPLETED COND2: INCOMPLETED>>GO TO 7.
COND1: COMPLETED COND2: COMPLETED>>GO TO 8.

7.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 8.
COND2: COMPLETED COND3: COMPLETED>>GO TO 9.

8.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 9.

9.PERFORM PROCEDURE FOR COND3-I

Touch “SELF DIAGRESULTS”.

Which displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-909, "Diagnosis Procedure".

CAN NOT BE DIAGNOSED>>GO TO 10.

10.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.

11.PREFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-908, "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 EC-909, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001161882

1.PERFORM COMPONENT FUNCTION CHECK-I

With GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	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.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	Coasting from 80 km/h (50 MPH) in 4th gear position	The voltage should be above 0.68V at least once during this procedure.

Always drive vehicle at a safe speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-909, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001161883

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CLEAR THE SELF-LEARNING DATA

1. Clear mixture ratio self-learning value, refer to EC-696, "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 EC-848, "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	
F13	1	F11	59	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	4	F11	50	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F13	4	F11	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-910, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001161884

1. INSPECTION START

Do you have CONSULT-III?

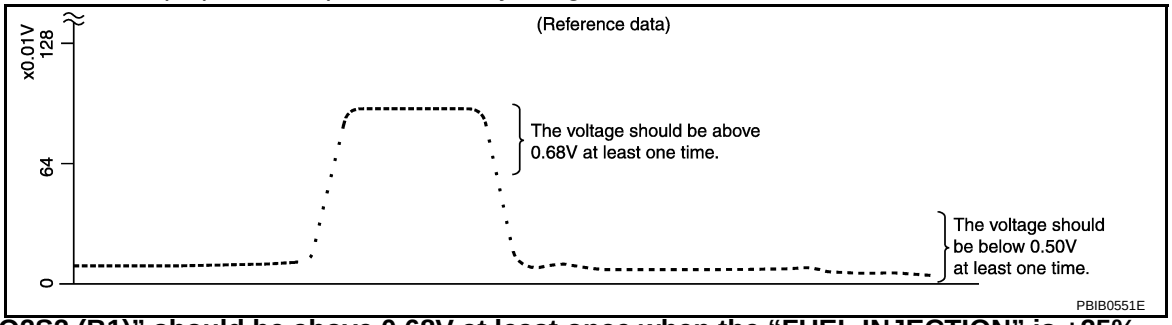
Do you have CONSULT-III?

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 0.50V 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			
F11	50 (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 0.50V 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			
F11	50 (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 0.50V 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			
F11	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in 4th gear position	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Always drive vehicle at a safe speed.

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.**

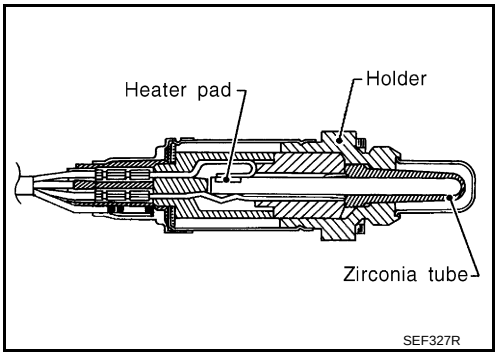
>> INSPECTION END

P1147 HO2S2

Description

INFOID:0000000001161885

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 heated oxygen 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.

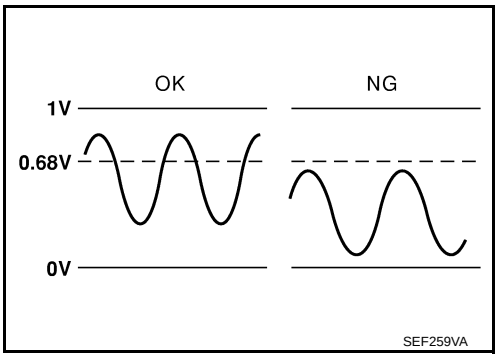


DTC Logic

INFOID:0000000001161886

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146	Heated oxygen sensor 2 circuit low voltage	The maximum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 11.

2.PRECONDITIONING

"COMPLETED" will appear on CONSULT-III screen when all tests "COND1", "COND2" and "COND3" are completed.
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **For 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 3.

3. PERFORM PROCEDURE FOR COND1-I

Start engine and warm it up to normal operating temperature.

>> GO TO 4.

4. PERFORM PROCEDURE FOR COND1-II

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 5.

5. 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) P1147” 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 9.
NO >> GO TO 6.

6. 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 4.
COND1: COMPLETED COND2: INCOMPLETED>>GO TO 7.
COND1: COMPLETED COND2: COMPLETED>>GO TO 8.

7. 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 8.
COND2: COMPLETED COND3: COMPLETED>>GO TO 9.

8. 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 9.

9. PERFORM PROCEDURE FOR COND3-I

Touch “SELF DIAGRESULTS”.

Which displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-915, "Diagnosis Procedure".

CAN NOT BE DIAGNOSED>>GO TO 10.

10.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.

11.PREFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-908, "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 EC-915, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001161887

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	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.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	Coasting from 80 km/h (50 MPH) in 4th gear position	The voltage should be above 0.68V at least once during this procedure.

Always drive vehicle at a safe speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-915, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001161888

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CLEAR THE SELF-LEARNING DATA

1. Clear mixture ratio self-learning value, refer to EC-696, "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 EC-848, "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	
F13	1	F11	59	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	4	F11	50	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F13	4	F11	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-910, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001161889

1. INSPECTION START

Do you have CONSULT-III?

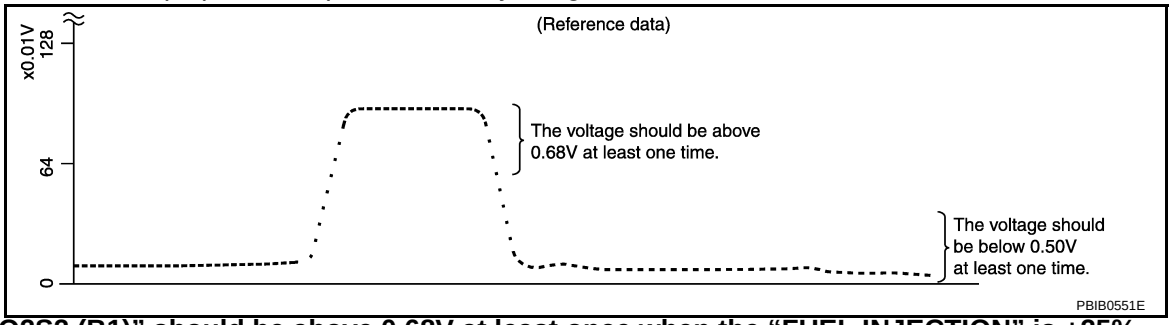
Do you have CONSULT-III?

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 0.50V at least once when the “FUEL INJECTION” is −25%.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.

3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	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 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	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 0.50V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals as follows under the following condition.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	50 (HO2S2 signal)	F11	59	Coasting from 80 km/h (50 MPH) in 4th gear position	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.50V at least once during this procedure.

Always drive vehicle at a safe speed.

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

P1211 TCS CONTROL UNIT

Description

INFOID:0000000001161890

The malfunction information related to TCS is transferred through the CAN communication line from “ABS actuator and electric unit (control unit)” to ECM.
Be sure to erase the malfunction information such as DTC not only for “ABS actuator and electric unit (control unit)” but also for ECM after TCS related repair.

DTC Logic

INFOID:0000000001161891

DTC DETECTION LOGIC

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1211	TCS control unit	ECM receives a malfunction information from “ABS actuator and electric unit (control unit)”.	• ABS actuator and electric unit (control unit) • TCS related parts

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 60 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> EC-918, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161892

Go to BRC-86, "Work Flow".

P1212 TCS COMMUNICATION LINE

Description

INFOID:0000000001161893

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:0000000001161894

DTC DETECTION LOGIC

NOTE:
- **If DTC P1212 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-793, "DTC Logic".**
- **If DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-794, "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 10.5V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-919, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161895

Go to BRC-86, "Work Flow".

P1217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000001161896

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 EC-793, "DTC Logic".**
- **If DTC P1217 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-794, "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 relay-1, -2, -3) • Cooling fan motor • Radiator hose • Radiator • Radiator cap • Reservoir tank • Water pump • Thermostat • Water control valve

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to CO-35, "Inspection". Also, replace the engine oil. Refer to LU-16, "Changing Engine Oil".

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-20, "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 EC-920, "Component Function Check".

NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-921, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001161897

1.PERFORM COMPONENT FUNCTION CHECK-I

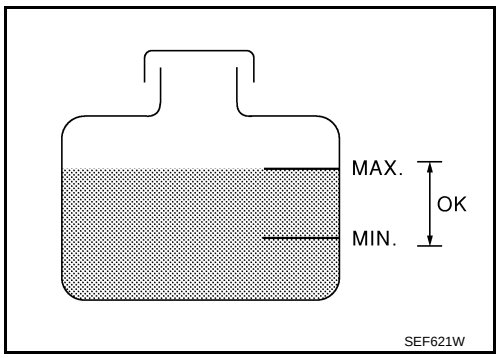
WARNING:

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 EC-921, "Diagnosis Procedure".
NO >> GO TO 2.



2.PERFORM COMPONENT FUNCTION CHECK-II

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

YES >> Go to EC-921, "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 motor operate at each speed (LOW/HI).

Without CONSULT-III
Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PCS-10, "Diagnosis Description".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-921, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001161898

1.INSPECTION START

Do you have CONSULT-III?

Yes or No

Yes >> GO TO 2.
No-1 >> With A/C models: GO TO 4.
No-2 >> Without A/C models: GO TO 5

2.CHECK COOLING FAN LOW SPEED OPERATION

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 fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check cooling fan control circuit. Refer to EC-969, "Diagnosis Procedure".

3.CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-III
1. Touch “HIGH” on the CONSULT-III screen.
2. Make sure that cooling fan operates at higher speed than low speed.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check cooling fan control circuit. Refer to EC-969, "Diagnosis Procedure".

4. CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT-III

1. Start engine and let it idle.
2. Turn air conditioner switch ON.
3. Turn blower fan switch ON.
4. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check cooling fan speed control circuit. Refer to EC-969, "Diagnosis Procedure".

5. CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT-III

1. Perfom IPDM E/R auto active test and check cooling fan motor operation. Refer to PCS-10, "Diagnosis Description".
2. Make sure that cooling fan operates at low speed.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check cooling fan speed control circuit. Refer to EC-969, "Diagnosis Procedure"

6. CHECK COOLING FAN HIGH SPEED OPERATION.

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 >> GO TO 7.
NO >> Check cooling fan speed control circuit. Refer to EC-969, "Diagnosis Procedure".

7. CHECK COOLING SYSTEM FOR LEAK

Check cooling system for leak. Refer to CO-35, "Inspection".

Is leakage detected?

YES >> GO TO 9.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following for leak. Refer to CO-35, "Inspection".

- Hose
- Radiator
- Water pump (Refer to CO-44, "Component")
- Reservoir tank

>> Repair or replace.

9. CHECK RESERVOIR TANK CAP

Check radiator cap. Refer to CO-38, "Checking Radiator Cap".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace radiator cap.

10. CHECK THERMOSTAT

Check thermostat. Refer to CO-45, "Component")

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace thermostat.

11. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to EC-808, "Component Inspection".

Is the inspection result normal?

OK >> GO TO 12.
NG >> Replace engine coolant temperature sensor.

12. 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-20, "SAE Viscosity Number"
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-35, "Inspection"
	4	• Reservoir tank cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 bar, 0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	CO-40, "Removal and Installation"
ON*2	5	• Coolant leaks	• Visual	No leaks	CO-35, "Inspection"
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	CO-45, "Removal and Installation"
ON*1	7	• Cooling fan motor	• CONSULT-III	Operating	EC-971, "Component Inspection"
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-35, "Inspection"
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	CO-35, "Inspection"
OFF	11	• Water control valve	• Remove and inspect the valve	Within the specified value	CO-47, "Removal and Installation"
OFF	12	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-198, "Removal and Installation"
	13	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	EM-202, "Inspection After Disassembly"

*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-30, "Troubleshooting Chart".

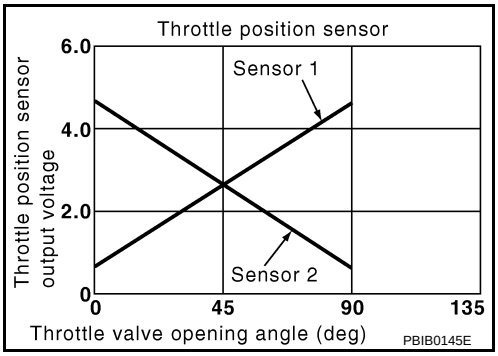
>> INSPECTION END

P1225 TP SENSOR

Description

INFOID:0000000001161899

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:0000000001161900

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 EC-924, "Diagnosis Procedure".
NO >> INSPECTION END

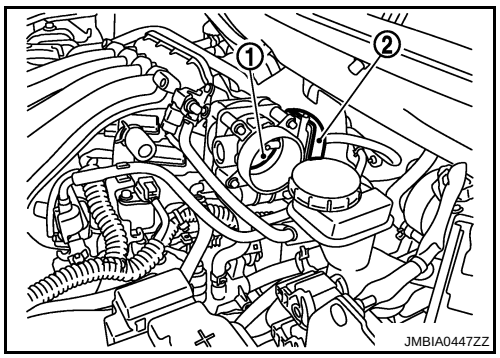
Diagnosis Procedure

INFOID:0000000001161901

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-925, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001161902

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-694, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-694, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

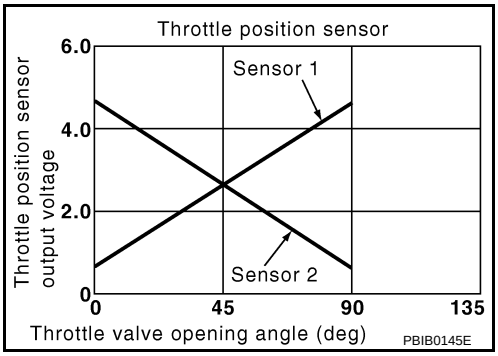
>> END

P1226 TP SENSOR

Description

INFOID:0000000001161903

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:0000000001161904

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF, wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 2 and 3 for 32 times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-926, "Diagnosis Procedure".
NO >> INSPECTION END

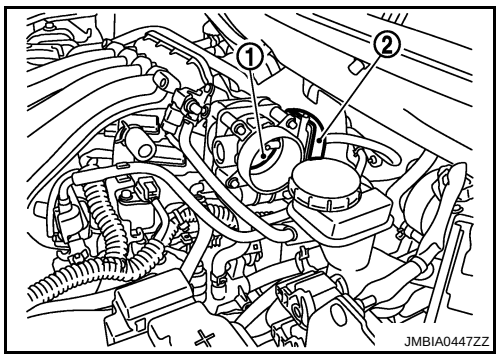
Diagnosis Procedure

INFOID:0000000001161905

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-925, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001161906

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-694, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-694, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P1229 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000001161907

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	• Harness or connectors (APP sensor 1 circuit is shorted.) (TP sensor circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] • Accelerator pedal position sensor 1 (APPS 1) • Throttle position sensor • Camshaft position sensor (PHASE)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-928, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161908

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E12 (LHD models) M204 (RHD models)	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Item	Connector	Terminal
F11	72	Electric throttle control actuator	F7	2
	78	CMP sensor (PHASE)	F21	1
E16	106	APP sensor	E12 (LHD models) M204 (RHD models)	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 COMSHAFT PSITION SENSOR

Refer to EC-868, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning component.

5. CHECK TP SENSOR

Refer to EC-958, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 8.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-958, "Component Inspection".

>> INSPECTION END

7. CHECK APP SENSOR

Refer to EC-950, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-693, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

9. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

P1564 ASCD STEERING SWITCH

Description

INFOID:0000000001161909

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.
Refer to EC-728, "System Description" for the ASCD function.

DTC Logic

INFOID:0000000001161910

DTC DETECTION LOGIC

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-880, "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 EC-930, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161911

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YS >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-III
1. Turn ignition switch ON.

2. Select “MAIN SW”, “CANCEL SW”, “RESUME/ACC SW” and “SET SW” in “DATA MONITOR” mode with CONSULT-III.
3. Check each item indication under the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF
RESUME/ACC SW	RESUME/ACCELERATE switch	Pressed	ON
		Released	OFF
SET SW	SET/COAST switch	Pressed	ON
		Released	OFF

Without CONSULT-III
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition	Voltage
Connector	Terminal	Connector	Terminal		
E16	94 (ASCD steering switch signal)	E16	95	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 M30.
4. Check the continuity between combination switch and ECM harness connector.

Combination switch	ECM		Continuity
Terminal	Connector	Terminal	
15	E16	95	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- 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 ASCD steering switch.

Combination switch	ECM		Continuity
Terminal	Connector	Terminal	
14	E16	94	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 M69, E7
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD STEERING SWITCH

Refer to EC-932, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001161912

1. CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector.
2. Check the continuity between combination switch harness connector terminals under following conditions.

Combination meter		Condition	Resistance
Connector	Terminals		
M30	14 and 15	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:0000000001161913

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-728, "System Description" for the ASCD function.

DTC Logic

INFOID:0000000001161914

DTC DETECTION LOGIC

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-880, "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.) • Stop lamp switch • ASCD brake switch • ASCD clutch switch • Incorrect stop lamp switch installation • Incorrect ASCD brake switch installation • Incorrect ASCD clutch switch installation • ECM
		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. Start engine.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Press MAIN switch and make sure that CRUISE indicator is displayed in combination meter.
4. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

VHCL SPEED SE	More than 30 km/h (19 mph)
Shift lever	Suitable position

5. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Go to EC-934, "Diagnosis Procedure".
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-II

1. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than 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 EC-934, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001610402

1. CHECK OVERALL FUNCTION-I

With CONSULT-III

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BRAKE SW1” indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal and clutch pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminal as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E16	100 (ASCD brake switch signal)	E16	108	Brake pedal	Slightly depressed	Approx. 0V
					Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-III
Select “BRAKE SW2” and check indication in “DATA MONITOR” mode.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal	Slightly depressed	ON
		Fully released	OFF

Without CONSULT-III
Check the voltage between ECM harness connector terminal as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E16	99 (Stop lamp switch signal)	E108	108	Brake pedal	Slightly depressed	Approx. 0V
					Fully released	Battery voltage

Is the inspection result normal?
YES >> GO TO 16.
NO >> GO TO 11.

3. CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD cluch switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD cluch switch harness connector and ground.

ASCD Clutch switch		Ground	Condition		Voltage (V)
Connector	Terminal				
E35 (LHD models) M206 (RHD models)	1	Ground	Brake pedal	Slightly depressed	Approx. 0
				Fully released	Battery voltage

Is the inspection result normal?
YES >> GO TO 8.
NO >> GO TO 4.

4. 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		
E36 (LHD models) M205 (RHD models)	1	Ground	Battery voltage

Is the inspection result normal?
YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, M69 (LHD models)
- Harness connectors M201, M25 (RHD models)
- 10A fuse (No.2)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. 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	
E36 (LHD models) M205 (RHD models)	2	E35 (LHD models) M206 (RHD models)	1	Existed

3. 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 ASCD BRAKE SWITCH

Refer to EC-966, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace ASCD brake switch.

8. 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 cluch switch harness connector.

ECM		ASCD cluch switch		Continuity
Connector	Terminal	Connector	Terminal	
E16	100	E35 (LHD models) M206 (RHD models)	2	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E7, M69, M201, M25 (RHD models)
- Harness for open or short between ECM and ASCD clutch switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ASCD CLUTCH SWITCH

Refer to EC-966, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace ASCD clutch switch.

11. 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		
E13 (LHD models) M203 (RHD models)	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7 (LHD models)
- Harness connectors M25, M201 (RHD models)
- 10A fuse (No.7)
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

ECM		Stop lamp switch		Continuity
Connector	Terminal	Connector	Terminal	
E16	99	E13 (LHD models) M203 (RHD models)	2	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E7, M69, M201, M25 (RHD models)
- Harness for open or short between ECM and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK STOP LAMP SWITCH

Refer to EC-946, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace stop lamp switch.

16. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000001161916

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-6, "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:0000000001161917

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, "On-vehicle 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:0000000001161918

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-6, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

P1574 ASCD VEHICLE SPEED SENSOR

Description

INFOID:0000000001161919

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-728, "System Description" for ASCD functions.

DTC Logic

INFOID:0000000001161920

DTC DETECTION LOGIC

NOTE:

- **If DTC P1574 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-793, "DTC Logic".**
- **If DTC P1574 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-794, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-878, "DTC Logic"**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-880, "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 • 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.
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 EC-940, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161921

1.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-105, "CONSULT-III Function (ABS)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

2. CHECK COMBINATION METER

Check combination meter function.
Refer to MWI-22, "CONSULT-III Function (METER/M&A)".

>> INSPECTION END

P1706 PNP SWITCH

Description

INFOID:0000000001161922

When the shift lever position is Neutral position, park/neutral position (PNP) switch is ON.
ECM detects the position because the continuity of the line (the ON signal) exists.

DTC Logic

INFOID:0000000001161923

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
Neutral position	ON
Except above position	OFF

Is the inspection result normal?

YES >> GO TO 4.
NO >> Go to EC-943, "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	1,500 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	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 EC-943, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-943, "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 EC-943, "Diagnosis Procedure".

Component Function Check

INFOID:0000000001161924

1.PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminal as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
F11	69 (PNP switch signal)	E16	108	Shift lever	Neutral	Approx. 0V
					Except above	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-943, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001161925

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		
F24	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DTECTED MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- 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

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	
F24	3	F11	69	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.

4.CHECK PNP SWITCH

Refer to TM-665, "PARK/NEUTRAL POSITION (PNP) SWITCH : Component Inspection"

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace PNP switch.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

P1805 BRAKE SWITCH

Description

INFOID:0000000001161929

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:0000000001161930

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 EC-945, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161931

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 the inspection result normal?

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		
E13 (LHD models)	1	Ground	Battery voltage
M203 (RHD models)			

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7 (LHD models)
- Harness connectors M201, M25 (RHD models)
- Harness for open or short between stop lamp switch and fuse

>> 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	
E16	99	E13 (LHD models)	2	Existed
		M203 (RHD models)		

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 connectors M201, M25, M69, E7 (RHD models)
- Harness for open or short between ECM and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK STOP LAMP SWITCH

Refer to EC-946, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Stop Lamp Switch)

INFOID:0000000001161932

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 EC-946, "Component Inspection (Stop Lamp Switch)".

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?

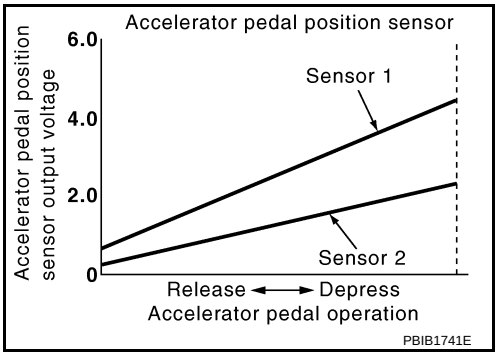
YES >> INSPECTION END
NO >> Replace stop lamp switch.

P2122, P2123 APP SENSOR

Description

INFOID:0000000001161933

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:0000000001161934

DTC DETECTION LOGIC

NOTE:
If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-928, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	• Harness or connectors (APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)
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 EC-948, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161935

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
E12 (LHD models) M204 (RHD models)	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness conector E7, M69, M25, M201 (RHD models)
- Harness for open or short between ECM and APP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12 (LHD models) M204 (RHD models)	2	E16	111	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 conector E7, M69, M25, M201 (RHD models)
- Harness for open or short between ECM and APP sensor

>> 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	
E12 (LHD models) M204 (RHD models)	3	E16	110	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 conector E7, M69, M25, M201 (RHD models)
- Harness for open or short between ECM and APP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK APP SENSOR

Refer to EC-950, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-950, "Special Repair Requirement".

>> INSPECTION END

10.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001161936

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			
E16	110 (APP sensor 1 signal)	E16	111	Accelerator pedal	Fully released	0.6 - 0.9V
					Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)		104		Fully released	0.3 - 0.6V
					Fully depressed	1.95 - 2.4V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-950, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001161937

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-693, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-694, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-694, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

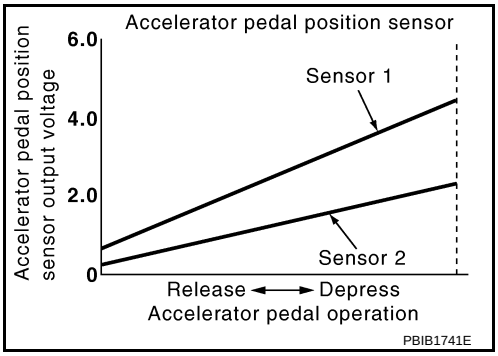
>> END

P2127, P2128 APP SENSOR

Description

INFOID:0000000001161938

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:0000000001161939

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.] (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor
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 EC-952, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161940

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
E12 (LHD models) M204 (RHD models)	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 8.
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	
E12 (LHD models) M204 (RHD models)	5	E16	102	Existed

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness conector E7, M69, M25, M201 (RHD models)
- Harness for open or short between ECM and APP sensor

>> Repair open circuit or short to ground or short 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	Item	Connector	Terminal
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
E16	102	APP sensor	E12 (LHD models) M204 (RHD models)	5

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.
- Harness conector E7, M69, M25, M201 (RHD models)
- Harness for open or short between ECM and APP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-865, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-988, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 14.
NO >> Replace malfunctioning component.

8.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	
E12 (LHD models) M204 (RHD models)	1	E16	104	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9.DETECT MALFUNCTIONING PART

Check the following.
- Harness conector E7, M69, M25, M201 (RHD models)
- Harness for open or short between ECM and APP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12 (LHD models) M204 (RHD models)	6	E16	103	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 11.

11.DETECT MALFUNCTIONING PART

Check the following.
- Harness conector E7, M69, M25, M201 (RHD models)
- Harness for open or short between ECM and APP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

12.CHECK APP SENSOR

Refer to EC-955, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

13. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-955, "Special Repair Requirement".

>> INSPECTION END

14. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001161941

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E16	110 (APP sensor 1 signal)	E16	111	Accelerator pedal	Fully released	0.6 - 0.9V
					Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)		104		Fully released	0.3 - 0.6V
					Fully depressed	1.95 - 2.4V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-955, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001161942

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-693, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-694, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-694, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

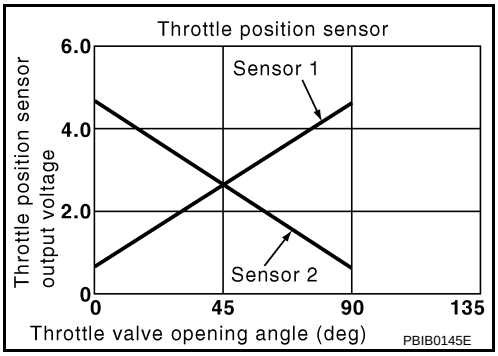
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P2135 TP SENSOR

Description

INFOID:0000000001161943

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:0000000001161944

DTC DETECTION LOGIC

NOTE:
If DTC P2135 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-928, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	• Harness or connector (TP sensor 1 and 2 circuit is open or shorted.) • 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 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 EC-956, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161945

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
F7	2	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	
F7	2	F11	72	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit.

4. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	4	F11	36	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 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	
F7	1	F11	33	Existed
	3		34	

2. 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

Refer to EC-958, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. EC-958, "Special Repair Requirement"

>> INSPECTION END

8.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001161946

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-958, "Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to 1st position.
6. Check the voltage between ECM harness connector terminals as follows.

(+)		(–)		Condition		Voltage
Connector	Terminal	Connector	Terminal			
F11	33 (TP sensor 1 signal)	F11	36	Accelerator pedal	Fully released	More than 0.36V
					Fully depressed	Less than 4.75V
	34 (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 EC-958, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001161947

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-694, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-694, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

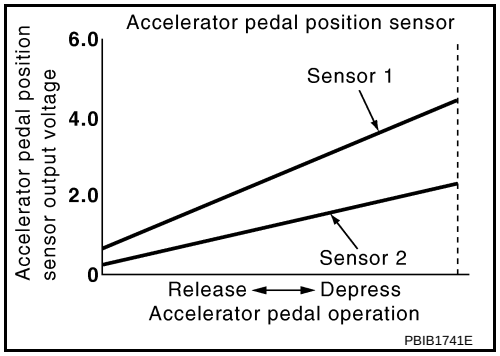
>> END

P2138 APP SENSOR

Description

INFOID:0000000001161948

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:0000000001161949

DTC DETECTION LOGIC

NOTE:
If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-928, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal position sensor circuit range/ performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	• Harness or connector (APP sensor 1 and 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2) • Crankshaft position sensor (POS) • 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 10V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-959, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000001161950

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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		
E12 (LHD models) M204 (RHD models)	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness conector E7, M69, M25, M201 (RHD models)
- Harness for open or short between ECM and APP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E12 (LHD models) M204 (RHD models)	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 5.

5.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12 (LHD models) M204 (RHD models)	5	E16	102	Existed

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.
- Harness conector E7, M69, M25, M201 (RHD models)
- Harness for open or short between ECM and APP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. 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	Item	Connector	Terminal
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
E16	102	APP sensor	E12 (LHD models) M204 (RHD models)	5

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness conector E7, M69, M25, M201 (RHD models)
- Harness for open or short between ECM and APP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-865, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-988, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace malfunctioning component.

10. 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	
E12 (LHD models) M204 (RHD models)	2	E16	111	Existed
	1		104	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.
- Harness conector E7, M69, M25, M201 (RHD models)
- Harness for open or short between ECM and APP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. 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	
E12 (LHD models) M204 (RHD models)	3	E16	110	Existed
	6		103	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 14.
NO >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.
- Harness conector E7, M69, M25, M201 (RHD models)
- Harness for open or short between ECM and APP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK APP SENSOR

Refer to EC-962, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 10.

15. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-963, "Special Repair Requirement".

>> INSPECTION END

16. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001161951

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			
E16	110 (APP sensor 1 signal)	E16	111	Accelerator pedal	Fully released	0.6 - 0.9V
					Fully depressed	3.9 - 4.7V
	103 (APP sensor 2 signal)		104		Fully released	0.3 - 0.6V
					Fully depressed	1.95 - 2.4V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-963, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000001161952

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-693, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-694, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-694, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

ASCD BRAKE SWITCH

Description

INFOID:0000000001161953

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-728, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000001161954

1.CHECK FOR ASCD BRAKE SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BRAKE SW1” indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal and clutch pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Condition		Voltage
Connector	Terminal				
E16	100 (ASCD brake switch signal)	Ground	Brake pedal and clutch pedal	Slightly depressed	Approx. 0V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-964, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001611130

1.CHECK ASCD CLUCH SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD cluch switch harness connector.
3. Turn ignition switch ON.
4. Check the continuity between ASCD cluch switch harness connector and ground.

ASCD cluch switch		Ground	Condition		Voltage (V)
Connector	Terminal				
E35 (LHD models) M206 (RHD models)	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 6.
NO >> GO TO 2.

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		
E36 (LHD models) M205 (RHD models)	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connector M69, E7 (LHD models)
- Harness connector M25, M201 (RHD models)
- 10A fuse (No. 2)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. 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	
E36 (LHD models) M205 (RHD models)	2	E35 (LHD models) M206 (RHD models)	1	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 ASCD BRAKE SWITCH

Refer to EC-966, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace ASCD brake switch.

6. CHECK ASCD CLUCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector
3. Check the continuity between ASCD cluch switch harness connector and ECM harness connector.

ASCD cluch switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E35 (LHD models) M206 (RHD models)	2	E16	100	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 ASCD CLUTCH SWITCH

Refer to EC-966, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace ASCD clutch switch.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000001161956

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-6, "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:0000000001161957

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, "On-vehicle 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:0000000001161958

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.
CRUISE lamp illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.
SET lamp illuminates when following conditions are met.
- CRUISE lamp is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET lamp remains lit during ASCD control.
Refer to EC-728, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000001161959

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 144 km/h (89 MPH)	• ASCD: Operating	ON
		• ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-968, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001161960

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 EC-793, "DTC Logic".

2.CHECK COMBINATION METER OPERATION

Refer to MWI-22, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check combination meter circuit. Refer to MWI-4, "METER SYSTEM : System Diagram".

3.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

COOLING FAN

Description

INFOID:0000000001161961

Cooling fan operates at each speed when the current flows in the cooling fan motor as follows.
Refer to EC-737, "System Diagram" for cooling fan operation.

Component Function Check

INFOID:0000000001161962

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. Refer to EC-969, "Diagnosis Procedure".

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. Perform IPDM E/R auto active test and check cooling fan motors operation.
2. Make sure that cooling fan operates at high speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Check cooling fan high speed control circuit. Refer to EC-969, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001161963

1. CHECK POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the voltage between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Continuity
Connector	Terminal		
E44	22	Ground	Existed

Is the inspection result normal?

YES-2 >> With A/C models: GO TO 3.
YES-2 >> Without A/C models: GO TO 5.
NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- 50A fusible link (letter J)(with A/C models)
- 40A fusible link (letter J)(without A/C models)
- Harness for open or short between IPDM E/R and battery

>> Repair or replace malfunctioning part.

3. CHECK COOLING FAN MOTORS CIRCUIT FOR OPEN AND SHORT

1. Disconnect cooling fan motor harness connector.
2. Check the continuity between IPDM E/R harness connector and cooling fan motor harness connector.

IPDM E/R		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E45	30	E3	1	Existed
E44	24			

3. Check the continuity between cooling fan motor harness connector or IPDM E/R harness connector and ground.

Cooling fan motor		IPDM E/R		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E3	2	E46	59	Ground	Existed
			39		

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground
- Harness for open or short between IPDM E/R and ground
- Resistor E5

>> Repair or replace malfunctioning part.

5. CHECK COOLING FAN MOTORS CIRCUIT FOR OPEN AND SHORT

1. Disconnect cooling fan motor harness connector.
2. Check the continuity between IPDM E/R harness connector and cooling fan motor harness connector.

IPDM E/R		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E45	30	E3	1	Existed
E44	24		2	
	23		3	

3. Check the continuity between cooling fan motor harness connector or IPDM E/R harness connector and ground.

Cooling fan motor		IPDM E/R		Ground	Continuity
Connector	Terminal	Connector	Terminal		
E3	4	E46	59	Ground	Existed
			39		

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground
- Harness for open or short between IPDM E/R and ground

>> Repair or replace malfunctioning part.

7. CHECK GROUND CONNECTION

Check ground connection E24. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace ground connection.

8. CHECK COOLING FAN MOTOR

Refer to EC-971, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace malfunctioning cooling fan motor.

9. CHECK INTERMITTENT INCIDENT

Perform GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connector.

Component Inspection

INFOID:0000000001161964

1. CHECK OVERALL FUNCTION

Check if the vehicle is equipped with an air conditioner.

Is it equipped with an air conditioner?

YES >> GO TO 2.
NO >> GO TO 3.

2. CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector.
3. Supply cooling fan motor terminals with battery voltage and check operation.

Terminals		Operation
(+)	(–)	
1	2	Cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan motor.

3. CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector.
3. Supply cooling fan motor terminals with battery voltage and check operation.

Terminals		Operation
(+)	(–)	
1	4	Cooling fan operates at low speed.
2	3	
1 and 2	3 and 4	Cooling fan operates at high speed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan motor.

ELECTRICAL LOAD SIGNAL

Description

INFOID:0000000001161966

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:0000000001161967

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 EC-973, "Diagnosis Procedure".

2.CHECK LIGHTING SWITCH FUNCTION

Check “LOAD SIGNAL” indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Lighting switch	ON at 2nd position	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.
NO >> Go to EC-973, "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 EC-973, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001161968

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-973, "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-6, "System Diagram".

>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Refer to EXL-10, "System Diagram" (XENON TYPE) or EXL-8, "System Diagram" (HALOGEN TYPE).

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Refer to GI-55, "Intermittent Incident".

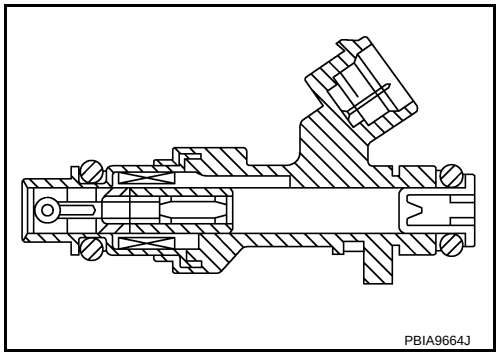
>> INSPECTION END

FUEL INJECTOR

Description

INFOID:0000000001161969

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.


PBIA9664J

Component Function Check

INFOID:0000000001161970

1. INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.
NO >> Go to EC-975, "Diagnosis Procedure".

2. CHECK FUEL INJECTOR FUNCTION

With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

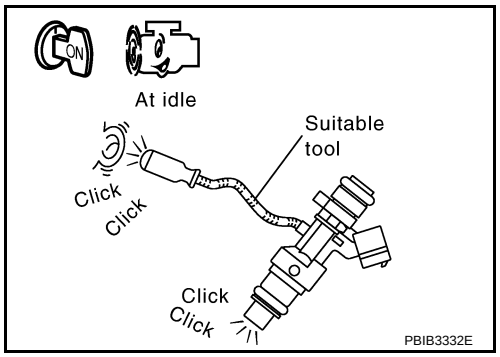
Without CONSULT-III

1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-975, "Diagnosis Procedure".



PBIB3332E

Diagnosis Procedure

INFOID:0000000001161971

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.

Fuel injector			Ground	Voltage
Cylinder	Connector	Terminal		
1	F17	1	Ground	Battery voltage
2	F18	1		
3	F19	1		
4	F20	1		

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F8, E8
- 10A fuse (No. 55)
- 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.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F17	2	F10	31	Existed
2	F18	2		30	
3	F19	2		29	
4	F20	2		25	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL INJECTOR

Refer to EC-976, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning fuel injector.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001161972

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 [at 10 - 60°C (50 - 140°F)]
1 and 2	11.1 - 14.5Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector.

FUEL PUMP

Description

INFOID:0000000001161973

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 in 1.5 seconds.
Except as shown above	Stops.

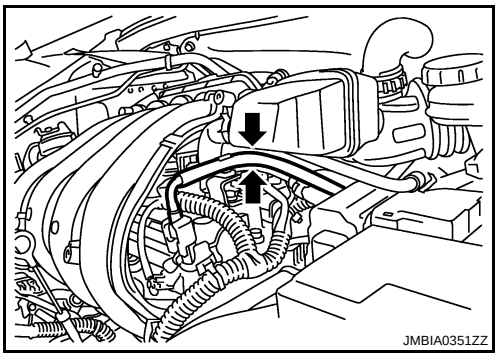
Component Function Check

INFOID:0000000001161974

1.CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.



Is the inspection result normal?

YES >> INSPECTION END
NO >> EC-978, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001161975

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 terminals as follows.

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F10	23	E16	108	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.
3. Check the continuity between IPDM E/R harness connector and ECM harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F10	23	E46	47	Existed

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. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E8, F8.
- Harness for open or short to ground and short power.

>> Repair harness or connectors.

4. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect “fuel level sensor unit and fuel pump” harness connector.
4. Turn ignition switch ON.
5. Check voltage between “fuel level sensor unit and fuel pump” harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage
Connector	Terminal		
B40	1	Ground	Battery voltage should exist 1 second after ignition switch is turn ON.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 5.

5. CHECK 10A FUSE

1. Turn ignition switch OFF.
2. Disconnect 15A fuse (No. 48) from IPDM E/R.
3. Check 15A fuse.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace fuse.

6. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between IPDM E/R harness connector and “fuel level sensor unit and fuel pump” harness connector.

IPDM E/R		Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E45	36	B40	1	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, M69, M12, B1.
- Harness for open or short between IPDM E/R and “fuel level sensor unit and fuel pump”

>> Repair open circuit or short to power in harness or connectors.

8.CHECK FUEL PUMP GROUND CIRCUIT

1. 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 9.
NO >> Repair open circuit or short to power in harness or connectors.

9.CHECK FUEL PUMP

Refer to EC-980, "Component Inspection (Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace fuel pump.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

Component Inspection (Fuel Pump)

INFOID:0000000001161976

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 - 5.0 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace “fuel level sensor unit and fuel pump”.

IGNITION SIGNAL

Description

INFOID:0000000001161977

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.

Component Function Check

INFOID:0000000001161978

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT-III: GO TO 2.
YES-2 >> Without CONSULT-III: GO TO 3.
NO >> Go to EC-981, "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.

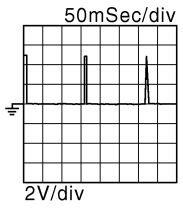
Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-981, "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.

ECM		Ground		Voltage signal
Connector	Terminal	Connector	Terminal	
F10	17	E16	108	
	18			
	21			
	22			

NOTE:
The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-981, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001161979

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	
E16	105	E16	108	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-789, "Diagnosis Procedure".

2.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser-2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between condenser-2 harness connector and ground.

Condenser-2		Ground	Voltage
Connector	Terminal		
F26	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and condenser-2 harness connector.

IPDM E/R		Condenser-2		Continuity
Connector	Terminal	Connector	Terminal	
E43	3	F26	1	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Go to EC-789, "Diagnosis Procedure".
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CONDENSER-2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between condenser-2 harness connector and ground.

Condenser-2		Ground	Continuity
Connector	Terminal		
F26	2	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK CONDENSER

Refer to EC-984, "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	F34	3	Ground	Battery voltage
2	F35	3		
3	F36	3		
4	F37	3		

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity
Cylinder	Connector	Terminal		
1	F34	2	Ground	Existed
2	F35	2		
3	F36	2		
4	F37	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

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	F34	1	F10	17	Existed
2	F35	1		18	
3	F36	1		22	
4	F37	1		21	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-984, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000001161980

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 [at 25°C (77°F)]
1 and 2	Except 0 or ∞ Ω
1 and 3	Except 0 Ω
2 and 3	

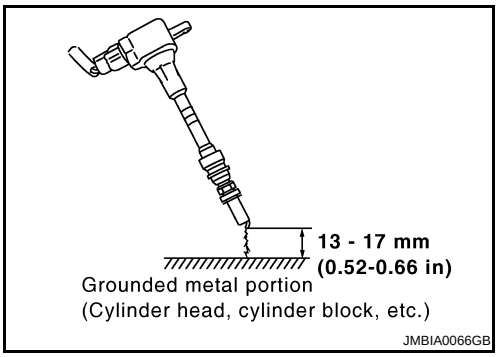
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning ignition coil with power transistor.

2. CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:
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:0000000001161981

1. CHECK CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser-2 harness connector.

3. Check resistance between condenser-2 terminals as follows.

Terminals	Resistance
1 and 2	Above 1 MΩ [at 25°C (77°F)]

Is the inspection result normal?

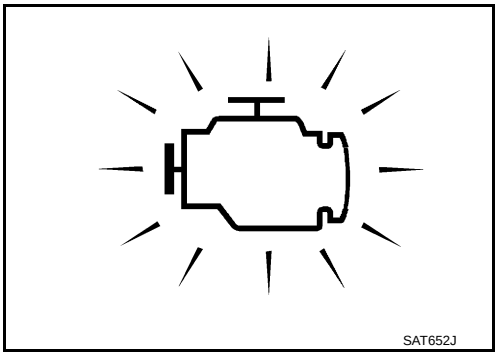
YES >> INSPECTION END
NO >> Replace condenser.

MALFUNCTION INDICATOR

Description

INFOID:0000000001161982

The Malfunction Indicator (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 EC-986, "Diagnosis Procedure".



Component Function Check

INFOID:0000000001161983

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 EC-986, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001161984

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 EC-793, "Diagnosis Procedure".

2.CHECK DTC WITH COMBINATION METER

Refer to MWI-22, "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-55, "Intermittent Incident".

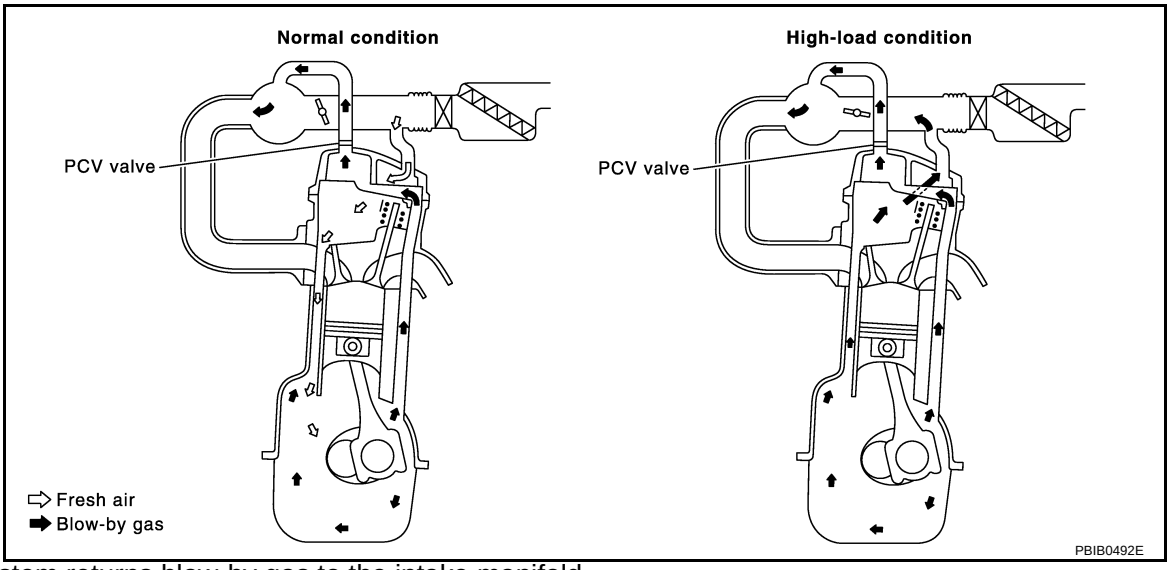
Is the inspection result normal?

YES >> Replace combination meter.
NO >> Repair or replace.

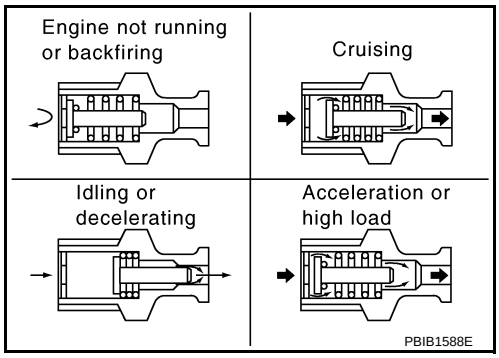
POSITIVE CRANKCASE VENTILATION

Description

INFOID:0000000001161985



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

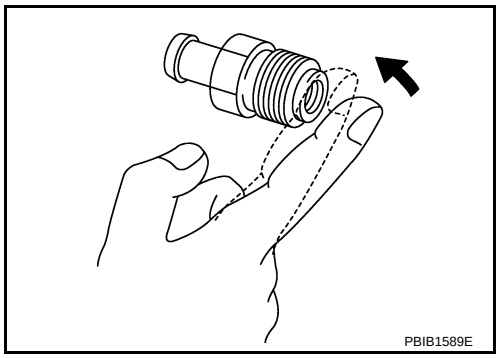
INFOID:0000000001161986

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.

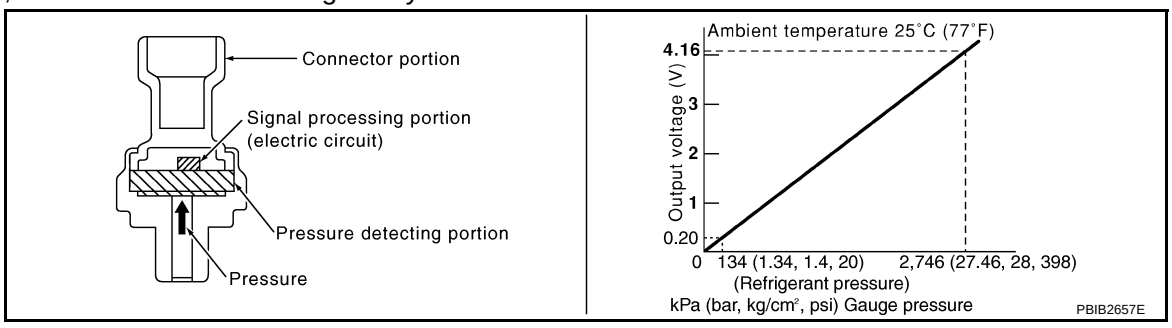


REFRIGERANT PRESSURE SENSOR

Description

INFOID:0000000001161987

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:0000000001161988

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.

(+)		(–)		Voltage
Connector	Terminal	Connector	Terminal	
F11	41 (Refrigerant pressure sensor signal)	F11	48	1.0 - 4.0V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-988, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001161989

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 E15. Refer to Ground Inspection in GI-58, "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		
E17	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 E8, F8
- 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	
E17	1	F11	48	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- 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	
E17	2	F11	41	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- 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-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.
NO >> Repair or replace.

ECU DIAGNOSIS

ECM

Reference Value

INFOID:0000000001611216

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.

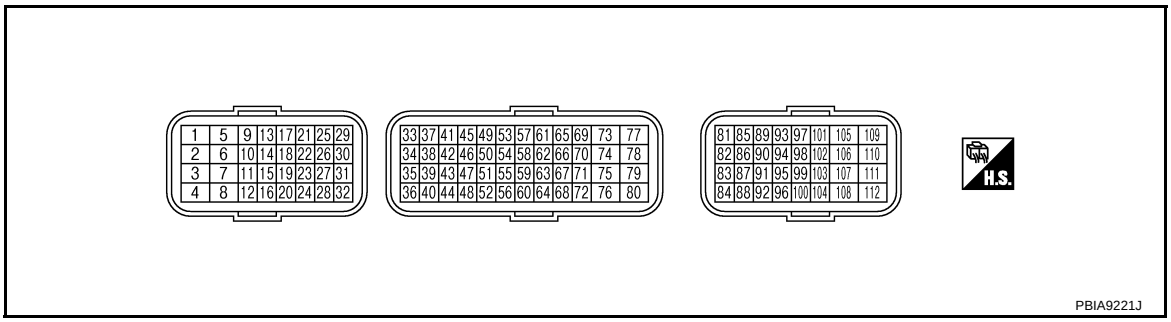
Monitor Item	Condition		Values/Status
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-782, "Diagnosis Procedure".		
B/FUEL SCHDL	See EC-782, "Diagnosis Procedure".		
A/F ALPHA-B1	See EC-782, "Diagnosis Procedure".		
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
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
HO2S2 MNTR (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→→RICH Change more than 5 times during 10 seconds.
HO2S2 MNTR (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		LEAN ←→ RICH
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 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*	• 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: 1st	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
THRL SEN 2-B1*	• Ignition switch: ON (Engine stopped) • Shift lever:1st	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

Monitor Item	Condition		Values/Status
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: Neutral	ON
		Selector lever: Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON
		Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	• Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1	• Engine: After warming up • Shift lever:Neutral • 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 • Shift lever:Neutral • Air conditioner switch: OFF • No load	Idle	10° - 20° BTDC
		2,000 rpm	25° - 45° BTDC
PURG VOL C/V	• Engine: After warming up • Shift lever:Neutral • Air conditioner switch: OFF • No load	Idle	0%
		2,000 rpm	20% - 90%
INT/V TIM (B1)	• Engine: After warming up • Shift lever:Neutral • 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:Neutral • 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, idle the engine • Air conditioner switch: OFF	Engine coolant temperature is 97 °C (207°F) or less.	OFF
		Engine coolant temperature is between 98°C (208°F) and 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH
HO2S1 HTR (B1)	• Engine: After warming up • Engine speed: Above 3,600 rpm		ON
	Engine speed: Above 3,600 rpm		OFF

Monitor Item	Condition		Values/Status
HO2S2 HTR (B1)	• Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
	• Engine speed: Above 3,600 rpm		OFF
VEHICLE SPEED	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
IDL A/V LEARN	• Engine: running	Idle air volume learning has not been performed yet.	YET
		Idle air volume learning has already been performed successfully.	CMPLT
O2SEN HTR DTY	• Engine coolant temperature when engine started: More than 80°C (176°F) • Engine speed: below 3,600 rpm		Approx. 30%
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
MAIN SW	• Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	• Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	• Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	• Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
BRAKE SW1 (ASCD brake switch)	• Ignition switch: ON	Brake pedal and clutch pedal: Fully released	ON
		Brake pedal and/or clutch pedal: Slightly depressed	OFF
BRAKE SW2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
VHCL SPD CUT	• Ignition switch: ON		NON
LO SPEED CUT	• Ignition switch: ON		NON
AT OD MONITOR	• Ignition switch: ON		OFF
AT OD CANCEL	• Ignition switch: ON		OFF
CRUISE LAMP	• Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed: Between 40 km/h (25 MPH) and 180 km/h (112 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

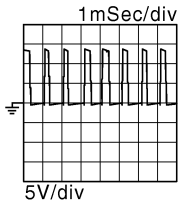
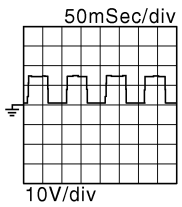
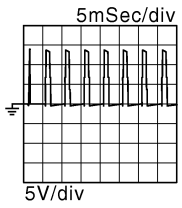
TERMINAL LAYOUT

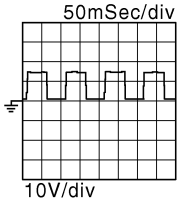
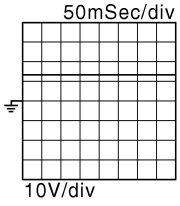
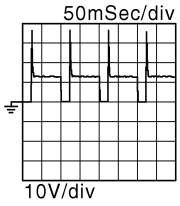
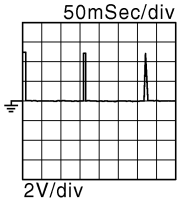
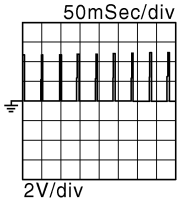


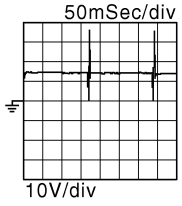
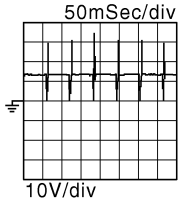
PHYSICAL VALUES

NOTE:
- ECM is located in the engine room left side near battery.
- Use extreme care not to 2 pins at one time.
- Data is for comparison and may not be exact.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

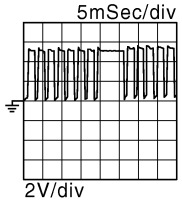
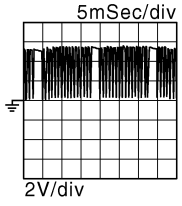
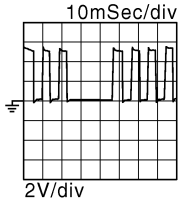
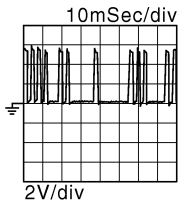
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

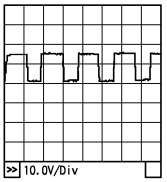
Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
1 (L)	108 (B)	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: 1st • Accelerator pedal: Fully depressed	3.2V★  JMBIA0324GB
2 (SB)	108 (B)	Throttle control motor relay power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
3 (G)	56 (B)	Heated oxygen sensor 1 heater	Output	[Engine is running] • Warm-up condition • Engine speed: Below 3,600 rpm	2.9 - 8.8V★  JMBIA0325GB
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: below 3,600 rpm	BATTERY VOLTAGE (11-14V)
4 (P)	108 (B)	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Shift lever:1st • Accelerator pedal: Fully released	1.8V★  JMBIA0326GB

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
5 (G)	59 (O)	Heated oxygen sensor 2 heater	Output	[Engine is running] • Engine speed: Below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	10V★  JMBIA0325GB
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
9 (P)	108 (B)	EVAP canister purge volume control solenoid valve	Output	[Engine is running] • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14V)★  JMBIA0327GB
				[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)	10V★  JMBIA0328GB
10 (B) 11 (B)	—	ECM ground	—	—	—
15 (Y)	108 (B)	Throttle control motor relay	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
				[Ignition switch: ON]	0 - 1.0V
17 (R) 18 (LG) 21 (G) 22 (SB)	108 (B)	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 4 Ignition signal No. 3	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.3V★  JMBIA0329GB
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.2 - 0.5V★  JMBIA0330GB

Terminal No. +	Terminal No. –	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
23 (GR)	108 (B)	Fuel pump relay	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.0V
25 (V)	108 (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)★  JMBIA0331GB
29 (Y)		Fuel injector No. 3			
30 (O)		Fuel injector No. 2		[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  JMBIA0332GB
31 (L)		Fuel injector No. 1			
32 (P)	108 (B)	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] • A few seconds after turning ignition switch OFF	0 - 1.0V
				[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
33 (LG)	36 (Y)	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Shift lever: 1st • Accelerator pedal: Fully released	More than 0.36V
				[Ignition switch: ON] • Engine stopped • Shift lever:1st • Accelerator pedal: Fully depressed	Less than 4.75V
34 (O)	36 (Y)	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Shift lever:1st • Accelerator pedal: Fully released	Less than 4.75V
				[Ignition switch: ON] • Engine stopped • Shift lever:1st • Accelerator pedal: Fully depressed	More than 0.36V
36 (Y)	—	Sensor ground (Throttle position sensor)	—	—	—
37 (W)	40 —	Knock sensor	Input	[Engine is running] • Idle speed	2.5V
38 (P)	44 (B)	Engine coolant temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with engine coolant temperature.
40 (B)	—	Sensor ground (Knock sensor)	—	—	—

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
41 (GR)	48 (BR)	Refrigerant pressure sensor	Input	[Engine is running] • Warm-up condition • Both A/C switch and blower fan motor switch: ON (Compressor operates)	1.0 - 4.0V
44 (B)	—	Sensor ground (Engine coolant temperature sensor)	—	—	—
45 (G)	52 (LG)	Mass air flow sensor	Input	[Ignition switch: ON] • Engine stopped	0.4V
				[Engine is running] • Warm-up condition • Idle speed	0.9 - 1.2V
				[Engine is running] • Warm-up condition • Engine is revving from idle to about 4,000 rpm	0.9 - 1.2 to 2.4V (Check for linear voltage rise in response to engine being increased to about 4,000 rpm.)
46 (V)	55 (O)	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with intake air temperature.
48 (BR)	—	Sensor ground (Refrigerant pressure sensor)	—	—	—
49 (W)	56 (B)	Heated oxygen sensor 1	Input	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 - 1.0V
50 (W)	59 (O)	Heated oxygen sensor 2	Input	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
52 (LG)	—	Sensor ground (Mass air flow sensor)	—	—	—
55 (O)	—	Sensor ground (Intake air temperature sensor)	—	—	—
56 (B)	—	Sensor ground (Heated oxygen sensor 1)	—	—	—
59 (O)	—	Sensor ground (Heated oxygen sensor 2)	—	—	—

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
61 (W)	62 (R)	Crankshaft position sensor (POS)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	4.0V★  JMBIA0333GB
				[Engine is running] • Engine speed: 2,000 rpm	4.0V★  JMBIA0334GB
62 (R)	—	Sensor ground [Crankshaft position sensor (POS)]	—	—	—
63 (L)	—	Sensor ground [Camshaft position sensor (PHASE)]	—	—	—
65 (G)	63 (BR)	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 - 2.0★  JMBIA0335GB
				[Engine is running] • Engine speed is 2,000 rpm	1.0 - 2.0★  JMBIA0336GB
69 (L)	108 (B)	PNP switch	Input	[Ignition switch: ON] • Shift lever: Neutral	BATTERY VOLTAGE (11 - 14V)
				[Ignition switch: ON] • Shift lever: Except above	0V
72 (V)	36 (Y)	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5V

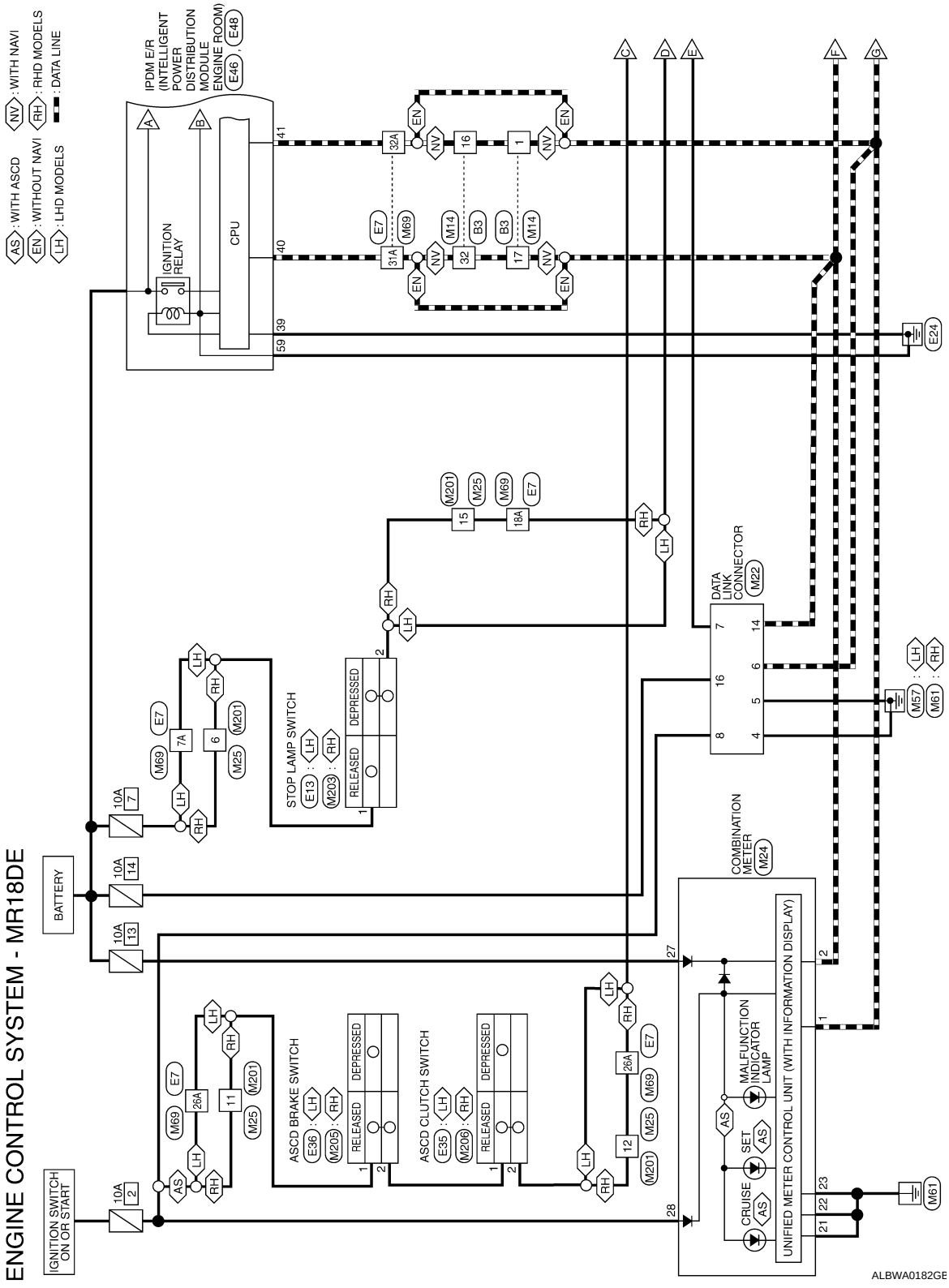
Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
73 (P)	108 (B)	Intake valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	0V
				[Engine is running] • Warm-up condition • When revving engine up to 2,000rpm Quickly	7 - 10V★  PBIA4937J
74 (W)	108 (B)	Sensor power supply (Refrigerant pressure sensor)	Input	[Ignition switch: ON]	5V
75 (BR)	62 (R)	Sensor power supply [Crankshaft position sensor (POS)]	—	[Ignition switch: ON]	5V
78 (O)	63 (BR)	Sensor power supply [Camshaft position sensor (PHASE)]	—	[Ignition switch: ON]	5V
83 (P)	108 (B)	CAN communication line	Input/ Output	—	—
84 (L)	108 (B)	CAN communication line	Input/ Output	—	—
88 (LG)	108 (B)	Data link connector	Input/ Output	[Ignition switch: ON] • CONSULT-III or GST: Disconnected	10.5V
93 (O)	108 (B)	Ignition switch	Input	[Ignition switch: OFF]	0V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
94 (R)	95 (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
95 (B)	—	Sensor ground (ASCD steering switch)	—	—	—
99 (R)	108 (B)	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0V
				[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
100 (G)	108 (B)	ASCD brake switch	Input	[Ignition switch: ON] • Brake pedal and clutch pedal: Slightly depressed	0V
				[Ignition switch: ON] • Brake pedal and/or clutch pedal: Fully released	BATTERY VOLTAGE (11 - 14V)

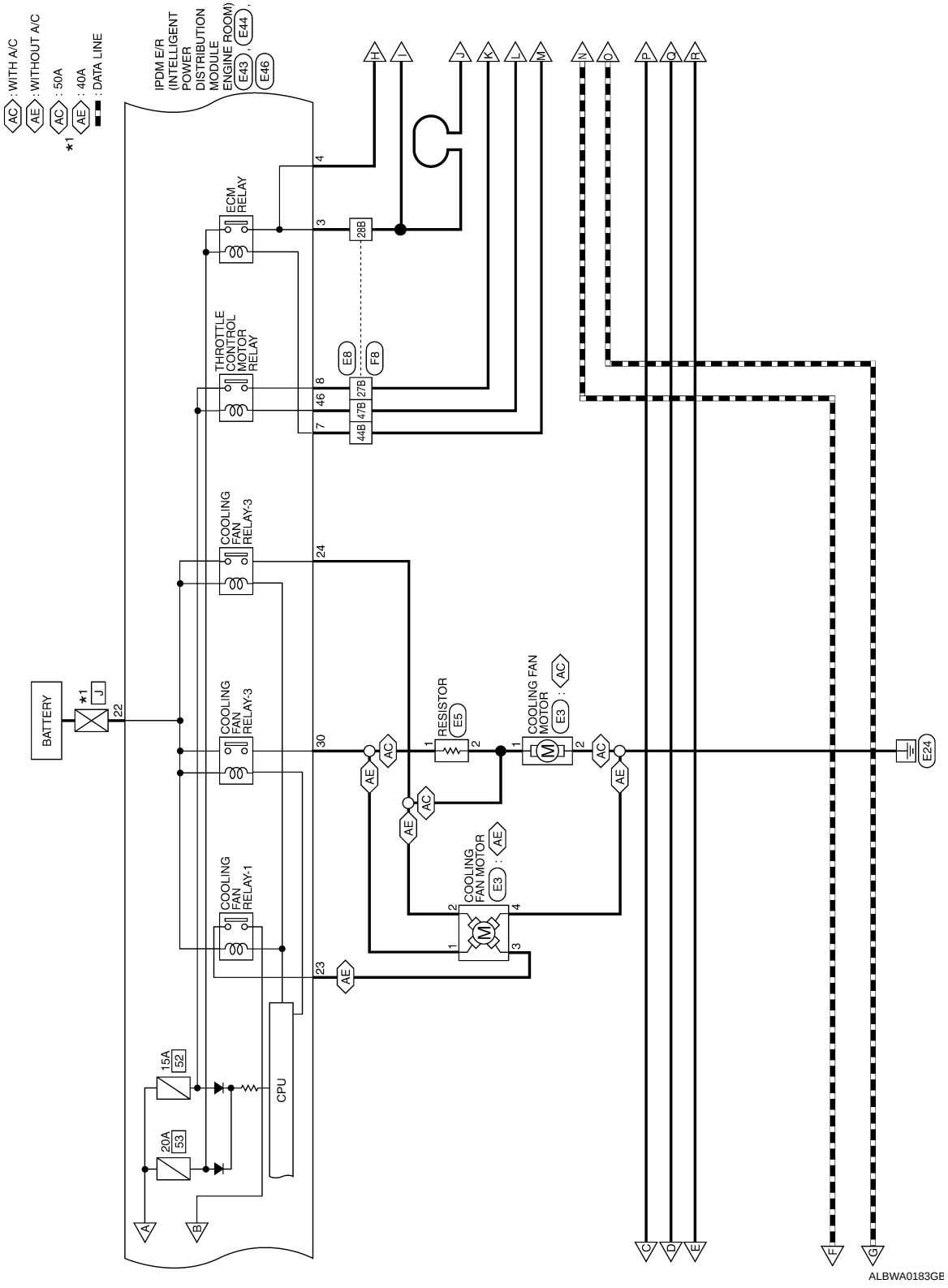
Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
102 (SB)	108 (B)	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5V
103 (GR)	104 (Y)	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4V
104 (Y)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
105 (G)	108 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
106 (P)	111 (R)	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5V
108 (B)	—	ECM ground	—	—	—
110 (G)	111 (R)	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
111 (R)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—

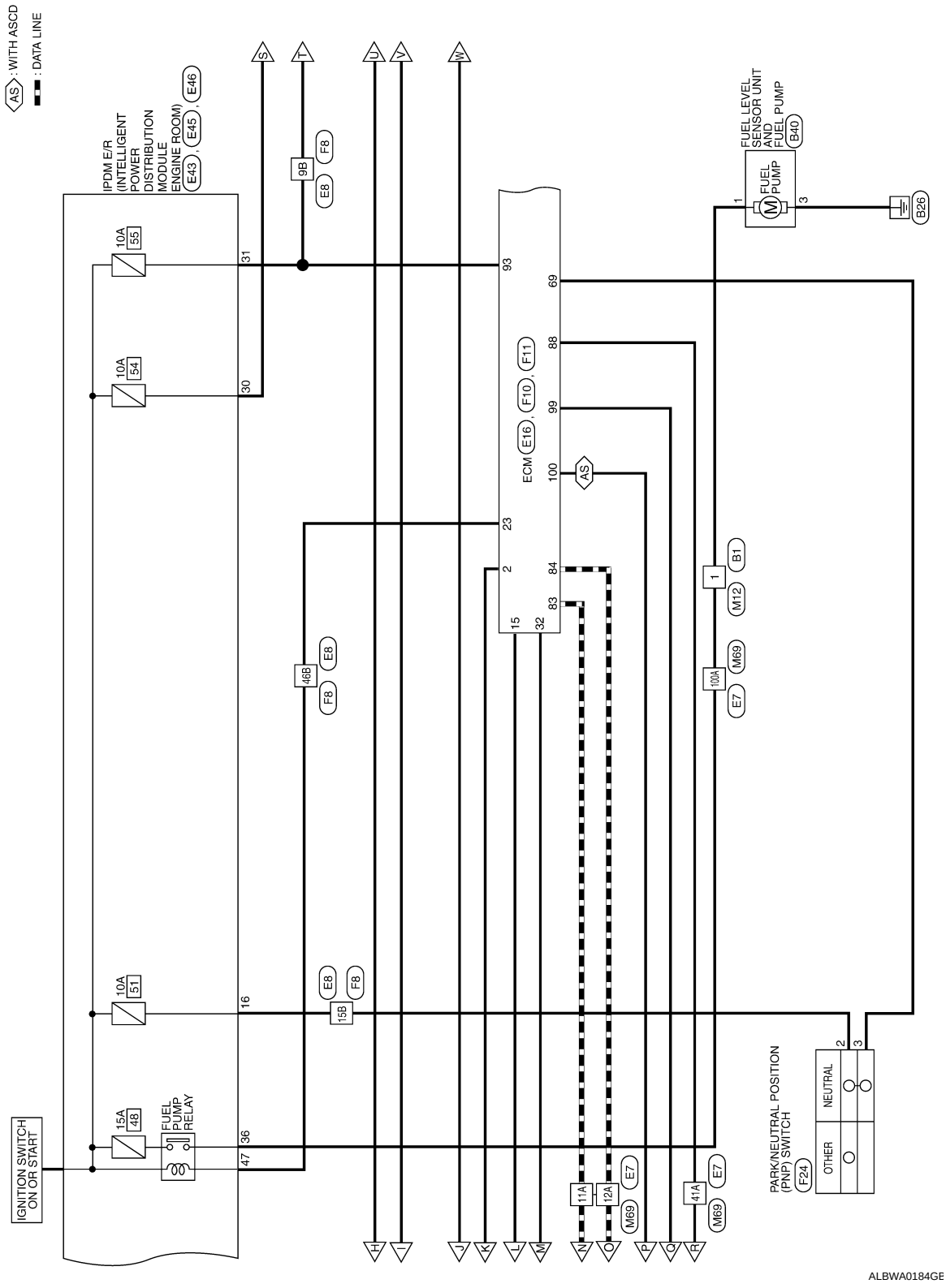
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

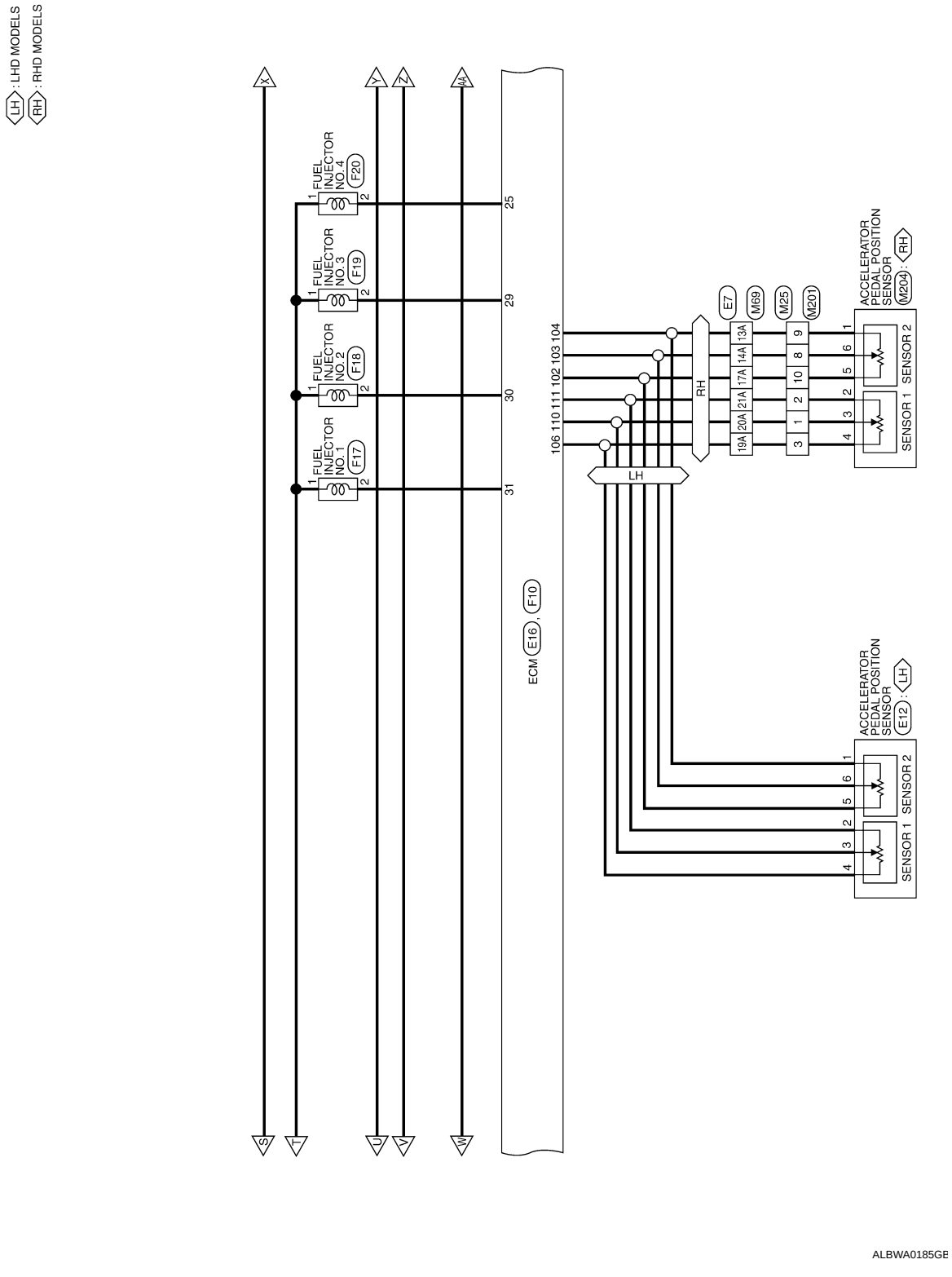
Wiring Diagram - ENGINE CONTROL SYSTEM -

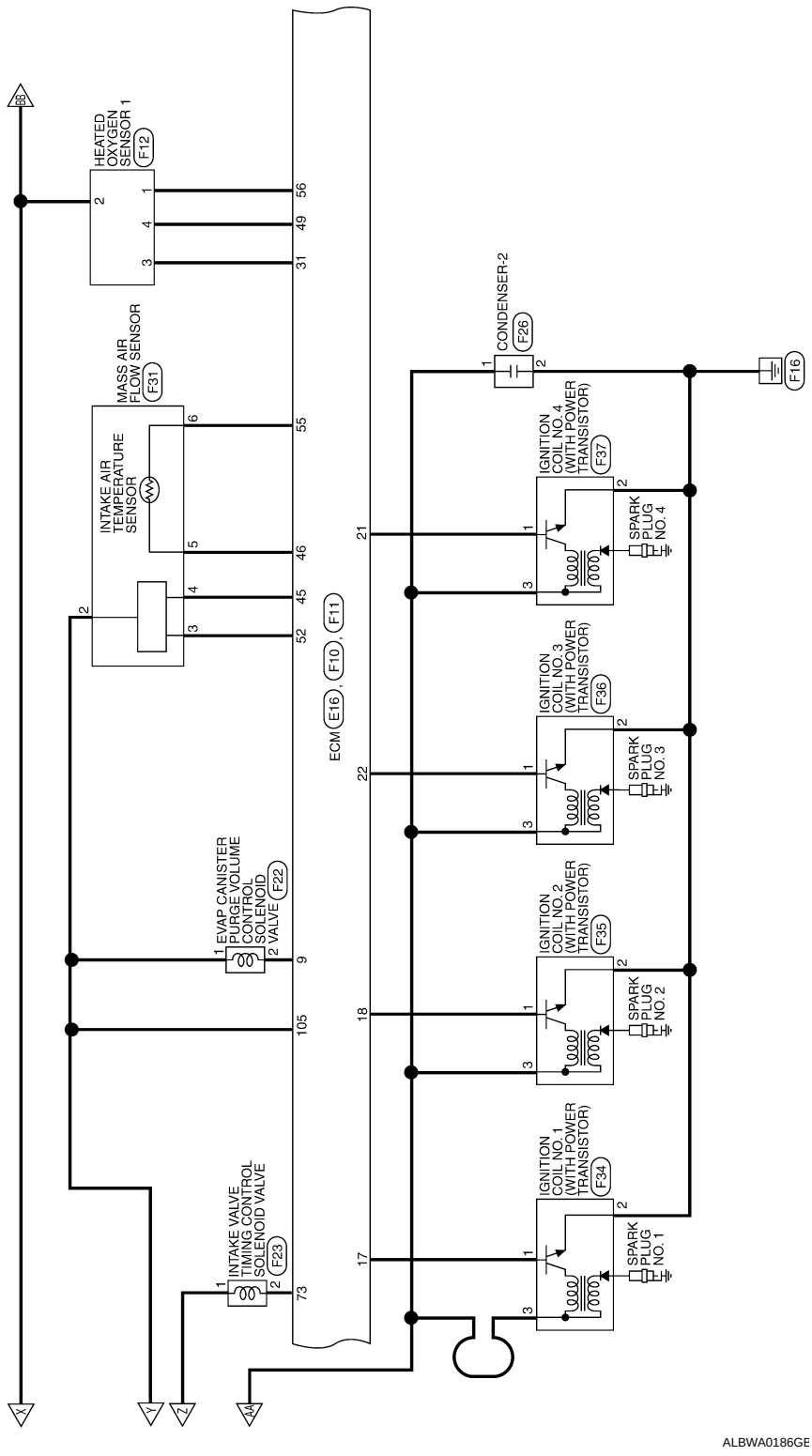
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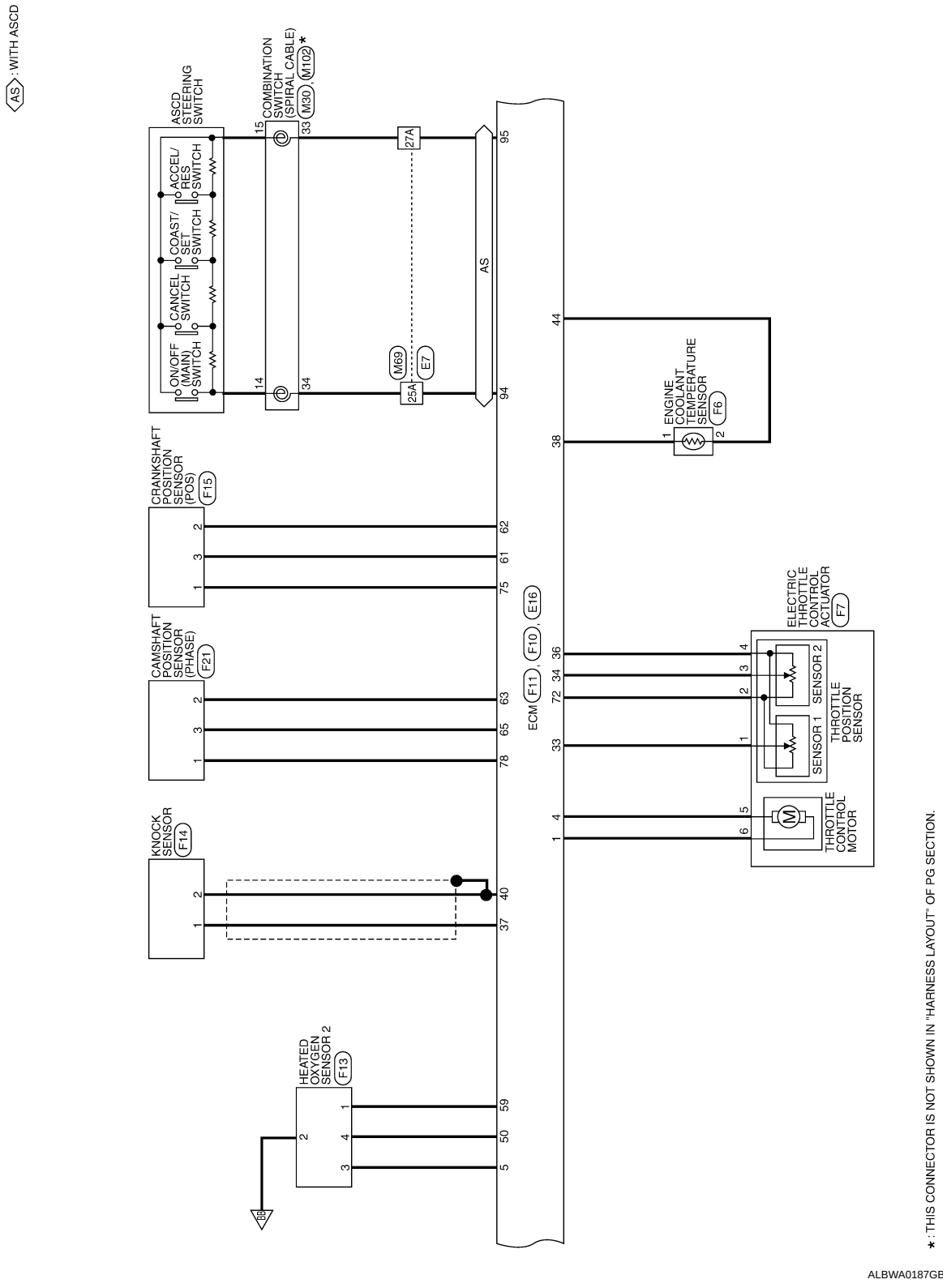


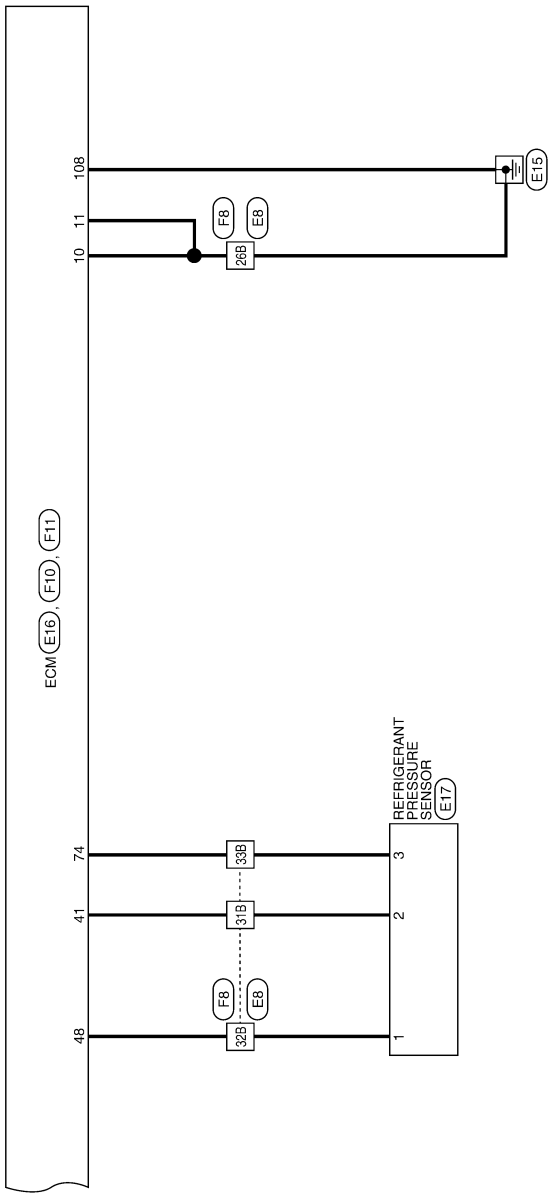

AC : WITH A/C
AE : WITHOUT A/C
AC : 50A
AE : 40A
*1
: DATA LINE
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
E43
E44
E46
ECM RELAY
THROTTLE CONTROL MOTOR RELAY
COOLING FAN RELAY-3
COOLING FAN RELAY-1
BATTERY
RESISTOR
E5
COOLING FAN MOTOR
E3
E8
F8
28B
27B
47B
44B
15A
52
20A
53
CPU
E24
ALBWA0183GB


AS : WITH ASCD
: DATA LINE
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) E43, E45, E46
10A 55
10A 54
10A 51
15A 48
FUEL PUMP RELAY
IGNITION SWITCH ON OR START
ECM E16, F10, F11
FUEL LEVEL SENSOR UNIT AND FUEL PUMP B40
FUEL PUMP
B26
B1
M12
M69
E7
PARK/NEUTRAL POSITION (PNP) SWITCH F24
NEUTRAL
OTHER
ALBWA0184GE


LH : LHD MODELS
RH : RHD MODELS
X
Y
Z
M4
S
T
U
V
W
FUEL INJECTOR NO.4 F20
FUEL INJECTOR NO.3 F19
FUEL INJECTOR NO.2 F18
FUEL INJECTOR NO.1 F17
25
29
30
31
ECM E16, F10
106 110 111 102 103 104
RH
LH
E7
M69
M25
M201
13A
14A
17A
21A
20A
19A
ACCELERATOR PEDAL POSITION SENSOR M204 : RH
SENSOR 1 SENSOR 2
ACCELERATOR PEDAL POSITION SENSOR E12 : LH
SENSOR 1 SENSOR 2
ALBWA0185GE


HEATED OXYGEN SENSOR 1 F12
MASS AIR FLOW SENSOR F31
INTAKE AIR TEMPERATURE SENSOR
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE F22
INTAKE VALVE TIMING CONTROL SOLENOID VALVE F23
ECM E16, F10, F11
CONDENSER-2 F26
IGNITION COIL NO. 4 (WITH POWER TRANSISTOR) F37
IGNITION COIL NO. 3 (WITH POWER TRANSISTOR) F36
IGNITION COIL NO. 2 (WITH POWER TRANSISTOR) F35
IGNITION COIL NO. 1 (WITH POWER TRANSISTOR) F34
SPARK PLUG NO. 4
SPARK PLUG NO. 3
SPARK PLUG NO. 2
SPARK PLUG NO. 1
F16
ALBWA0186GE

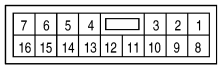

AS : WITH ASCD
ASCD STEERING SWITCH
ON/OFF (MAIN) SWITCH
CANCEL SWITCH
COAST/ SET SWITCH
ACCEL/ RES SWITCH
COMBINATION SWITCH (SPIRAL CABLE) ★
M102
M30
15
33
14
34
27A
25A
M69
E7
AS
95
94
44
38
ENGINE COOLANT TEMPERATURE SENSOR
F6
CRANKSHAFT POSITION SENSOR (POS)
F15
62
61
75
CAMSHAFT POSITION SENSOR (PHASE)
F21
63
65
78
KNOCK SENSOR
F14
40
37
HEATED OXYGEN SENSOR 2
F13
59
50
5
ECM F11, F10, E16
36
34
72
33
1
4
ELECTRIC THROTTLE CONTROL ACTUATOR
F7
THROTTLE POSITION SENSOR
SENSOR 1
SENSOR 2
THROTTLE CONTROL MOTOR
★: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION.
ALBWA0187GE


ECM E16, F10, F11
108
11
10
74
41
48
F8
E8
26B
33B
31B
32B
E15
REFRIGERANT PRESSURE SENSOR
E17
3
2
1
ALBWA0188GE

ENGINE CONTROL SYSTEM - MR18DE CONNECTORS

Connector No.	M12
Connector Name	WIRE TO WIRE
Connector Color	WHITE

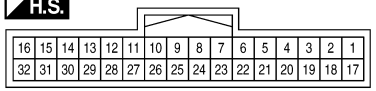
H.S.



Terminal No.	Color of Wire	Signal Name
1	W	—

Connector No.	M14
Connector Name	WIRE TO WIRE
Connector Color	WHITE

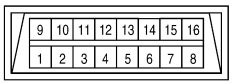
H.S.



Terminal No.	Color of Wire	Signal Name
1	L	—
16	L	—
17	P	—
32	P	—

Connector No.	M22
Connector Name	DATA LINK CONNECTOR
Connector Color	WHITE

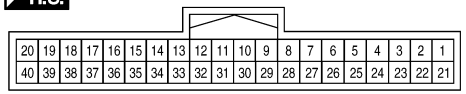
H.S.



Terminal No.	Color of Wire	Signal Name
4	B	GND
5	B	GND
6	L	CAN-H(+)
7	GR	K-LINE
8	LG	IGN
14	P	CAN-L(-)
16	V	B+

Connector No.	M24
Connector Name	COMBINATION METER
Connector Color	WHITE

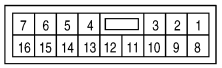
H.S.



Terminal No.	Color of Wire	Signal Name
1	L	CAN-H
2	P	CAN-L
21	B	GND 1(ILL)
22	B	GND2(POWER)
23	B	GND3
27	G	BAT
28	SB	IGN

Connector No.	M25
Connector Name	WIRE TO WIRE
Connector Color	WHITE

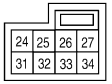
H.S.



Terminal No.	Color of Wire	Signal Name
1	G	—
2	R	—
3	P	—
6	L	—
8	GR	—
9	Y	—
10	SB	—
11	GR	—
12	G	—
15	R	—

Connector No.	M30
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Color	GRAY

H.S.

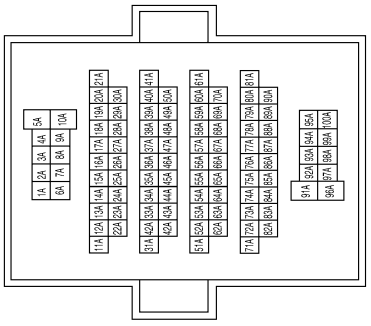


Terminal No.	Color of Wire	Signal Name
33	B	GND ASCD SW
34	R	SCCD SW

ALBIA0437GB

Connector No.	M69
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
7A	L	—
11A	P	—
12A	L	—
13A	Y	—
14A	GR	—
17A	SB	—
18A	R	—
19A	P	—
20A	G	—
21A	R	—
25A	R	—
26A	GR	—
27A	B	—
31A	P	—
32A	L	—
41A	GR	—
100A	W	—

Connector No.	M102
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Color	GRAY

H.S.



Terminal No.	Color of Wire	Signal Name
14	R	—
15	B	—

Connector No.	M201
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
1	G	—
2	R	—
3	V	—
6	L	—
8	GR	—
9	Y	—
10	BR	—
11	O	—
12	G	—
15	R	—

Connector No.	M203
Connector Name	STOP LAMP SWITCH
Connector Color	BLACK

H.S.



Terminal No.	Color of Wire	Signal Name
1	L	—
2	R	—

ALBIA0438GB

Connector No.	M204
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	GND A APS 2
2	R	GND A APS 1
3	G	APS 1
4	V	AVCC APS 1
5	BR	AVCC APS 2
6	GR	APS 2

Connector No.	M205
Connector Name	ASCD BRAKE SWITCH
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	—
2	GR	—

Connector No.	M206
Connector Name	ASCD CLUTCH SWITCH
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	G	—
2	B	—

Connector No.	E3
Connector Name	COOLING FAN MOTOR (WITHOUT A/C)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	LG	LO (+)
2	Y	HI (+)
3	L	HI (-)
4	B	LO (-)

Connector No.	E3
Connector Name	COOLING FAN MOTOR (WITH A/C)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	—
2	B	—

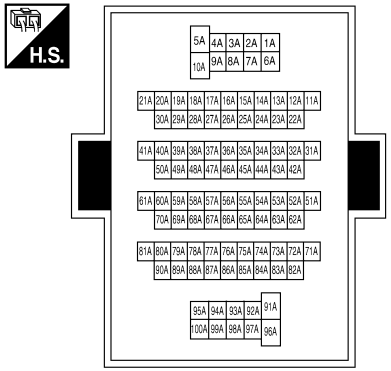
Connector No.	E5
Connector Name	RESISTOR
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	—
2	Y	—

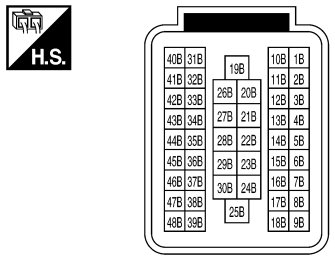
ALBIA0439GB

Connector No.	E7
Connector Name	WIRE TO WIRE
Connector Color	WHITE



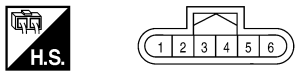
Terminal No.	Color of Wire	Signal Name
7A	L	—
11A	P	—
12A	L	—
13A	Y	—
14A	GR	—
17A	SB	—
18A	R	—
19A	O	—
20A	G	—
21A	R	—
25A	R	—
26A	GR	—
27A	B	—
31A	P	—
32A	L	—
41A	LG	—
100A	BR	—

Connector No.	E8
Connector Name	WIRE TO WIRE
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
9B	O	—
15B	BR	—
27B	G	—
28B	Y	—
31B	GR	—
32B	BR	—
33B	W	—
44B	G	—
46B	GR	—
47B	Y	—

Connector No.	E12
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	Y	GND A APS 2
2	R	GND A APS 1
3	G	APS 1
4	P	AVCC APS 1
5	SB	AVCC APS 2
6	GR	APS 2

ALBIA0440GB

Terminal No.	Color of Wire	Signal Name
83	P	CAN-L
84	L	CAN-H
88	LG	K-LINE
93	O	IGN SW
94	R	ASCD SW
95	B	GND ASCD SW
99	R	BRAKE
100	G	ASCD BRAKE SW
102	SB	AVCC-APS2
103	GR	APS2
104	Y	GND-A-APS2
105	G	VBR
106	P	AVCC-APS1
108	B	GND
110	G	APS1
111	R	GND-A-APS1

Connector No.	E16
Connector Name	ECM
Connector Color	BLACK

H.S.

81	85	89	93	97	101	105	109					
82	86	90	94	98	102	106	110					
83	87	91	95	99	103	107	111					
84	88	92	96	100	104	108	112					

Connector No.	E36
Connector Name	ASCD BRAKE SWITCH
Connector Color	BROWN

H.S.

2	1

Terminal No.	Color of Wire	Signal Name
1	O	—
2	GR	—

Connector No.	E13
Connector Name	STOP LAMP SWITCH
Connector Color	BLACK

H.S.

2	1

Terminal No.	Color of Wire	Signal Name
1	L	—
2	R	—

Connector No.	E35
Connector Name	ASCD CLUTCH SWITCH
Connector Color	BROWN

H.S.

2	1

Terminal No.	Color of Wire	Signal Name
1	G	—
2	B	—

Connector No.	E17
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Color	BLACK

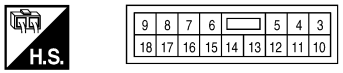
H.S.

1	2	3

Terminal No.	Color of Wire	Signal Name
1	BR	—
2	GR	—
3	W	—

ALBIA0441GB

Connector No.	E43
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE



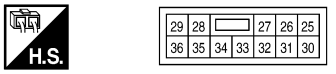
Terminal No.	Color of Wire	Signal Name
3	Y	IGN COIL
4	G	ECM (VB)
7	G	ECM CONT
8	G	ELEC THROTTLE
16	SB	REV LAMP

Connector No.	E44
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE



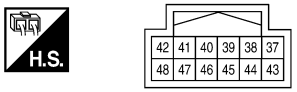
Terminal No.	Color of Wire	Signal Name
20	L	MOTOR FAN LO
22	G	FL50A MOTOR FAN
23	L	MOTOR FAN GND
24	Y	MOTOR FAN HI

Connector No.	E45
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BROWN



Terminal No.	Color of Wire	Signal Name
30	R	O2 SENS (IGN)
31	O	INJ ECU
36	BR	F/PUMP MOTOR

Connector No.	E46
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
39	B	SIGNAL GND
40	P	CAN-L
41	L	CAN-H
46	Y	ETC CONT
47	GR	FUEL PUMP CONT

Connector No.	E48
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
59	B	POWER GND

Connector No.	F6
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Color	GRAY



Terminal No.	Color of Wire	Signal Name
1	P	—
2	B	—

ALBIA0442GB

Connector No.	F7
Connector Name	ELECTRONIC THROTTLE CONTROL ACTUATOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	LG	TPS1
2	V	AVCC-TPS
3	O	TPS2
4	Y	GND-A2
5	P	MOTOR(+)
6	L	MOTOR(-)

Connector No.	F8
Connector Name	WIRE TO WIRE
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
9B	SB	—
15B	R	—
27B	SB	—
28B	V	—
31B	GR	—
32B	BR	—
33B	W	—
44B	P	—
46B	GR	—
47B	Y	—

Terminal No.	Color of Wire	Signal Name
1	L	MOTOR 1
2	SB	VMOT
3	G	O2 HF
4	P	MOTOR 2
5	G	O2HR
9	P	EVAP
10	B	GND
11	B	GND
15	Y	MOTRLY

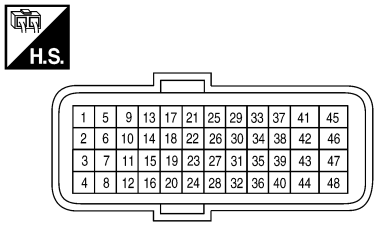
Terminal No.	Color of Wire	Signal Name
17	R	IGN COIL #1
18	LG	IGN COIL #2
21	G	IGN COIL #4
22	SB	IGN COIL #3
23	GR	FPR
25	V	INJ #4
29	Y	INJ #3
30	O	INJ #2
31	L	INJ #1
32	P	SSOF

Connector No.	F10
Connector Name	ECM
Connector Color	GRAY

H.S.

ALBIA0443GB

Connector No.	F11
Connector Name	ECM
Connector Color	BROWN



Terminal No.	Color of Wire	Signal Name
33	LG	TPS 1
34	O	TPS 2
36	Y	GND-A TPS
37	W	KNK
38	P	TW
40	SHIELD	GND KNK
41	GR	PDPRES
44	B	GND-A TW
45	G	QA+
46	V	TA
48	BR	GND-A (PDPRES)
49	W	O2SF
50	W	O2SR

Terminal No.	Color of Wire	Signal Name
52	LG	QA-
55	O	GND-TA
56	B	GNDA-O2SF
59	O	GND-A O2SR
61	W	POS
62	R	GND POS
63	BR	GND-(A)-PHASE
65	G	PHASE
69	L	NEUT H
72	V	AVCC-TPS
73	P	CVTC
74	W	AVCC(PDPRES)
75	BR	POS AVCC
78	O	PHASE AVCC

Connector No.	F12
Connector Name	HEATED OXYGEN SENSOR 1
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	B	GND-O2
2	R	PWR SUPPLY
3	SG	HEATER GND
4	W	SIGNAL

Connector No.	F13
Connector Name	HEATED OXYGEN SENSOR 2
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	O	GND-02
2	R	PWR SUPPLY
3	G	HEATER GND
4	W	SIGNAL

Connector No.	F14
Connector Name	KNOCK SENSOR
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	W	KNK
2	SHIELD	GND

ALBIA0444GB

Connector No.	F15
Connector Name	CRANKSHAFT POSITION SENSOR (POS)
Connector Color	BLACK

Terminal No.	Color of Wire	Signal Name
1	BR	POWER SUPPLY
2	R	GND
3	W	SIGNAL

Connector No.	F17
Connector Name	FUEL INJECTOR NO. 1
Connector Color	GRAY

Terminal No.	Color of Wire	Signal Name
1	SB	—
2	L	—

Connector No.	F18
Connector Name	FUEL INJECTOR NO. 2
Connector Color	GRAY

Terminal No.	Color of Wire	Signal Name
1	SB	—
2	O	—

Connector No.	F19
Connector Name	FUEL INJECTOR NO. 3
Connector Color	GRAY

Terminal No.	Color of Wire	Signal Name
1	SB	—
2	Y	—

Connector No.	F20
Connector Name	FUEL INJECTOR NO. 4
Connector Color	GRAY

Terminal No.	Color of Wire	Signal Name
1	SB	—
2	V	—

Connector No.	F21
Connector Name	CAMSHAFT POSITION SENSOR (PHASE)
Connector Color	BLACK

Terminal No.	Color of Wire	Signal Name
1	O	POWER SUPPLY
2	BR	GND
3	G	SIGNAL

ALBIA0445GB

Connector No.	F22
Connector Name	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Connector Color	BLUE

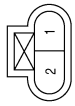
H.S.



Terminal No.	Color of Wire	Signal Name
1	G	—
2	P	—

Connector No.	F23
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
Connector Color	GREEN

H.S.



Terminal No.	Color of Wire	Signal Name
1	V	—
2	P	—

Connector No.	F24
Connector Name	NEUTRAL AND REVERSE SWITCH
Connector Color	GREEN

H.S.



Terminal No.	Color of Wire	Signal Name
2	R	—
3	L	—

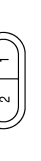
Connector No.	F26
Connector Name	CONDENSER-2
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	V	—
2	B	—

Connector No.	F31
Connector Name	MASS AIR FLOW SENSOR
Connector Color	BLACK

H.S.



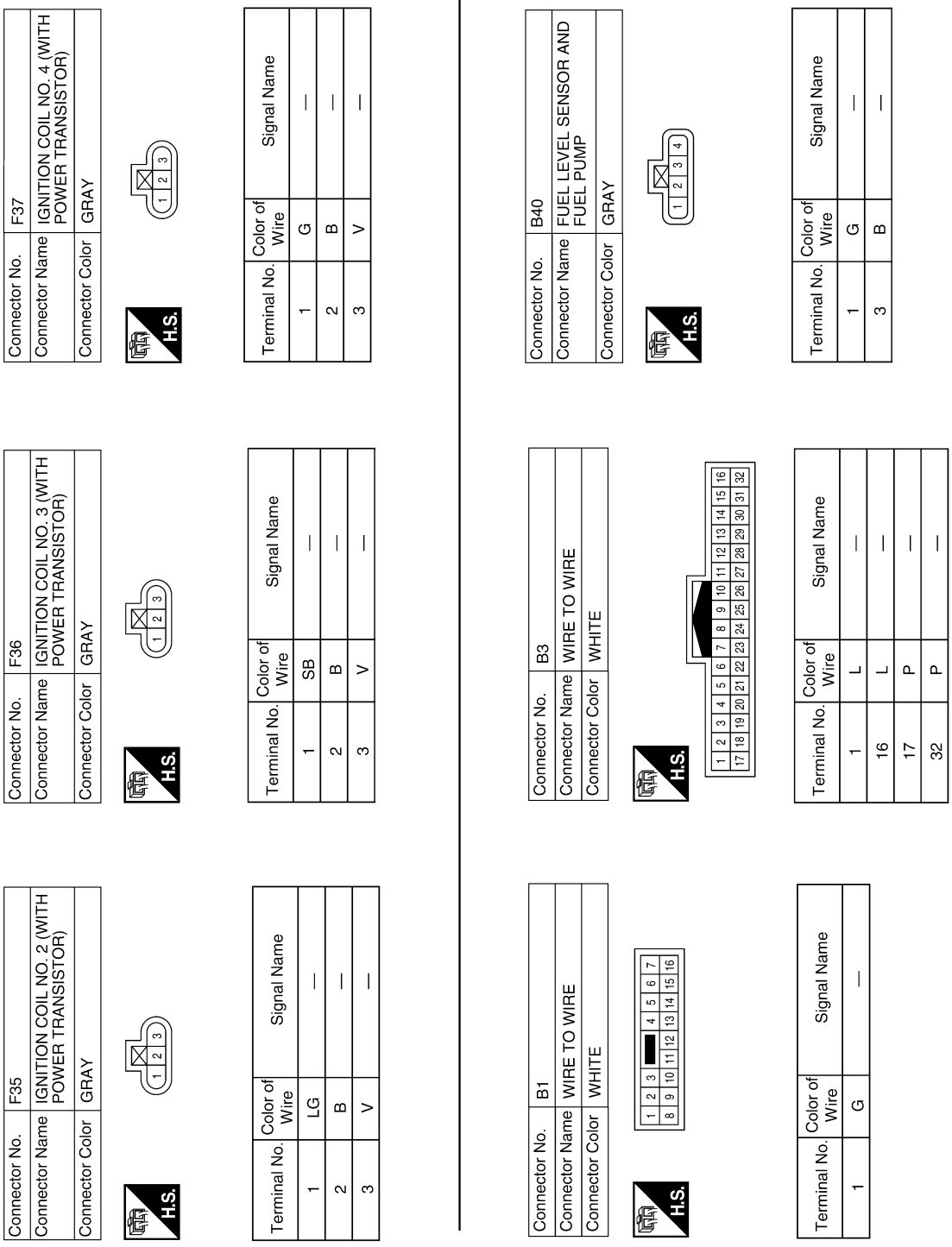
Terminal No.	Color of Wire	Signal Name
2	BR	POWER SUPPLY
3	V	TA SIGNAL
4	G	QA (+)
5	LG	QA (-)
6	O	TA GND

Connector No.	F34
Connector Name	IGNITION COIL NO. 1 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	—
2	B	—
3	V	—

ALBIA0446GB



ALBIA0447GB

Fail Safe

INFOID:0000000001161992

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 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.	EC-986

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 stating	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 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.	
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.	
P1121	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 Neutral position, and engine speed will not exceed 1,000 rpm or more.	
P1122	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
P1124 P1126	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.
P1128	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.
P1229	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.
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: When engine is idling — Driving condition: Normal
		Vehicle condition: When accelerating — Driving condition: Poor acceleration
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:0000000001161993

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 • P0102 P0103 Mass air flow sensor • P0112 P0113 P0127 Intake air temperature sensor • P0117 P0118 P0125 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0327 P0328 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0500 Vehicle speed sensor • P0605 ECM • P1229 sensor power supply • P1610 P1611 P1614 NATS • P1706 Park/Neutral position (PNP) switch • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	• P0132 P0133 P0134 P1143 P1144 Heated oxygen • P0135 Heated oxygen sensor 1 heater • P0138 P0139 P1146 P1147 Heated oxygen sensor 2 • P0141 Heated oxygen sensor 2 heater • P0444 EVAP canister purge volume control solenoid valve • P1111 Intake valve timing control solenoid valve • P1122 Electric throttle control function • P1124 P1126 Throttle control motor relay • P1128 Throttle control motor • P1217 Engine over temperature (OVERHEAT) • P1805 Brake switch
3	• P0011 Intake valve timing control • P0171 P0172 Fuel injection system function • P0300 - P0304 Misfire • P0420 Three way catalyst function • P1121 Electric throttle motor actuator • P1211 TCS control unit • P1212 TCS communication line • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD vehicle speed sensor

DTC Index

INFOID:0000000001161994

×: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	—	—	2	—	EC-793
U1001	1001*4	CAN COMM CIRCUIT	—	—	2	—	EC-793
U1010	1010	CONTROL UNIT(CAN)	—	—	2	—	EC-794
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	—	**Flashing**	**—**
P0011	0011	INT/V TIM CONT-B1	—	—	2	—	EC-795
P0102	0102	MAF SEN/CIRCUIT-B1	—	—	1	×	EC-799
P0103	0103	MAF SEN/CIRCUIT-B1	—	—	1	×	EC-799
P0112	0112	IAT SEN/CIRCUIT-B1	—	—	2	×	EC-804
P0113	0113	IAT SEN/CIRCUIT-B1	—	—	2	×	EC-804
P0117	0117	ECT SEN/CIRC	—	—	1	×	EC-807
P0118	0118	ECT SEN/CIRC	—	—	1	×	EC-807
P0122	0122	TP SEN 2/CIRC-B1	—	—	1	×	EC-810
P0123	0123	TP SEN 2/CIRC-B1	—	—	1	×	EC-810
P0132	0132	HO2S1 (B1)	—	×	2	×	EC-813
P0133	0133	HO2S1 (B1)	×	×	2	×	EC-817
P0134	0134	HO2S1 (B1)	—	×	2	×	EC-823
P0135	0135	HO2S1 HTR (B1)	×	×	2	×	EC-828
P0138	0138	HO2S2 (B1)	×	×	2	×	EC-831
P0139	0139	HO2S2 (B1)	×	×	2	×	EC-835
P0141	0141	HO2S2 HTR (B1)	×	×	2	×	EC-841
P0171	0171	FUEL SYS-LEAN-B1	—	—	2	×	EC-844
P0172	0172	FUEL SYS-RICH-B1	—	—	2	×	EC-848
P0222	0222	TP SEN 1/CIRC-B1	—	—	1	×	EC-852
P0223	0223	TP SEN 1/CIRC-B1	—	—	1	×	EC-852
P0300	0300	MULTICYL MISFIRE	—	—	2	×	EC-855
P0301	0301	CYL 1 MISFIRE	—	—	2	×	EC-855
P0302	0302	CYL 2 MISFIRE	—	—	2	×	EC-855
P0303	0303	CYL 3 MISFIRE	—	—	2	×	EC-855
P0304	0304	CYL 4 MISFIRE	—	—	2	×	EC-855
P0327	0327	KNOCK SEN/CIRC-B1	—	—	2	—	EC-860
P0328	0328	KNOCK SEN/CIRC-B1	—	—	2	—	EC-860
P0335	0335	CKP SEN/CIRCUIT	—	—	2	×	EC-862
P0340	0340	CMP SEN/CIRC-B1	—	—	2	×	EC-866
P0420	0420	TW CATALYST SYS-B1	×	×	2	×	EC-870
P0444	0444	PURG VOLUME CONT/V	—	—	2	×	EC-875
P0500	0500	VEH SPEED SEN/CIRC*5	—	—	2	×	EC-878
P0605	0605	ECM	—	—	1 or 2	× or —	EC-880
P1111	1111	INT/V TIM C/CIRC	—	—	1	×	EC-882

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						
P1121	1121	ETC ACTR - B1	—	—	1	×	EC-885
P1122	1122	ETC FUNCTION/CIRC - B1	—	—	1	×	EC-887
P1124	1124	ETC MOT PWP	—	—	1	×	EC-891
P1126	1126	ETC MOT PWP - B1	—	—	1	×	EC-891
P1128	1128	ETC MOT - B1	—	—	1	×	EC-894
P1143	1143	HO2S1 (B1)	×	×	2	×	EC-896
P1144	1144	HO2S1 (B1)	×	×	2	×	EC-901
P1146	1146	HO2S2 (B1)	×	×	2	×	EC-906
P1147	1147	HO2S2 (B1)	×	×	2	×	EC-912
P1211	1211	TCS C/U FUNCTN	—	—	2	—	EC-918
P1212	1212	TCS/CIRC	—	—	2	—	EC-919
P1217	1217	ENG OVER TEMP	—	—	1	×	EC-920
P1225	1225	CTP LEARNING-B1	—	—	2	—	EC-924
P1226	1226	CTP LEARNING-B1	—	—	2	—	EC-926
P1229	1129	SENSOR POWER/CIRC	—	—	1	×	EC-928
P1564	1564	ASCD SW	—	—	1	—	EC-930
P1572	1572	ASCD BRAKE SW	—	—	1	—	EC-933
P1574	1574	ASCD VHL SPD SEN	—	—	1	—	EC-940
P1610	1610	LOCK MODE	—	—	2	—	SEC-36
P1611	1611	ID DISCARD IMM-ECM	—	—	2	—	SEC-30
P1614	1615	DIFFERENCE OF KEY	—	—	2	—	SEC-29
P1706	1706	P-N POS SW/CIRCUIT	—	—	2	×	EC-942
P1805	1805	BRAKE SW/CIRCUIT	—	—	2	—	EC-945
P2122	2122	APP SEN 1/CIRC	—	—	1	×	EC-948
P2123	2123	APP SEN 1/CIRC	—	—	1	×	EC-948
P2127	2127	APP SEN 2/CIRC	—	—	1	×	EC-952
P2128	2128	APP SEN 2/CIRC	—	—	1	×	EC-952
P2135	2135	TP SENSOR-B1	—	—	1	×	EC-956
P2138	2138	APP SENSOR	—	—	1	×	EC-959

*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.

How to Set SRT Code

INFOID:0000000001161995

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.

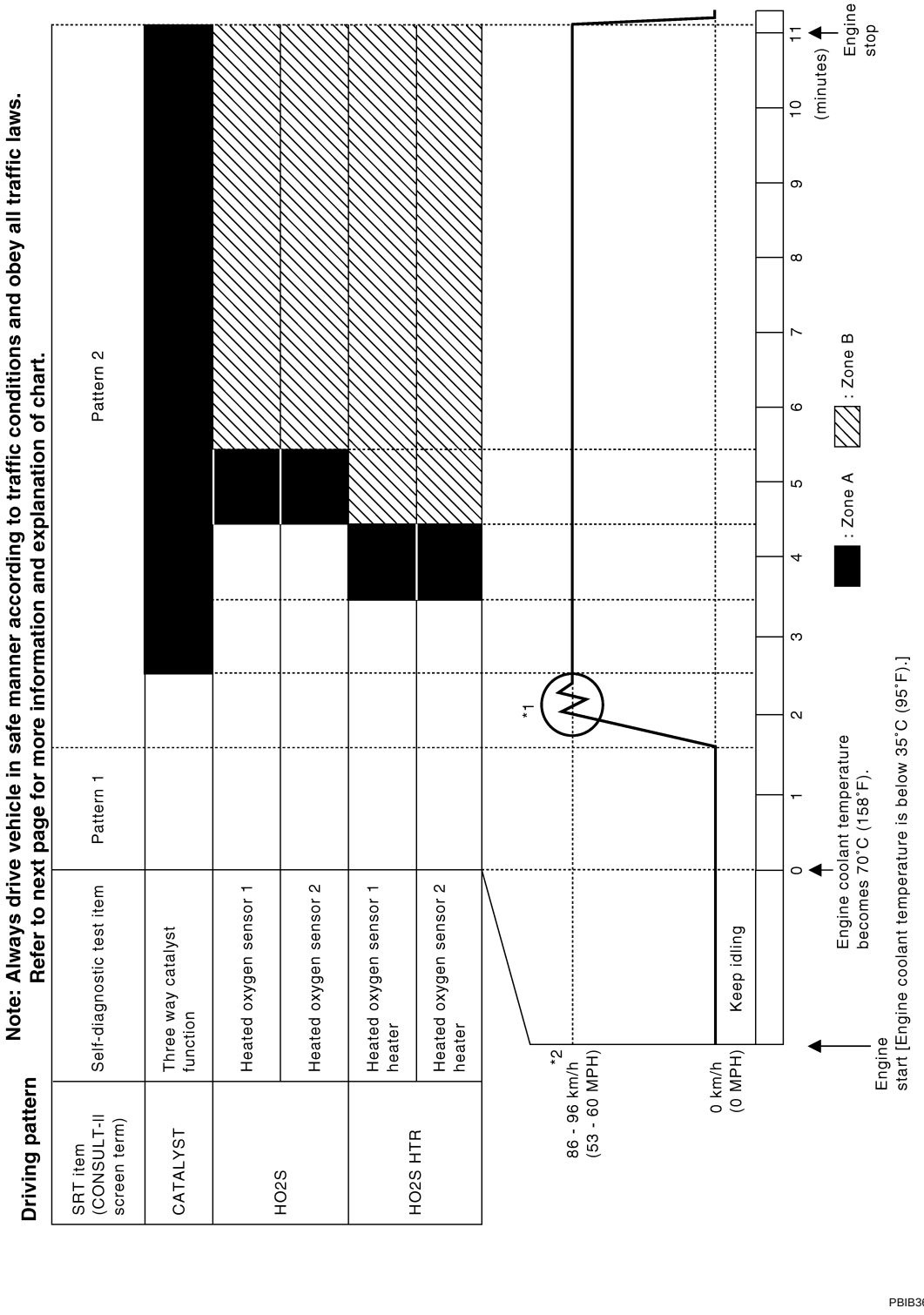
WITH CONSULT-III

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



PBIB3651E

- 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.

Test Value and Test Limit

INFOID:0000000001161996

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.

SRT item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit
			TID	CID	
CATALYST	Three way catalyst function	P0420	01H	01H	Max.
		P0420	02H	81H	Min.
HO2S	Heated oxygen sensor 1	P0133	09H	04H	Max.
		P1143	0AH	84H	Min.
		P1144	0BH	04H	Max.
		P0132	0CH	04H	Max.
		P0134	0DH	04H	Max.
	Heated oxygen sensor 2	P0139	19H	86H	Min.
		P1147	1AH	86H	Min.
		P1146	1BH	06H	Max.
		P0138	1CH	06H	Max.
HO2S HTR	Heated oxygen sensor 1 heater	P0135	29H	08H	Max.
			2AH	88H	Min.
	Heated oxygen sensor 2 heater	P0141	2DH	0AH	Max.
			2EH	8AH	Min.

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM

Symptom Table

INFOID:0000000001161997

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	EC-978
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-1035
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-975
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-745
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-987
	Incorrect idle speed adjustment						1	1	1	1		1			EC-692
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-885, EC-887
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-693
	Ignition circuit	1	1	2	2	2		2	2			2			EC-981
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-789
Mass air flow sensor circuit		1			2										EC-799
Engine coolant temperature sensor circuit							3			3					EC-807
Heated oxygen sensor 1 circuit			1	2	3	2		2	2			2			EC-813, EC-817, EC-823, EC-896, EC-901
Throttle position sensor circuit							2			2					EC-810, EC-852, EC-924, EC-926, EC-956
Accelerator pedal position sensor circuit				3	2	1									EC-948, EC-952, EC-956
Knock sensor circuit				2								3			EC-860
Crankshaft position sensor (POS) circuit		2	2												EC-862

	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	
Camshaft position sensor (PHASE) circuit	3	2												EC-866
Vehicle speed signal circuit		2	3		3						3			EC-878
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-880
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-882
PNP switch circuit			3		3		3	3			3			EC-942
Refrigerant pressure sensor circuit		2				3			3		4			EC-988
Electrical load signal circuit							3							EC-973
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-92, HAC-207
ABS actuator and electric unit (control unit)			4											BRC-86

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-10
	Fuel piping			5	5	5		5	5			5			EM-162
	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-154
	Air cleaner														EM-154
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)														EM-156
	Electric throttle control actuator														
	Air leakage from intake manifold/ Collector/Gasket														
Cranking	Battery	1	1	1		1		1	1			1		1	PG-6
	Generator circuit														CHG-29
	Starter circuit	3													STR-24
	Signal plate	6													EM-219
	PNP switch	4													TM-665
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-198
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-200
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mecha-nism	Timing chain	5	5	5	5	5		5	5			5			EM-177
	Camshaft														EM-186
	Intake valve timing control														EM-177
	Intake valve												3		EM-198
	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			EX-5, EX-9
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-166, LU-18, LU-19
	Oil level (Low)/Filthy oil														LU-15
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-40
	Thermostat									5					CO-45
	Water pump														CO-44
	Water gallery														CO-28
	Cooling fan									5					CO-43
	Coolant level (Low)/Contaminated coolant														CO-35
NATS (NISSAN Anti-Theft System)		1	1												SEC-7

1 - 6: The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

Description

INFOID:0000000001161998

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, EC-705, "System Diagram".

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000001161999

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SRC and SB section of this Service Manual.

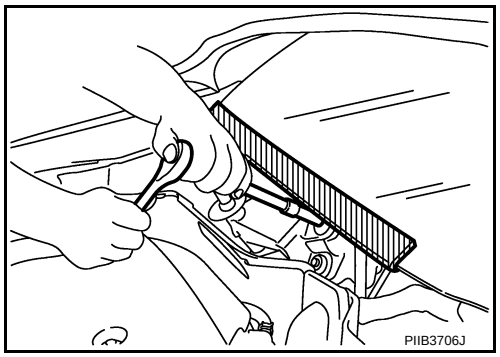
WARNING:

- **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 SRC section.**
- **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 for Procedure without Cowl Top Cover

INFOID:0000000001162000

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



Precautions For Xenon Headlamp Service

INFOID:0000000001679886

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

INFOID:0000000001679887

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.

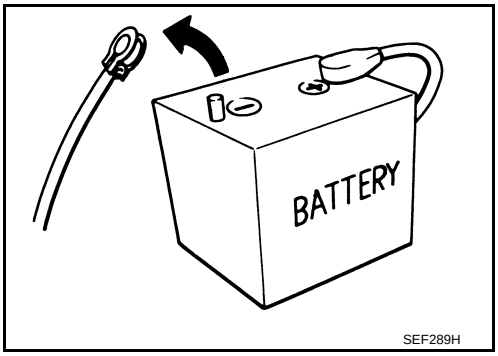
CAUTION:

- **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 XX-XX, "*****".**
- **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 before returning the vehicle to the customer.**

General Precautions

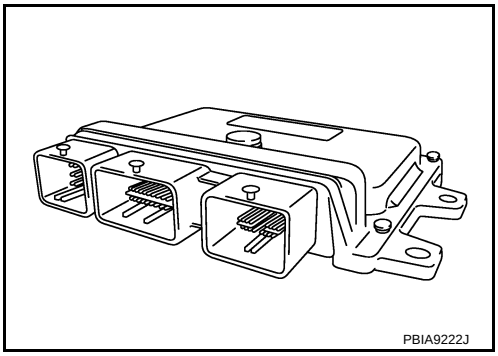
INFOID:0000000001162002

- **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.**



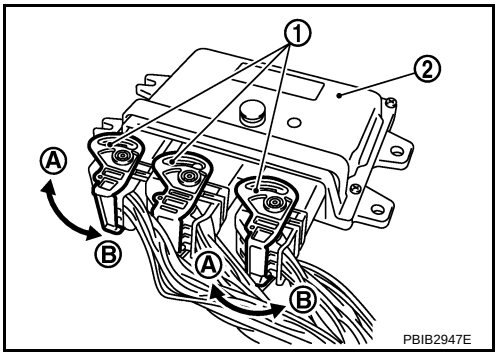
SEF289H

- **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**


PBIA9222J

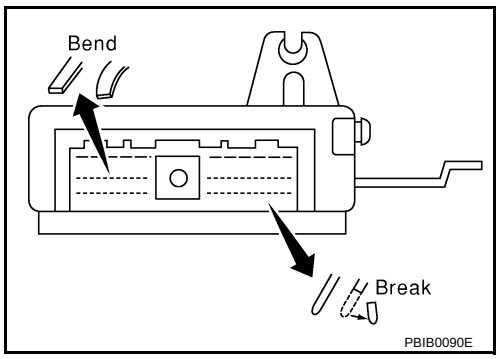
- **When connecting ECM harness connector (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.**

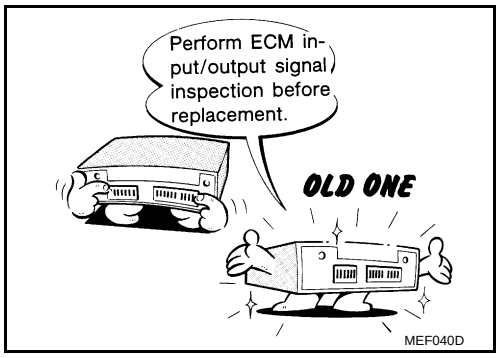
2. ECM
A. Loosen



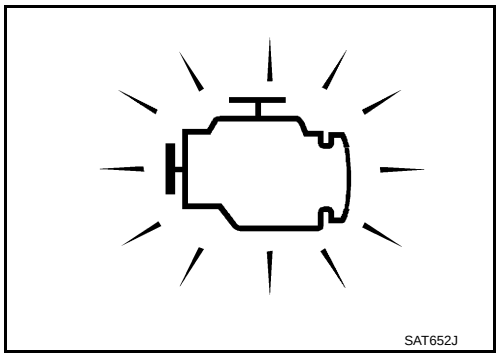
PBIB2947E

- **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 EC-990, "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).**

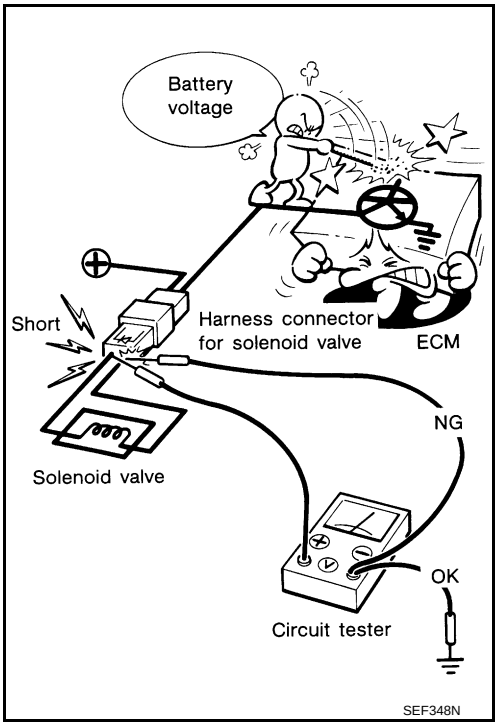




- **After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check.** The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.

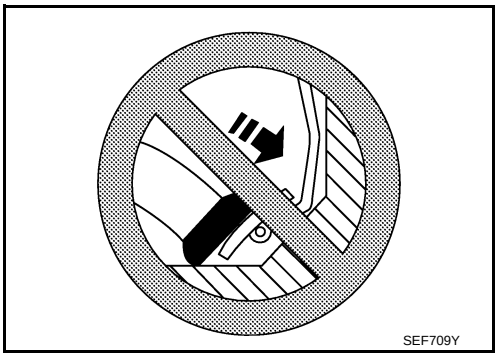


- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

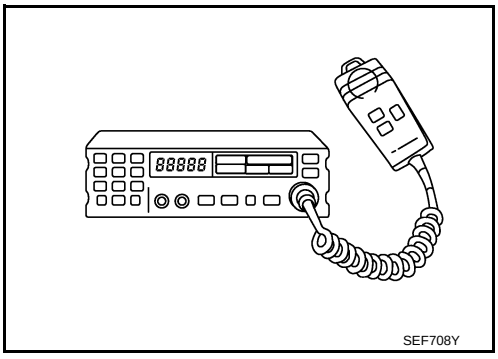


- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**

- **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.**



- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
- **Keep the antenna as far as possible from the electronic control units.**
- **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
  Do not let them run parallel for a long distance.
- **Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.**
- **Be sure to ground the radio to vehicle body.**

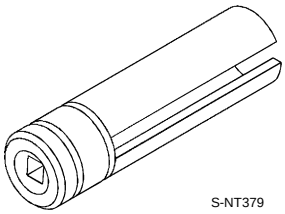
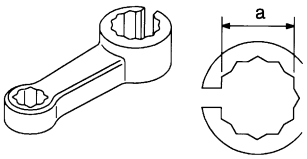
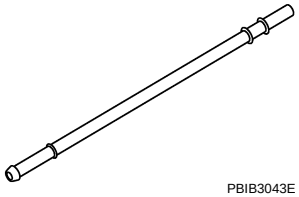


PREPARATION

PREPARATION

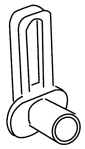
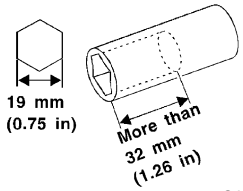
Special Service Tools

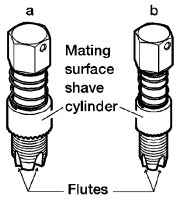
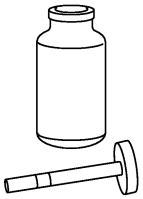
INFOID:0000000001162003

Tool number Tool name	Description
KV10117100 Heated oxygen sensor wrench  S-NT379	Loosening or tightening heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 Heated oxygen sensor wrench  S-NT636	Loosening or tightening heated oxygen sensor 2 **a: 22 mm (0.87 in)**
KV10118400 Fuel tube adapter  PBIB3043E	Measuring fuel pressure

Commercial Service Tools

INFOID:0000000001162004

Tool name	Description
Quick connector release  PBIC0198E	Removing fuel tube quick connectors in engine room (Available in SEC. 164 of PARTS CATALOG: Par No. 16441 6N210)
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor

Tool name	Description
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:0000000001162005

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

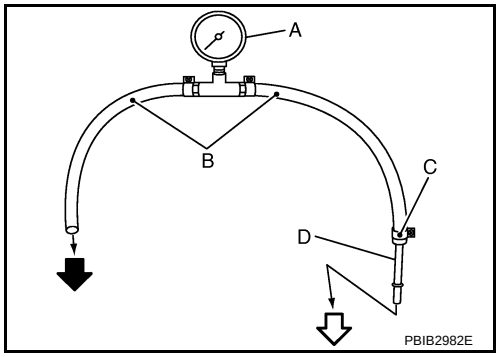
CAUTION:

- **Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.**
- **The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.**
- **Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains sealability with O-rings inside.**
- **Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.**

NOTE:

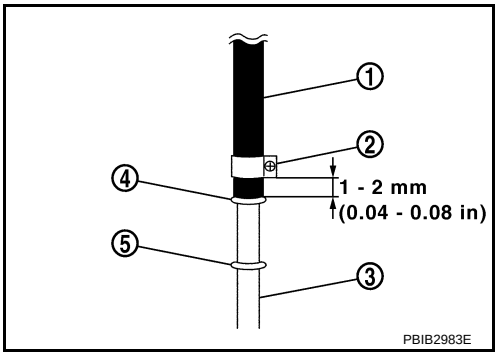
Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because C11 models do not have fuel return system.

1. Release fuel pressure to zero.
2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.
   - ⇦: To quick connector
   - ⬅: To fuel tube (engine side)
   - C: Clamp
   - Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
   - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
   - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
   - Use Pressure Gauge to check fuel pressure.



3. Remove fuel hose.
   - Do not twist or kink fuel hose because it is plastic hose.

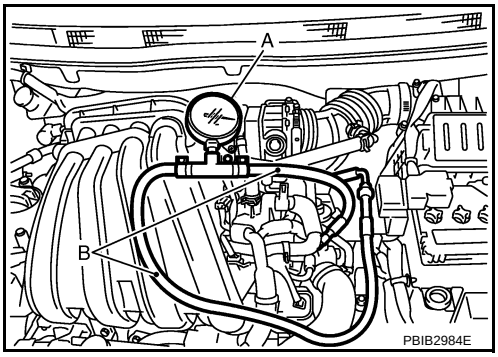
4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
   - No.2 spool (5)
   - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
   - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
   - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
   - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
   - When reconnecting fuel line, always use new clamps.
   - Use a torque driver to tighten clamps.
   - Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).



Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

   - Make sure that clamp screw does not contact adjacent parts.

5. Connect fuel tube adapter to quick connector.
   - A: Fuel pressure gauge
   - B: Fuel hose for fuel pressure check
6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
7. Turn ignition switch ON and check for fuel leakage.
8. Start engine and check for fuel leakage.
9. Read the indication of fuel pressure gauge.
   - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
   - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.



At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2, 51 psi)

10. If result is unsatisfactory, go to next step.
11. Check the following.
    - Fuel hoses and fuel tubes for clogging
    - Fuel filter for clogging
    - Fuel pump
    - Fuel pressure regulator for clogging

    If OK, replace fuel pressure regulator.
    If NG, repair or replace.

EVAPORATIVE EMISSION SYSTEM

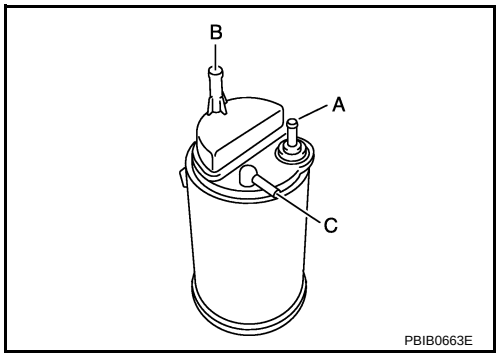
Inspection

INFOID:0000000001162006

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).

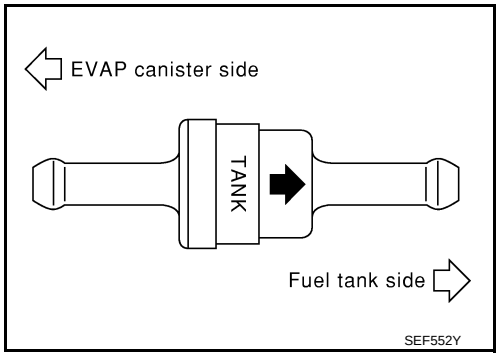


3. Visually inspect the fuel check valve for cracks, damage, loose connections chafing and deterioration.
4. Check fuel check valve as follows:

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.

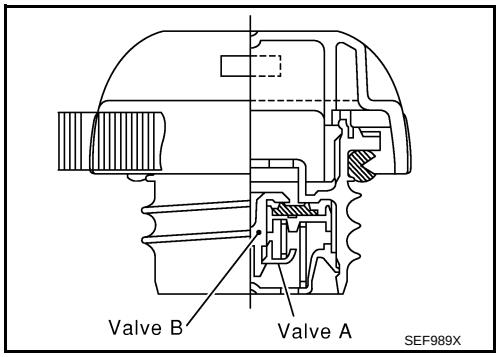
b. Blow air through connector on EVAP canister side. Air flow should be smoothly directed toward fuel tank side.

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.

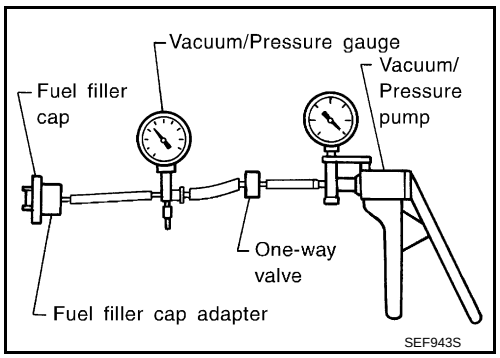
a. Wipe clean valve housing.



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:0000000001162007

Condition	Specification
No load* (in Neutral position)	700 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Timing

INFOID:0000000001162008

Condition	Specification
No load* (in Neutral position)	15 ± 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:0000000001162009

Condition	Specification (Using CONSULT-III or GST)
At idle	10 – 35 %
At 2,500 rpm	10 – 35 %

Mass Air Flow Sensor

INFOID:0000000001162010

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	0.8 – 1.1V*
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.

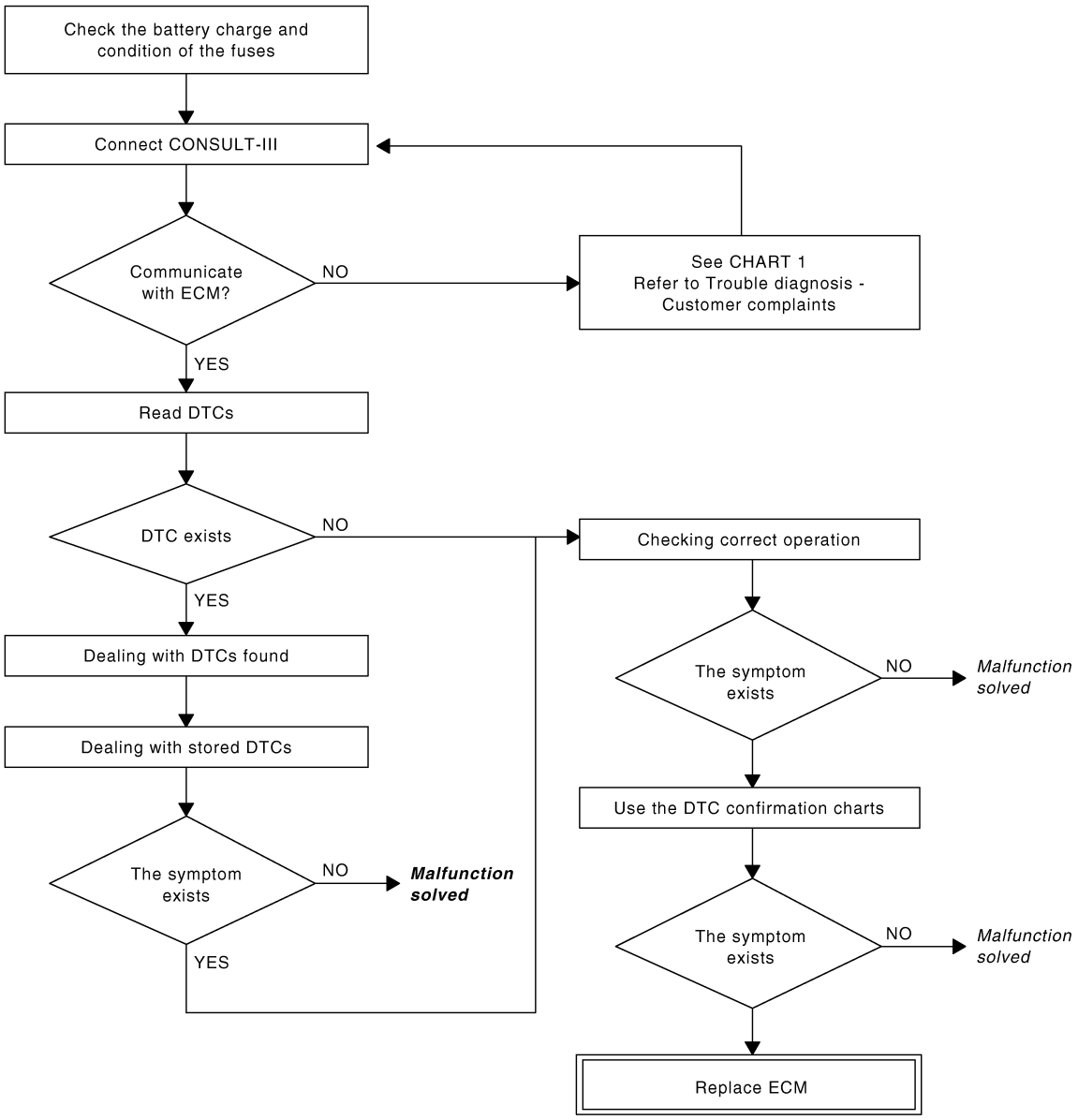
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000001162512

OVERALL SEQUENCE



JMBIA0634GB

Diagnostics Malfunctions

- Malfunctions are declared as either present or stored (depending on whether they appeared in a certain context and have disappeared since, or whether they remain present but have not been diagnosed within the current context).
- The present or stored status of malfunctions should be taken into consideration when the diagnostic tool is used following the + after ignition supply being switched on (without acting on the system components).
- For a present malfunction, apply the procedure described in the Interpretation of malfunction section.
- For a stored malfunction, note the malfunctions displayed and apply the instructions in the Notes section.
- If the malfunction is confirmed when the instructions in the Notes section are applied, the malfunction is present. Deal with the malfunction
- If the malfunction is not confirmed, check:

- the electrical lines which correspond to the malfunction,
- the connectors for these lines (for oxidation, bent pins, etc),
- the condition of the wires (insulation has melted or been cut, abrasions),
- the resistance of the component detected as malfunction.

Conformity Check

- The aim of the conformity check is to check data that does not produce a malfunction on the diagnostic tool because the data is inconsistent. Therefore, this phase is used to:

- carry out malfunction finding on malfunctions that do not have a malfunction display, and which may correspond to a customer complaint.
- check that the system is operating correctly and that there is no risk of a malfunction recurring after repairs.

- This section gives the malfunction finding procedures for statuses and parameters and the conditions for checking them.
- If a status is not behaving normally or a parameter is outside the permitted tolerance values, consult the corresponding malfunction finding page.

Customer Complaints - Malfunction finding chart

If the test with the diagnostic tool is OK but the customer complaint is still present, the malfunction should be processed by customer complaint.

NOTE:

A synopsis of the general procedure to follow is provided on the preceding page in the form of a flow chart.

Malfunction Finding Procedure (Wiring Check)

Diagnostics malfunctions

Removing the connectors and/or handling the wirings may temporarily remove the origin of a DTC. The measurements of the electrical voltages, resistance and insulation are generally correct, especially when the DTC is not present at the time of the analysis (stored DTC).

Visual Check

Look for impacts under the bonnet and in the passenger compartment.
Perform a careful check of the protections, insulation and correct running of wirings.
Look for traces of oxidation.

Tactile Check

While manipulating the wirings, use the diagnostic tool to detect a change in DTC status from “stored” to “present”.
Ensure that the connectors are correctly engaged.
Apply light stresses to the connectors.
Gently manipulate the wiring harness.
If a change of status occurs, try to isolate the origin of the incident.

Inspection of each component

Disconnect the connectors and check the appearance of the clips and blades and their crimping (no crimping on the insulating part).
Check that the clips and blades are properly engaged in the receptacles.
Ensure that there is no rebounding of clips or blades at the time of connection.
Check the contact pressure of the clips using a suitable model blade.

Resistance Control

Test the continuity of the lines in their entirety, then section by section.
Try to create a short-circuit to earth, on the + 12 V or with another wire.
If a DTC is detected, repair or replace the wiring.

REMINDERS

Trouble Diagnosis:

There are present DTCs and stored DTCs (which appeared in a certain context and have since disappeared or which are still present but have not had trouble diagnosis performed on them in the current context).
The “present” or “stored” status of DTCs must be considered when activating the diagnostic tool after power is supplied to the ECM (without activating the system components).
Deal with present DTCs according to the procedure specified in the corresponding DTC trouble diagnosis.
For stored DTCs, note the DTCs displayed and follow the instructions in the Notes section.
If the DTC is confirmed when the instructions in the Notes section are applied, the malfunction is present. Deal with the DTC.

If the DTC is not confirmed, check:
- Electrical lines which correspond to the malfunction
- Connectors for these lines (for oxidation, bent pins, etc.)
- Resistance of the malfunction component
- Condition of the wires (melted or cut insulation, wear)

Conformity Check
The conformity check is designed to check the states and data monitor items which do not display any DTCs on the diagnostic tool when inconsistent. This phase therefore allows:
- Diagnoses malfunctions that do not have a DTC display, and which may correspond to a customer complaint.
- Checks that the system is operating correctly and that there is no risk of a DTC reappearing after repairs.

This section gives the trouble diagnosis procedures for states and parameters and the conditions for checking them.
If a state is not operating normally or a data monitor value is outside permitted tolerance values, you should consult the corresponding trouble diagnosis page.

Customer Complaints - Trouble Diagnosis
If the test with the CONSULT-III is OK, but the customer complaint still present, the malfunction should be treated by customer complaints.

A synopsis of the general procedure to follow is provided on the previous page in the form of a flow chart.

SAFETY ADVICE
- The safety instructions must be followed at all times when working on components, to avoid damage or injury:
- make sure that the battery is properly charged to avoid damaging the computers with a low load,
- use the appropriate tools,
- do not touch the xenon bulbs.

Diagnostic Work Sheet

INFOID:0000000001162513

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 : Description

INFOID:0000000001162514

NOTE:
Only consult the tests after following the diagnostic procedure chart.
Some specific checks are grouped under the “tests” heading and are used as required in different diagnostic charts.

Basic test	Trouble diagnosis	Reference page
Low pressure fuel supply system check	TEST 1	EC-1043, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)"
Internal fuel transfer pump check	TEST 2	EC-1044, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)"
High pressure supply pump (Pressure control valve) check	TEST 3	EC-1044, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]"
High pressure supply pump (Volumetric control valve) check	TEST 4	EC-1045, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]"
Rail high pressure regulation check	TEST 5	EC-1048, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)"
Major leak in fuel injectors/fuel injectors open	TEST 6	EC-1052, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)"
Incorrect fuel injection quantity	TEST 7	EC-1053, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)"

BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)

INFOID:0000000001162515

NOTE:
- **CAUSE**
- No fuel can be seen in the transparent supply pipe leading to the pump or large air bubbles can be seen (small air bubbles are permitted).
- engine does not start.

1.CHECK CONFORMITY

Check the conformity and presence of the fuel (gasoline instead of diesel, contaminated fuel).

Is the inspection result normal?

Yes >> GO TO 2.
No >> Bleed the fuel supply system with the manual priming pump.

2.CHECK FUEL CIRCUIT

Does the fuel circulate correctly when pumped manually?

Yes or No

Yes >> GO TO 5.
No >> GO TO 3.

3.CHECK FOR LEAK

Look for leaks on the unions.

Are there leaks in the hoses and unions?

Yes >> Carry out the required repairs.
No >> GO TO 4.

4.CHECK FUEL FILTER

Check the correctness of the fuel filter.

Is the fuel filter correct?

Yes >> GO TO 5.
No >> Replace the fuel filter with a genuine part.

5.INSPECTION END

Low pressure circuit OK.

>> **INSPECTION END**

BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)

INFOID:0000000001162516

NOTE:
- **CONDITIONS PRIOR TO TEST**
- Test 1 Low pressure fuel supply system check has been carried out previously and results are satisfactory.
- **CAUSE**
- Fuel can be seen in the transparent supply pipe leading to the pump.
- However, fuel does not move during starting.

1.CHECK INTERNAL FUEL TRANSFER PUMP

1. Disconnect high pressure supply pump (volumetric control valve) harness connector
2. Remove fuel return pipe from the pump and block it so that it is sealed. Connect a pipe to the pump to measure the flow of diesel.
3. To authorise a 15 second cranking engine and carry out this test it is essential to carry out the following procedure: measure the flow of diesel.

- Turn ignition switch ON.
- Perform “SAVE DATA FOR CPU REPLC” in WORK SUPPORT mode with CONSULT-III.
- Perform “PRGRM REINITIALIZE” in WORK SUPPORT mode with CONSULT-III.
- Cranking engine for at least 15 seconds (starting speed 250 rpm)
- Check the flow rate of the fuel being collected in a graduated measuring cylinder (500 ml minimum).The minimum flow rate must be 25 ml every 15 sec.
- Perform “WRT DATA AFTR REPLC CPU” in WORK SUPPORT mode with CONSULT-III.

Does the flow measure less than 25ml?

Yes >> Replace high pressure supply pump.
No >> GO TO 2.

2.INSPECTION END

Low pressure system OK.

>> **INSPECTION END**

BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply

Pump (Pressure Control Valve) Check]

INFOID:0000000001162517

NOTE:
- **CONDITIONS PRIOR TO TEST**
  - The entire low pressure system must be in good condition.
  - Check the sealing of the high pressure pipes and unions.
- **CAUSE**
  - Rail pressure approximately 5000 kPa(50 bar, 51 kg/cm^2, 725 psi) during starting.

1.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (pressure control valve) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between high pressure supply pump (pressure control valve) harness connector and ground.

High pressure supply pump (Pressure control valve)		Ground	Voltage
Connector	Terminal		
F53	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R
- Harness for open or short between IPDM E/R and high pressure supply pump (pressure control valve)
- Harness for open or short between ECM and high pressure supply pump (pressure control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between high pressure supply pump (pressure control valve) harness connector and ECM harness connector.

High pressure supply pump (Pressure control valve)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F53	4	F11	49	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.HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) CHECK

Refer to EC-1123, "Component Inspection".

Is the inspection result normal?

Yes >> INSPECTION END
No >> Replace high pressure supply pump.

BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply

Pump (Volumetric Control Valve) Check]

INFOID:0000000001162518

NOTE:
- **CONDITIONS PRIOR TO TEST**
- The entire low pressure system must be in good condition.
- Check the sealing of the high pressure pipes and unions.
- **CAUSE**
- Not enough or no rail pressure during starting.
- Rail reference pressure during starting, minimum 15 000 kPa (150 bar, 153 kg/cm^2, 2175 psi).

1.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)-I

Refer to EC-1110, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2
NO >> Replace high pressure supply pump.

2.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)-II

- Reconnect all harness connectors disconnected.
- Turn ignition switch ON.
- Select “DATA MONITOR” mode with CONSULT-III.
- Check that the “FUEL FLOW S/V CU” indication when the cranking engine.

Is the excitation current between 0.6 - 1.0A?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (volumetric control valve) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between high pressure supply pump (volumetric control valve) harness connector and ground.

High pressure supply pump (volumetric control valve)		Ground	Voltage
Connector	Terminal		
F54	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R
- Harness for open or short between ECM and high pressure supply pump (volumetric control valve)
- Harness for open or short between IPDM E/R and high pressure supply pump (volumetric control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between high pressure supply pump (volumetric control valve) harness connector and ECM harness connector.

High pressure supply pump (volumetric control valve)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F54	2	F11	50	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK ENGINE CONDITION

Start engine.

Is the engine start?

YES >> GO TO 7.
NO >> GO TO 9.

7.CHECK ENGINE CONDITION

- Check that the oil level is correct and that the engine coolant temperature is normal operation temperature 60°C (140°F)
- Engine running at idle speed.
- Select “HIGH PRES CIRCUIT LEAK TEST” in “ACTIVE TEST” mode with CONSULT-III.
- Engine will perform 4 acceleration cycles.
- Select “DATA MONITOR” mode with CONSULT-III.
- Check that the “RAIL PRES SET” and “RAIL PRESSURE” indication.
- Does “RAIL PRESSURER” follow “RAIL PRES SET” at ± 5000 kPa(50 bar, 51 kg/cm^2, 725 psi) during the phase of the 4 acceleration cycles?

NOTE:
If the rail pressure does not reach the setpoint there is an fuel injector leak that is too great or the pressure signal is incorrect.

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 8.

8.CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Carry out TEST 5.

>> GO TO 11.

9.CHECK ENGINE CONDITION

- Check that the oil level is correct.
- Select “DATA MONITOR” mode with CONSULT-III.
- Check that the “RAIL PRES SET” and “RAIL PRESSURE” indication.
- Does “RAIL PRESSURER” follow “RAIL PRES SET” when the cranking engine.

NOTE:
If the rail pressure does not reach the setpoint there is an fuel injector leak that is too great or the pressure signal is incorrect.

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 10.

10.CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Carry out TEST 6.

>> GO TO 11.

11.INSPECTION END

High pressure supply pump (volumetric control valve) OK.

>> **INSPECTION END**

BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)

INFOID:0000000001162519

NOTE:
- If contaminants (swarf) can be seen in the transparent return pipe, the entire fuel injection system (fuel injectors, pump, rail, high pressure pipes and all return pipes) must be replaced.
- **CONDITIONS PRIOR TO TEST**
- Engine coolant temperature between 80 - 90°C (176 - 194°F).
- All the electrical load are switched off.
- Air conditioning is switched off.
- The tank is at least half-full.
- The pipe connections and unions have been checked.
- Check the sealing of the high pressure pipes and unions.
- **CAUSE**
- Rail pressure variations around the setpoint.
- The rail reference pressure is not reached.
- Rough idle.
- Possibly noisy combustion.

1.CHECK AIR BUBBLES

1. Start engine
2. Are there large air bubbles in the transparent supply pipe going to the pump?

Is the inspection result normal?

YES >> Check low pressure system.
NO >> GO TO 2.

2.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)-I

Disconnect high pressure supply pump (volumetric control valve) harness connector.

Does the engine stop?

YES >> GO TO 3.
NO >> Replace high pressure supply pump (the high pressure supply pump [volumetric control valve] remains open mechanically).

3.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)-I

1. Reconnect high pressure supply pump (volumetric control valve) harness connector.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Start engine.
4. Disconnect high pressure supply pump (pressure control valve) harness connector.

Does the engine stop?

YES >> GO TO 4.
NO >> Replace high pressure supply pump (the high pressure supply pump [pressure control valve] remains open mechanically).

4.CHECK FUEL INJECTOR

1. Reconnect high pressure supply pump (pressure control valve) harness connector.
2. Wait at least 30 seconds.
3. Start engine and let it idle speed.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check that the “F/FLOW CORR CYL1”, “F/FLOW CORR CYL2”, “F/FLOW CORR CYL3”, “F/FLOW CORR CYL4” indication.

Are the reference value 0.3 - 1.9?

YES >> GO TO 6.
NO >> GO TO 5.

5.CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Carry out TEST 6.

>> INSPECTION END

6. CHECK ENGINE CONDITION

- Check that the oil level is correct and that the engine coolant temperature is normal operation temperature.60°C (140°F)
- Engine running at idle speed.
- Select “HIGH PRES CIRCUIT LEAK TEST” in “ACTIVE TEST” mode with CONSULT-III.
- Engine will perform 4 acceleration cycles.
- Select “DATA MONITOR” mode with CONSULT-III.
- Check that the “RAIL PRES SET” and “RAIL PRESSURE” indication.
- Does “RAIL PRESSURE” follow “RAIL PRES SET” at during the phase of 4 acceleration cycles?

Is the inspection result normal?

YES >> GO TO 22.
NO >> GO TO 7.

7. CHECK ENGINE COOLANT TEMPERATURE AND FUEL TEMPERATURE

1. Select “DATA MONITOR” mode with CONSULT-III.
2. Check that the “FUEL TEMP” indication when operating at idle speed is between 60 - 80°C (140 - 176°F)
3. Check that the “WATER TEMP” indication is between 80 - 90°C (176 - 194°F)

NOTE:

- When the fuel temperature is above 136°C (277°F), the maximum rail pressure is reduced to protect the plastic pipes.
- When the coolant temperature is above 100°C (212°F), the maximum rail pressure is reduced to protect the engine.

Are the “FUEL TEMP” and “WATER TEMP” within the reference value range?

YES >> GO TO 8.
NO >> Check the fuel pump temperature sensor (Refer to EC-1137, "Component Inspection") or engine coolant temperature sensor (Refer to EC-1133, "Component Inspection").

8. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (volumetric control valve) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between high pressure supply pump (volumetric control valve) harness connector and ground.

High pressure supply pump (volumetric control valve)		Ground	Voltage
Connector	Terminal		
F54	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- IPDM E/R
- Harness for open or short between ECM and high pressure supply pump (volumetric control valve)
- Harness for open or short between IPDM E/R and high pressure supply pump (volumetric control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Check the continuity between high pressure supply pump (volumetric control valve) harness connector and ECM harness connector.

High pressure supply pump (volumetric control valve)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F54	2	F11	50	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 HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)-II

Refer to EC-1110, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace high pressure supply pump.

12. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (pressure control valve) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between high pressure supply pump (pressure control valve) harness connector and ground.

High pressure supply pump (Pressure control valve)		Ground	Voltage
Connector	Terminal		
F53	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 14.
NO >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R
- Harness for open or short between IPDM E/R and high pressure supply pump (pressure control valve)
- Harness for open or short between ECM and high pressure supply pump (pressure control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between high pressure supply pump (pressure control valve) harness connector and ECM harness connector.

High pressure supply pump (Pressure control valve)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F53	4	F11	49	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)-II

Refer to EC-1123, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace high pressure supply pump.

16. CHECK FUEL RAIL PRESSURE SENSOR POWER SUUPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel rail pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel rail pressure sensor harness connector and ground.

Fuel rail pressure sensor		Ground	Voltage (V)
Connector	Terminal		
F51	3	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

17. CHECK FUEL RAIL PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

Fuel rail pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F51	2	F10	15	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

18. CHECK FUEL RAIL PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

Fuel rail pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F51	1	F10	19	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 19.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

19. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1139, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 20.
NO >> Replace fuel rail.

20. CHECK FUEL RAIL PRESSURE-I

1. Reconnect all harness connectors disconnected.

2. Start engine and let it idle speed.
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Check that the “RAIL PRESSURE” indication under the following conditions.
   NOTE:
   An unusual combustion noise may be heard.

CONDITION (ENGINE SPEED)	INDICATION
At idle speed	190 - 210 bar
2000 rpm	400 - 500 bar
3000 rpm	500 - 700 bar
4000 rpm	700 - 900 bar

Is the inspection result normal?

YES >> GO TO 22.
NO >> GO TO 21.

21. CHECK FUEL RAIL PRESSURE-II

1. Turn ignition switch OFF.
2. Replace fuel rail. Refer to EM-281, "Removal and Installation"
3. Start engine and let it idle speed.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check that the “RAIL PRESSURE” indication under the following conditions.
   NOTE:
   An unusual combustion noise may be heard.

CONDITION (ENGINE SPEED)	INDICATION
At idle speed	190 - 210 bar
2000 rpm	400 - 500 bar
3000 rpm	500 - 700 bar
4000 rpm	700 - 900 bar

Is the inspection result normal?

YES >> GO TO 22.
NO >> Replace high pressure supply pump.

22. INSPECTION END

High pressure supply pump (volumetric control valve) OK.

>> **INSPECTION END**

BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)

INFOID:0000000001162520

NOTE:
- **CONDITIONS PRIOR TO TEST**
  - The entire low pressure system must be in good condition.
  - Check the sealing of the high pressure pipes and unions.
  - Test 3 High pressure supply pump (pressure control valve) check is OK
  - Test 4 High pressure supply pump (volumetric control valve) check is OK
  - Test 5 Rail high pressure regulation circuit check is OK.
- **CAUSE**
  - Not enough or no rail pressure during starting.
  - The engine does not start.

1. CHECK FUEL INJECTOR-I

Refer to EC-1141, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning fuel injector.

2.CHECK INTERNAL FUEL TRANSFER PUMP

1. Turn ignition switch OFF.
2. Disconnect the return system connections at the fuel injectors and close off the return pipes so they are leak-tight.
3. To authorise a 15 second cranking engine and carry out this test it is essential to carry out the following procedure:

- Disconnect high pressure supply pump (volumetric control valve) harness connector
- Turn ignition switch ON.
- Perform “SAVE DATA FOR CPU REPLC” in WORK SUPPORT mode with CONSULT-III.
- Perform “PRGRM REINITIALIZE” in WORK SUPPORT mode with CONSULT-III.
- Cranking engine for at least 15 seconds (starting speed 250 rpm)
- Perform “WRT DATA AFTR REPLC CPU” in WORK SUPPORT mode with CONSULT-III.

Is the return volume at the fuel injectors more than 20 ml per fuel injector for the starting phase?

NOTE:

- Do not repeat this procedure more than 3 times and wait 30 seconds between each 15 second cranking engine.
- Then wait 30 minutes before cranking the engine for 3 15 second cycles.
- Follow this instruction so that the starter does not get damaged.

Does the flow measure more than 20ml?

Yes >> Replace malfunctioning fuel injector.
No >> GO TO 3.

3.CHECK FUEL INJECTOR-II

1. Turn ignition switch OFF.
2. Reconnect return pipes.
3. Start Engine.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check “RAIL PRESSURE” and “RAIL PRES SET” indication.
6. Does “RAIL PRESSURE” follow “RAIL PRES SET” during the 3 second cranking engine?

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK GLOW PLUG

1. Turn ignition switch OFF.
2. Remove the glow plugs and check for moisture.
3. If the glow plugs are wet with fuel, it is possible that the fuel injector is leaking.

Are the glow plugs wet with fuel?

Yes >> Replace malfunction fuel injector.
No >> Replace high pressure supply pump.

5.INSPECTION END

Fuel injector system OK.

>> **INSPECTION END**

BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)

INFOID:0000000001162521

NOTE:

- **CONDITIONS PRIOR TO TEST**

- The entire low pressure system must be in good condition.
- Check the sealing of the high pressure pipes and unions.
- Test 3 High pressure supply pump (pressure control valve) check is OK
- Test 4 High pressure supply pump (volumetric control valve) check is OK
- Test 5 Rail high pressure regulation circuit check is OK.

- All the electrical loads are switched off.
- Air conditioning is switched off.

• **CAUSE**

- The engine runs poorly at idle speed, possibly emits white smoke.

1.CHECK FUEL INJECTOR

Refer to EC-1141, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning fuel injector.

2.CHECK ENGINE COOLANT TEMPERATURE AND FUEL TEMPERATURE

1. Start engine let it idle speed.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Check “FUEL TEMP” indication is above 60°C (140°F)
4. Check “F/FLOW CORR CYL1“, “F/FLOW CORR CYL2”, “F/FLOW CORR CYL3”, “F/FLOW CORR CYL4” indication.

Are the reference value 0.3 - 1.9?

YES >> GO TO 3.
NO >> GO TO 4.

3.CHECK INTERNAL FUEL TRANSFER PUMP

1. Turn ignition switch OFF.
2. Disconnect the return system connections at the fuel injectors and close off the return pipes so they are leak-tight. While the engine is idling, check the return flow rate at the fuel injector. After 5 minutes the return volume must be between 16 - 24 ml per fuel injector.

Is there more than 24 ml or less than 16 ml of return for each fuel injector?

Yes >> Replace malfunctioning fuel injector.
No >> INSPECTION END

4.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-267, "Inspection".

>> INSPECTION END

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description

INFOID:0000000001162522

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement

INFOID:0000000001162523

1.PRECONDITIONING

- Connect a CONSULT-III
- Connect a battery charger
- Electric load switch is OFF
- Wait for the engine to cool [engine coolant temperature < 60°C (140°F and air temperature < 50°C (122°F)].

NOTE:
While the ECM is being programmed the cooling fan motors are triggered automatically.

>> GO TO 2.

2.SAVE ECM DATA

Turn ignition switch ON.
Perform “SAVE DATA FOR CPU REPLC” in WORK SUPPORT mode with CONSULT-III.

>> GO TO 3.

3. REPLACE ECM

Replace ECM.

>> GO TO 4.

4. WRITE ECM DATA

1. Turn ignition switch OFF, wait at least 30 seconds and then turn ON.
2. Perform “PRGRM REINITIALIZE” in WORK SUPPORT mode with CONSULT-III.
3. Perform “WRT DATA AFTR REPLC CPU” in WORK SUPPORT mode with CONSULT-III.
4. Perform initialization of NATS system and registration of all NATS ignition key IDs.
   Refer to SEC-7, "ECM RE-COMMUNICATING FUNCTION : Description" (with intelligent key system) or SEC-83, "ECM RE-COMMUNICATING FUNCTION : Description" (without intelligent key system).
5. Turn ignition switch OFF, wait at least 30 seconds and then turn ON.
6. Select “DATA MONITOR” mode in ECM with CONSULT-III.
7. Check that the “CODE PROGRAM” indication.

Which is displayed on CONSULT-III?

YES >> GO TO 6.
NO >> GO TO 5.

5. WRITE ECM DATA

1. Perform initialization of NATS system and registration of all NATS ignition key IDs.
   Refer to SEC-7, "ECM RE-COMMUNICATING FUNCTION : Description" (with intelligent key system) or SEC-83, "ECM RE-COMMUNICATING FUNCTION : Description" (without intelligent key system).
2. Turn ignition switch OFF, wait at least 30 seconds and then turn ON.
3. Select “DATA MONITOR” mode in ECM with CONSULT-III.
4. Check that the “CODE PROGRAM” indication.

Which is displayed on CONSULT-III?

YES >> GO TO 6.
NO >> Repeat above steps.

6. PERFORM VIN REGISTRATION

1. Start engine and warm it up to normal operating temperature.
   NOTE:
   The start-up phase may last up to 30 seconds.
2. Turn ignition switch OFF, wait at least 30 seconds and then turn ON.
3. Perform “VIN REGISTRATION” in WORK SUPPORT mode with CONSULT-III.
4. Follow the instruction of CONSULT-III display.
   NOTE:
   After replace ECM, stored DTC may appear on other control unit. Clear the malfunction memory of these control unit.

>> END

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Description

INFOID:0000000001162524

EGR Volume Control Valve Closed Position Learning is an operation to learn the fully closed position of the EGR volume control valve by monitoring the EGR volume control valve control position sensor output signal.

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement

INFOID:0000000001162525

1. START

1. Turn ignition switch ON.
2. Perform “EGR ADAPTIVES” in WORK SUPPORT mode with CONSULT-III.

3. Turn ignition switch OFF.and wait at least 30 seconds.
4. Start engine and let it idle.
5. Select “DATA MONITOR” mode with CONSULT-III.
6. Check that the “NEW EGR/V OFFSET” and “LAST EGR/V OFSET” indication.

0.75V < NEW EGR/V OFFSET = LAST EGR/V OFSET < 1.5V

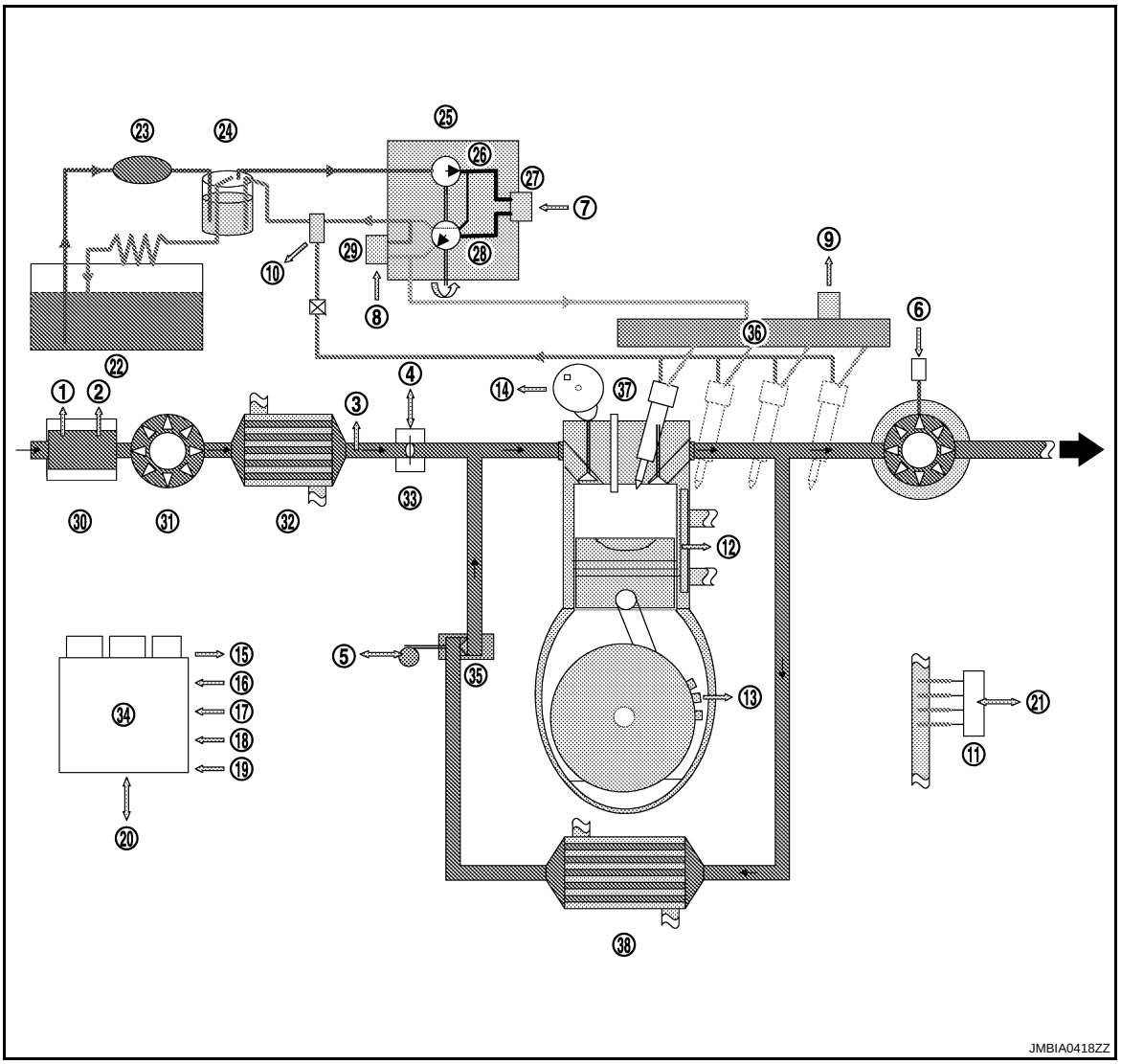
>> END

FUNCTION DIAGNOSIS

ENGINE CONTROL SYSTEM

System Diagram

INFOID:0000000001162526



1. Mass air flow sensor
2. Intake air temperature sensor
3. Turbocharger boost sensor
4. Throttle position sensor
5. EGR volume control valve control position sensor
6. Turbocharger boost control solenoid valve
7. High pressure supply pump (volumetric control valve)
8. High pressure supply pump (pressure control valve)
9. Fuel rail pressure sensor
10. Fuel pump temperature sensor
11. Glow plug
12. Engine coolant temperature sensor
13. Crankshaft position sensor
14. Camshaft position sensor
15. Barometric pressure sensor
16. Refrigerant pressure sensor
17. Accelerator pedal position sensor
18. ASCD clutch switch
19. Brake switch
20. CAN communication
21. Glow plug
22. Fuel tank
23. Fuel pump
24. Fuel filter
25. High pressure supply pump
26. High pressure supply pump (internal transfer pump)
27. High pressure supply pump (volumetric control valve)
28. High pressure supply pump (high pressure pump)
29. High pressure supply pump (pressure control valve)
30. Mass air flow sensor (with intake air temperature sensor)
31. Compressor
32. Charge air cooler
33. Electric throttle control actuator

34. ECM
35. EGR volume control valve
36. Fuel rail
37. Fuel injector
38. EGR cooler

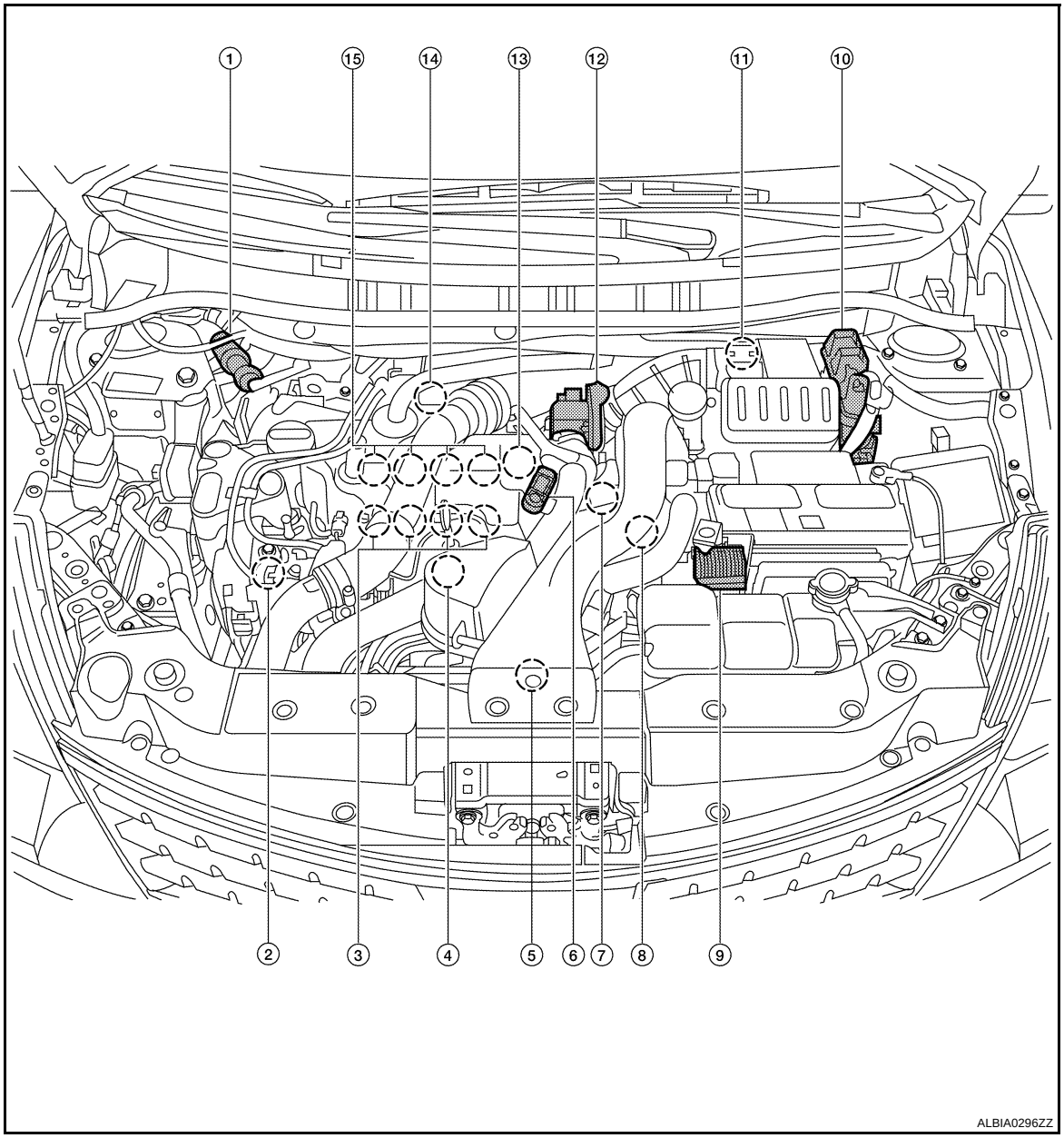
System Description

INFOID:0000000001162527

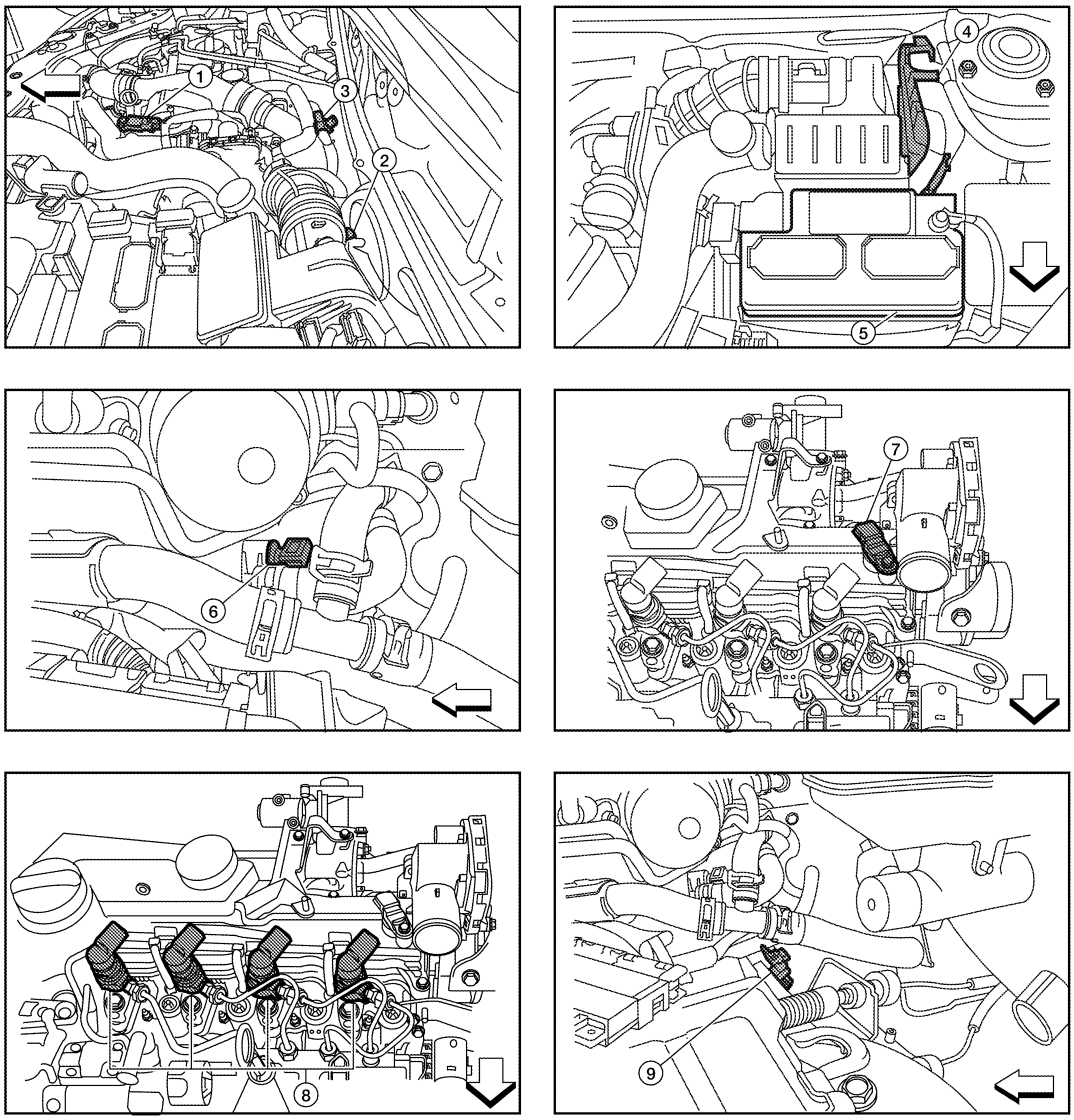
ECM performs various controls such as fuel injection control and furl pressure control.

Component Parts Location

INFOID:0000000001162528



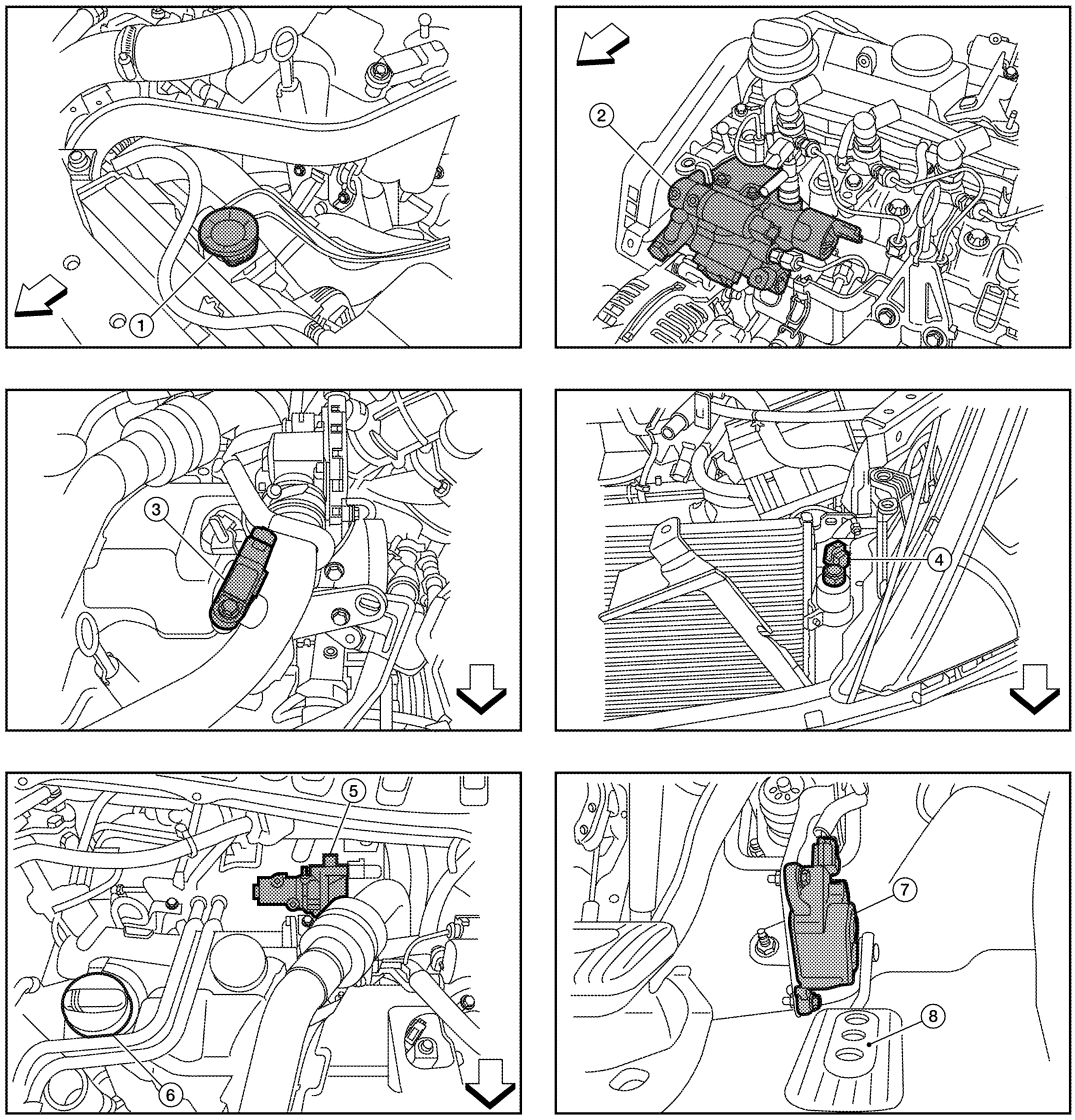
1. Priming pump
2. Fuel pump
3. Glow plug
4. Fuel rail
5. Turbocharger boost control solenoid valve
6. Turbocharger boost sensor
7. Engine coolant temperature sensor
8. Crankshaft position sensor
9. Glow relay
10. ECM
11. Mass air flow sensor
12. Electric throttle control actuator
13. Camshaft position sensor
14. EGR volume control valve
15. Fuel injector



ALBIA0297ZZ

1. Turbocharger boost sensor
2. Mass air flow sensor
3. EGR volume control valve
4. ECM
5. Battery
6. Engine coolant temperature sensor
7. Camshaft position sensor
8. Fuel injector
9. Crankshaft position sensor

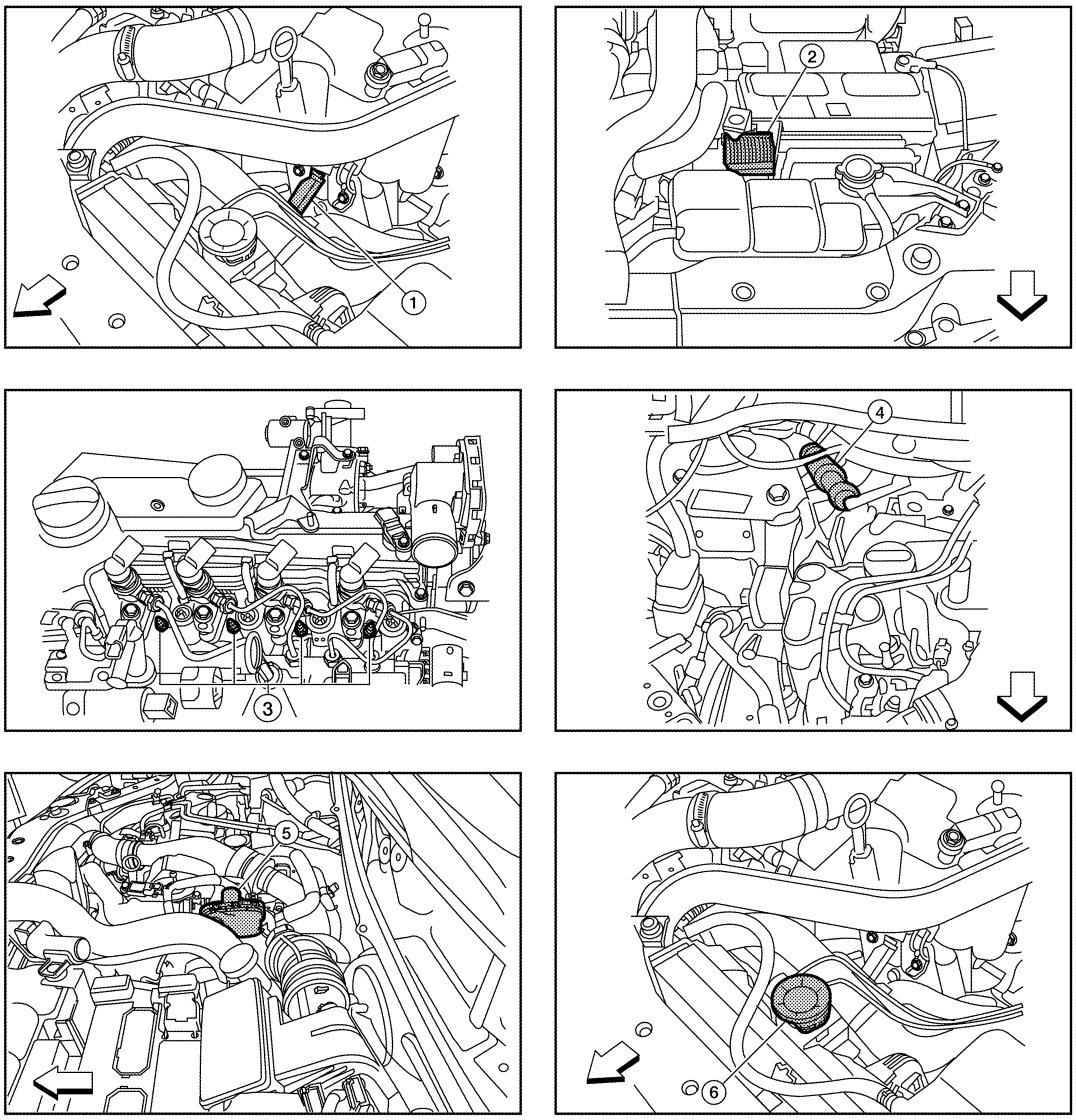
⇦ : Vehicle front



ALBIA0301ZZ

1. Turbocharger boost control solenoid valve
2. Fuel pump
3. Turbocharger boost sensor
4. Refrigerant pressure sensor
5. EGR volume control valve
6. Engine oil filler cap
7. Accelerator pedal position sensor
8. Accelerator pedal

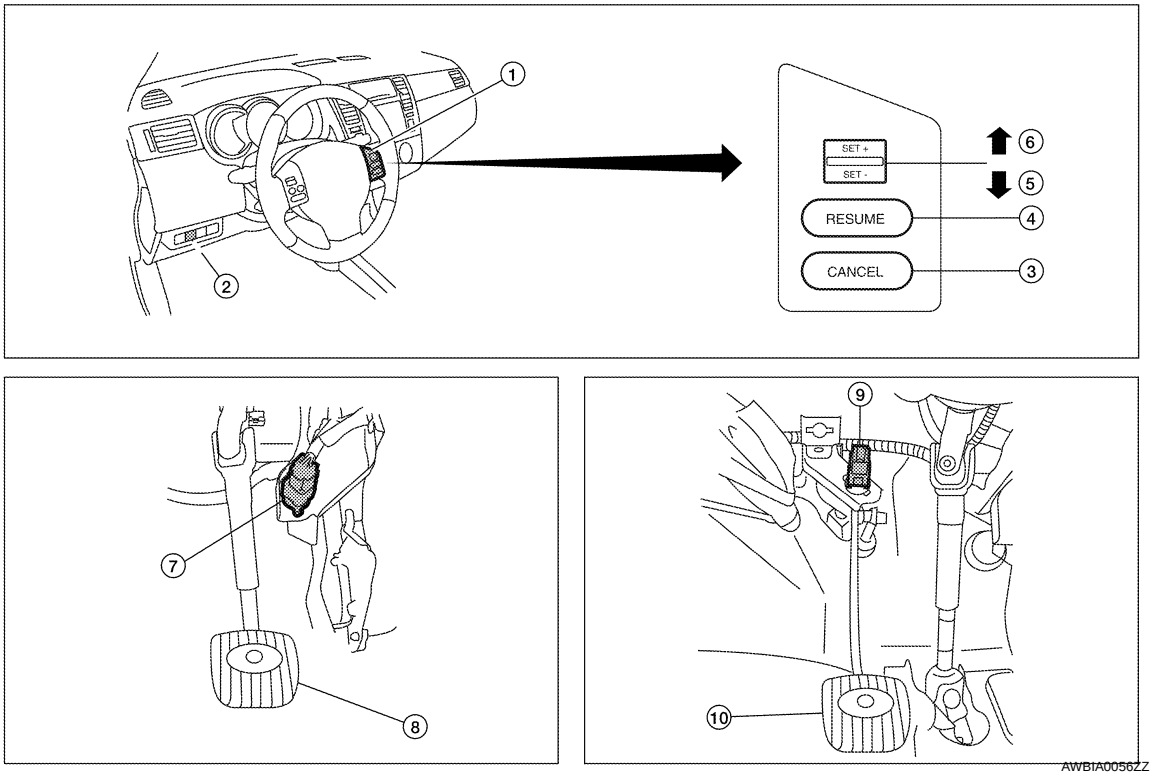
⇦ : Vehicle front



ALBIA0303ZZ

1. Fuel rail pressure sensor
2. Glow relay
3. Glow plug
4. Priming pump
5. Electronic throttle control actuator
6. Turbocharger boost control solenoid valve

⇦ : Vehicle front



1. ASCD steering switch
2. ASCD switch
3. CANCEL switch
4. RESUME switch
5. SET - switch
6. SET + switch
7. Stop lamp switch
8. Brake pedal
9. ASCD clutch switch
10. Clutch pedal

Component Description

INFOID:0000000001162529

Component	Reference
Accelerator pedal position sensor	EC-1191, "Description"
ASCD steering switch	EC-1174, "Description"
ASCD clutch switch	EC-1208, "Description"
Cooling fan motor	EC-1211, "Description"
Electric throttle control actuator	EC-1134, "Description"
Engine coolant temperature sensor	EC-1132, "Description"
Fuel pump temperature sensor	EC-1136, "Description"
Fuel rail pressure sensor	EC-1138, "Description"
Intake air temperature sensor	EC-1130, "Description"
Mass air flow sensor	EC-1127, "Description"
Refrigerant pressure sensor	EC-1166, "Description"
Stop lamp switch	EC-1214, "Description"
Throttle control motor	EC-1134, "Description"
Throttle position sensor	EC-1134, "Description"
Turbocharger boost sensor	EC-1147, "Description"
Vehicle speed sensor	EC-1165, "Description"

FUEL INJECTION CONTROL

System Description

INFOID:0000000001162530

SYSTEM DESCRIPTION

The high pressure injection system is designed to deliver a precise quantity of diesel fuel to the engine at a set moment. The Siemens VDO piezo Common Rail system used on the K9K Step 2 engine is a second generation Common Rail injection system. Fuel pressure in the rail can reach a maximum of 1,600 bar. It uses fuel injectors controlled by piezoelectric actuators. The fuel is pressurised by means of a high pressure pump then sent to a rail which supplies the four fuel injectors.

- The circuit comprises two subsystems, which are distinguished by the fuel pressure level:
  - the low pressure circuit comprises the tank, the diesel fuel filter, the transfer pump and the fuel injector return lines,
  - the high-pressure circuit comprises the high-pressure (HP) pump, the rail, the fuel injectors and the high-pressure (HP) pipes.

Finally, there are a number of control sensors and actuators which enable the entire system to be controlled and monitored.

- The system comprises:
  - Priming bulb
  - Fuel filter
  - High pressure supply pump
  - Fuel rail
  - Fuel rail pressure sensor
  - Fuel injector
  - Fuel pump temperature sensor
  - Engine coolant temperature sensor
  - Camshaft position sensor
  - Crankshaft position sensor
  - Turbocharger boost sensor
  - EGR volume control valve control position sensor
  - EGR volume control valve
  - Barometric pressure sensor (built in ECM)
  - Mass air flow sensor
  - Intake air temperature sensor
  - Electric throttle control actuator

High Pressure Supply Pump

The high pressure supply pump consists of the following components:

- Internal fuel transfer pump:
  - This pump is a vane-type rotary pump. It draws in fuel from the fuel tank through a fuel filter and supplies the high pressure pump with fuel.
- Volumetric control valve:
  - This solenoid valve regulates the flow of fuel entering the high pressure pump and enables an optimum quantity of fuel to be pressurised according to operating phase; this improves the output of the high pressure supply pump and thereby the output of the engine as well.
- High pressure pump:
  - This pump is a 3-piston radial pump, it generates the required pressure in the rail.
- Pressure control valve:
  - This solenoid valve regulates the output pressure of the high pressure pump.

Fuel Injector (Piezo Type)

CAUTION:

The fuel injector voltage is very high (much higher than that of conventional fuel injectors). This voltage can be as much as 150 V.

The piezo fuel injectors enable rapid, precise metering of the quantity of fuel injected, with excellent injection process repetitivity.

The piezo actuator operates like a capacitor. To control the fuel injector, the computer sends, at the correct time, a quantity of energy which is sufficient to enable the actuator to deform and the fuel injector to open.

During the injection period, the piezo actuator stores this energy.

At the end of the injection period, the computer recovers the energy sent at the start of the control operation. The piezo actuator discharges and returns to its original shape. The fuel injector closes. To improve output, the

energy returned by the piezo actuator is reused, which keeps down the amount of energy that has to be supplied for the next injection process.

Engine Synchronisation

One of the determining factors for fuel injection control is knowing the position of each of the pistons in their respective cylinders at all times.
The angular position is measured by means of a magneto-inductive sensor which is excited by the teeth machined onto the flywheel; this is known as the crankshaft position sensor. The flywheel has 60 teeth, each 6 degrees apart; 2 of these teeth are missing to form a notch.
A second sensor (Hall-effect sensor), stimulated by a tooth machined onto the camshaft, which turns at half the engine speed, provides a signal relating to the progress of the injection cycle. Indeed, when the piston of cylinder 1 is at top dead centre (TDC), either at the end of the compression stroke or at the end of the exhaust stroke, the camshaft position sensor enables a distinction to be made between these two states.
By comparing the signals from these two sensors, the computer is able to provide all its systems with synchronisation parameters, namely: the angular position of the flywheel, engine speed, the number of the active fuel injector and the progress of the injection cycle.
This module also supplies the system with the rotation speed signal.
The camshaft position sensor is only used when starting the engine. As soon as the engine is running by itself (not being cranked by the starter), the signal provided by the crankshaft position sensor is sufficient. If the camshaft position sensor should fail while the engine is running, this will not affect the operation of the engine.

Quantity of Fuel Injected and Control of Start of Injection

- The parameters for controlling injection are, for each cylinder, the quantity to be injected and the start of injection. These are calculated by the ECM from the following information:

- Engine speed.
- Accelerator pedal position.
- Turbocharge air pressure.
- Engine coolant temperature.
- Intake air temperature.
- Fuel pump temperature.
- Mass air flow.
- Pressure of fuel in the rail.

Station to Station Flow Regulation

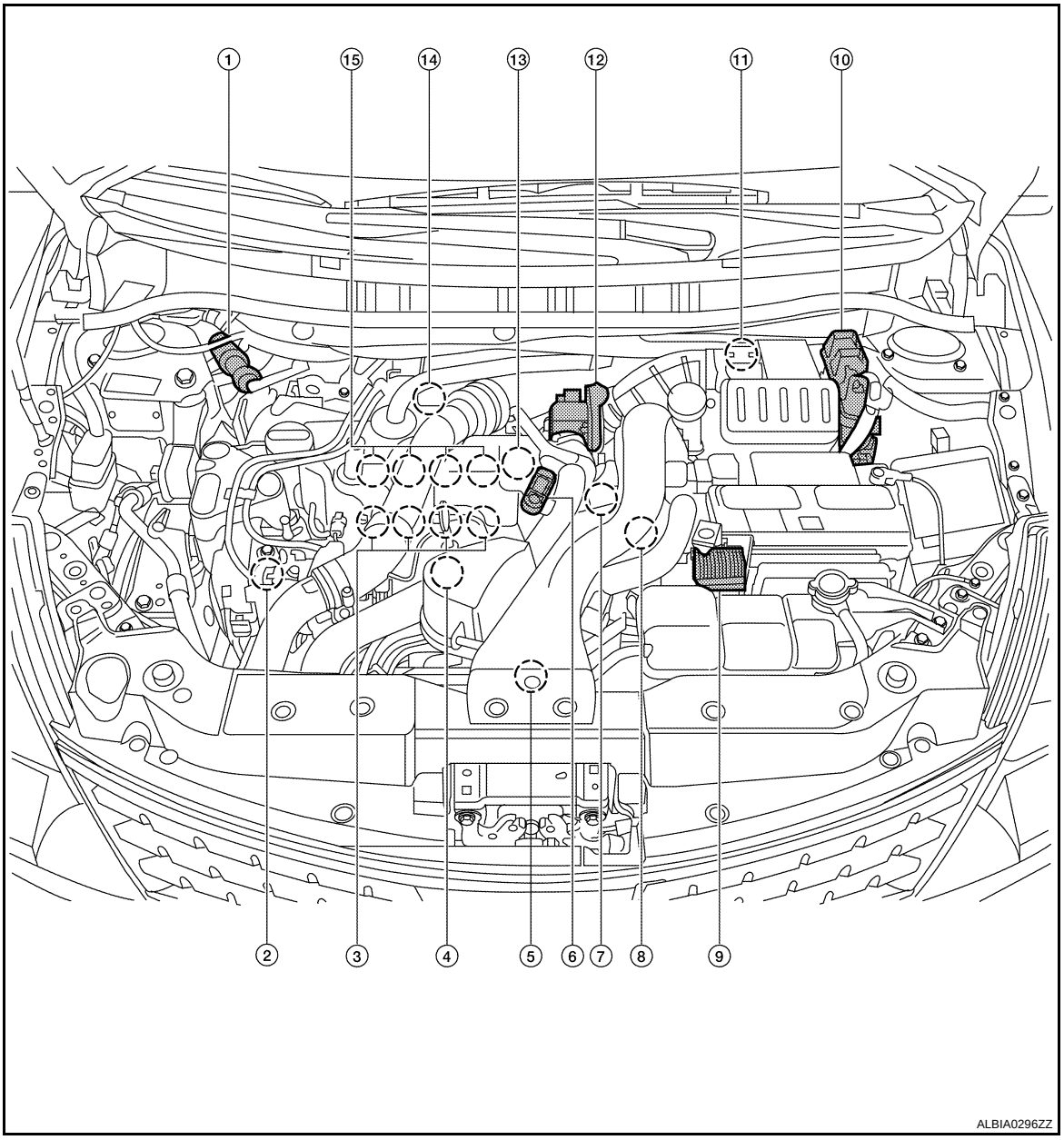
The aim of this regulation process is to facilitate smooth engine operation by compensating for the system variations (fuel injectors, compression rate, etc.) which affect the torque generated by each cylinder during combustion.
The regulation process is only active at idle speed, with a warm engine and on condition that the engine speed is sufficiently stable. An injection timing correction coefficient is assigned to each cylinder; this is "learning" all the time the regulation process is active and remains fixed at the last value that was learned when the regulation is inactive.
At each new cycle, the coefficients are initialised to 1.

Cylinder Balancing Control

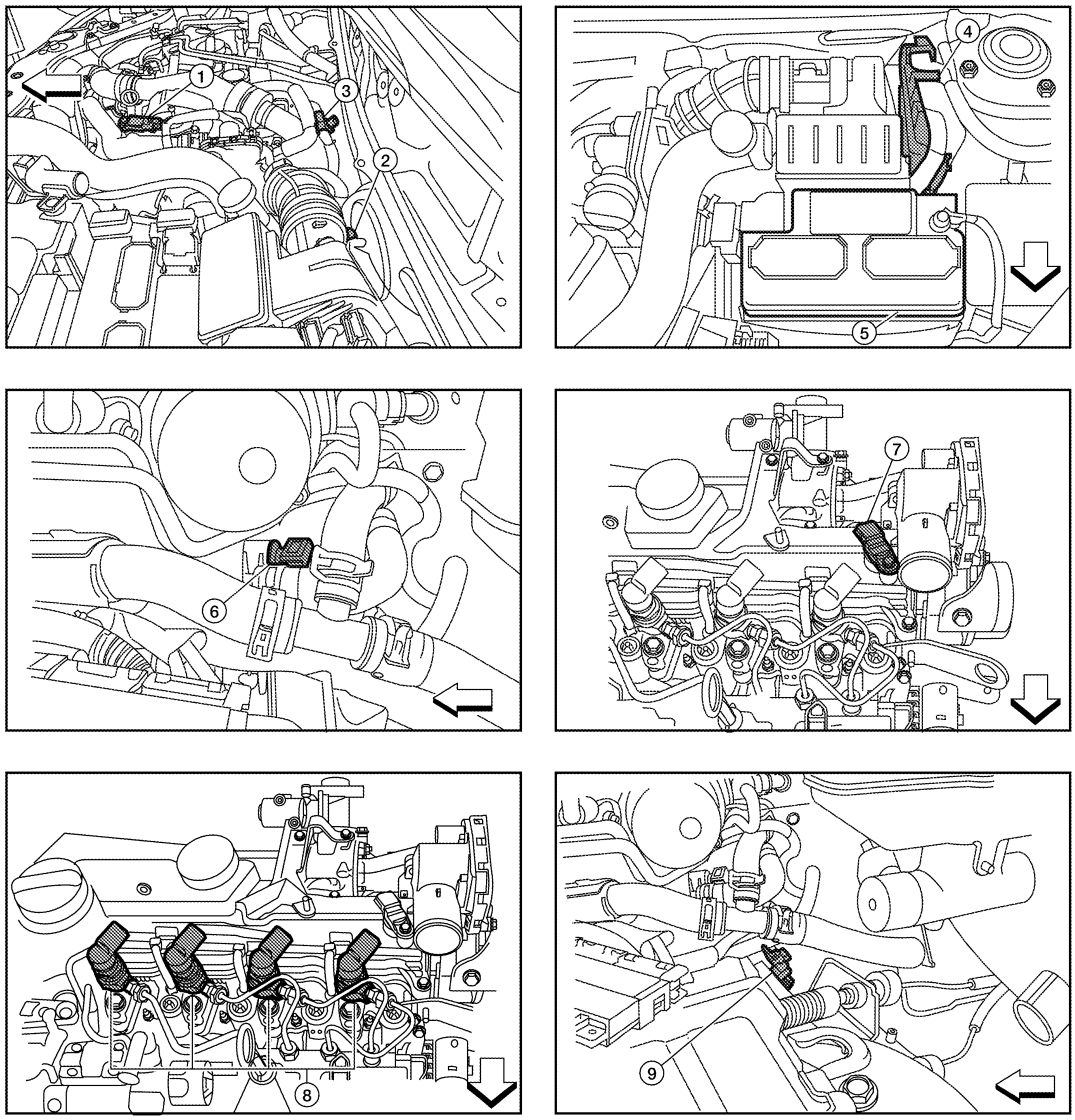
This controller allows smooth behavior of running engine, reduction of noise and oscillations in the drivetrain by compensating for system dispersions (fuel injectors, compression ratio, manufacturing tolerances of cylinders or valves...) having an influence on the torque generated by each cylinder during combustion.
The controller is only activated if engine is in idle, warm and not too rough. Corrective coefficient on the injection time is associated with each cylinder that is learnt as soon as the regulation is active. Otherwise it remains with its last memorized value.
At each new driving cycle, coefficients are initialized to 1.

Component Parts Location

INFOID:0000000001611144



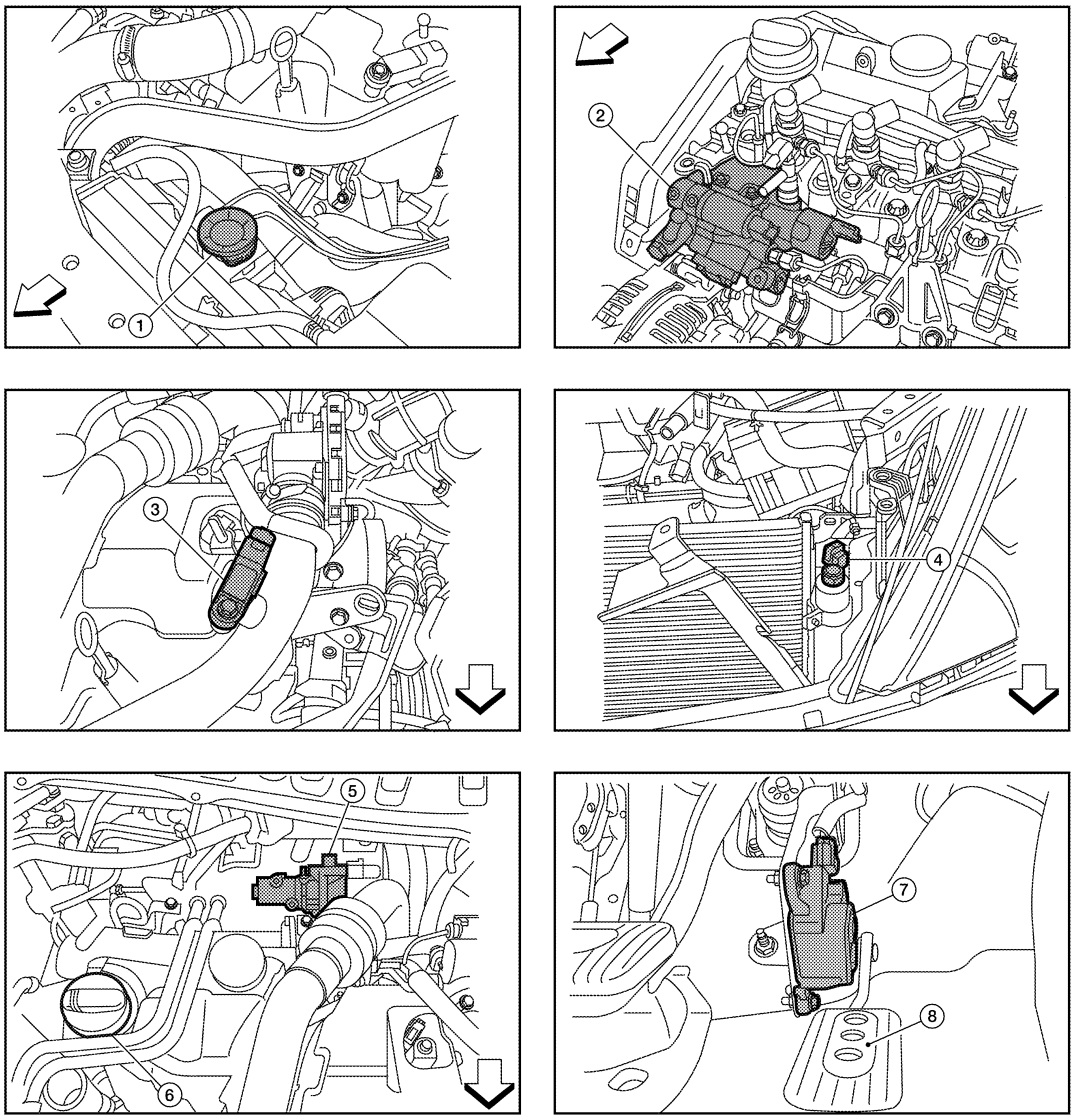
1. Priming pump
2. Fuel pump
3. Glow plug
4. Fuel rail
5. Turbocharger boost control solenoid valve
6. Turbocharger boost sensor
7. Engine coolant temperature sensor
8. Crankshaft position sensor
9. Glow relay
10. ECM
11. Mass air flow sensor
12. Electric throttle control actuator
13. Camshaft position sensor
14. EGR volume control valve
15. Fuel injector



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1. Turbocharger boost sensor
2. Mass air flow sensor
3. EGR volume control valve
4. ECM
5. Battery
6. Engine coolant temperature sensor
7. Camshaft position sensor
8. Fuel injector
9. Crankshaft position sensor

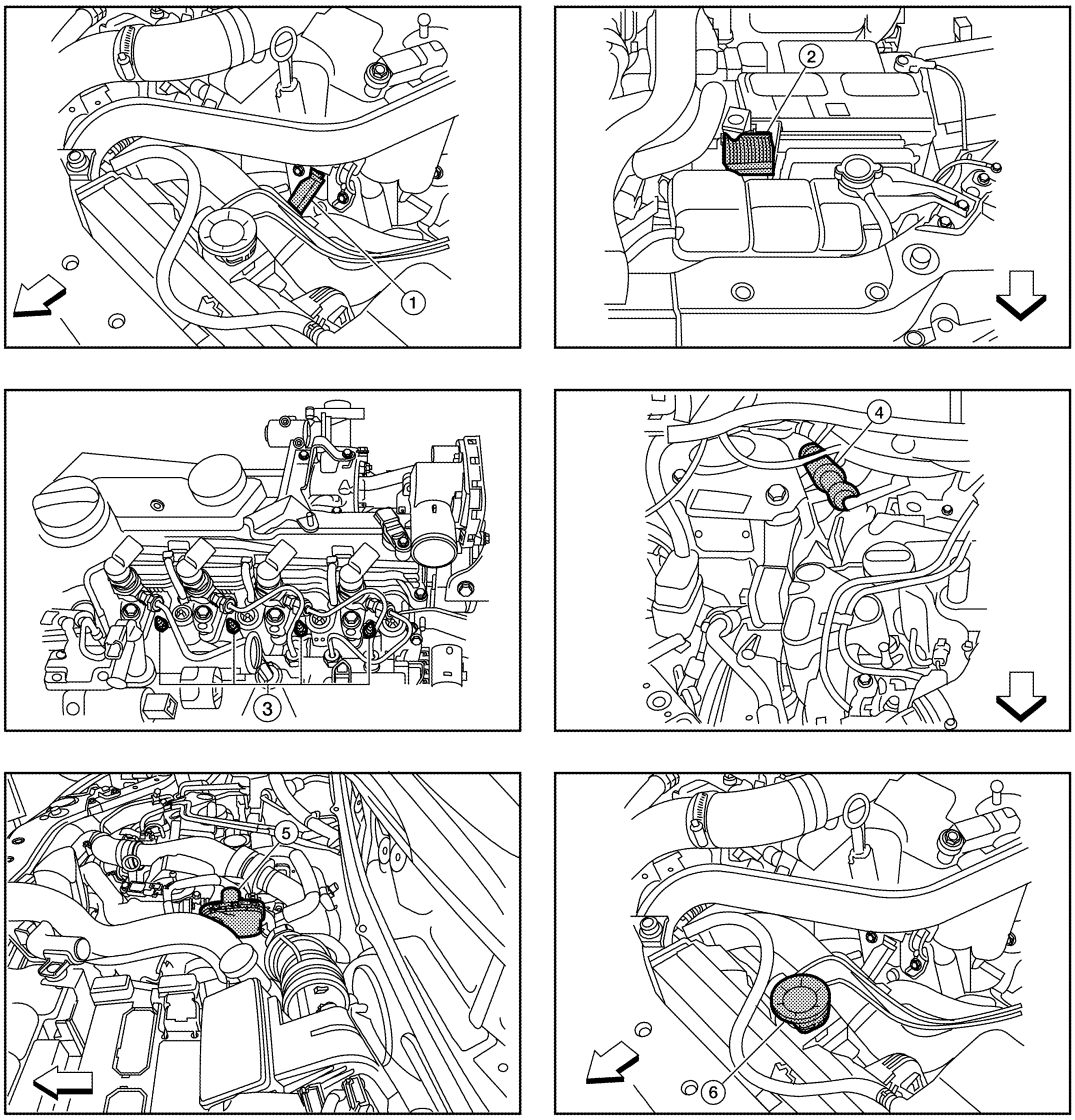
⇦ : Vehicle front



ALBIA0301ZZ

1. Turbocharger boost control solenoid valve
2. Fuel pump
3. Turbocharger boost sensor
4. Refrigerant pressure sensor
5. EGR volume control valve
6. Engine oil filler cap
7. Accelerator pedal position sensor
8. Accelerator pedal

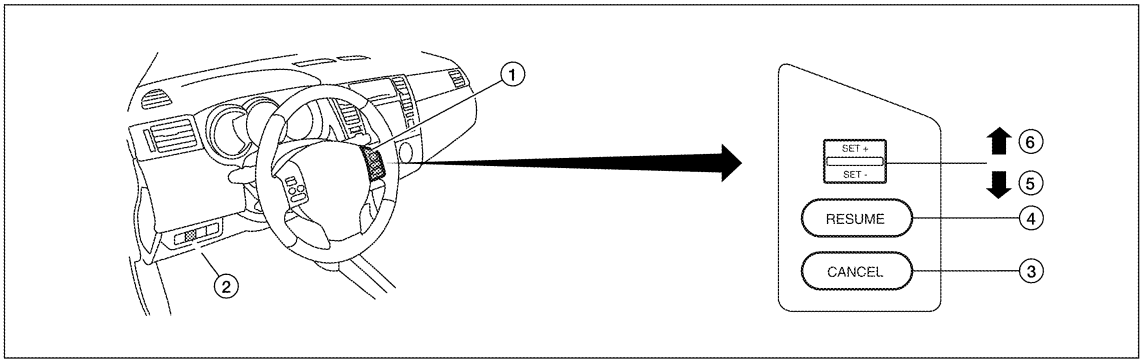
⇦ : Vehicle front

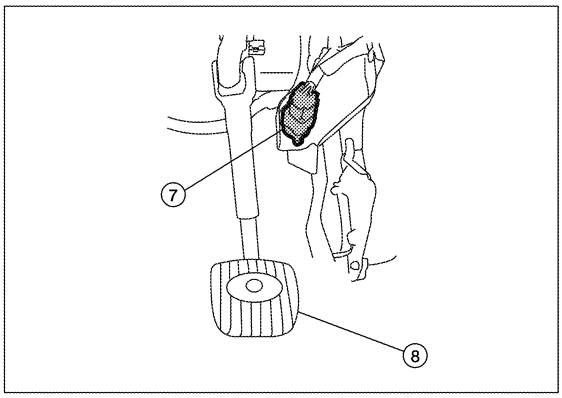


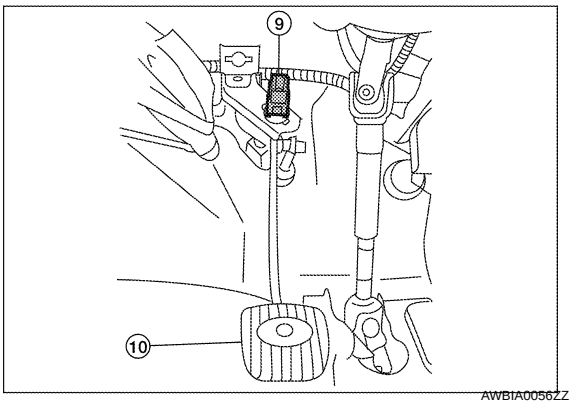
ALBIA0303ZZ

1. Fuel rail pressure sensor
2. Glow relay
3. Glow plug
4. Priming pump
5. Electronic throttle control actuator
6. Turbocharger boost control solenoid valve

⇦ : Vehicle front







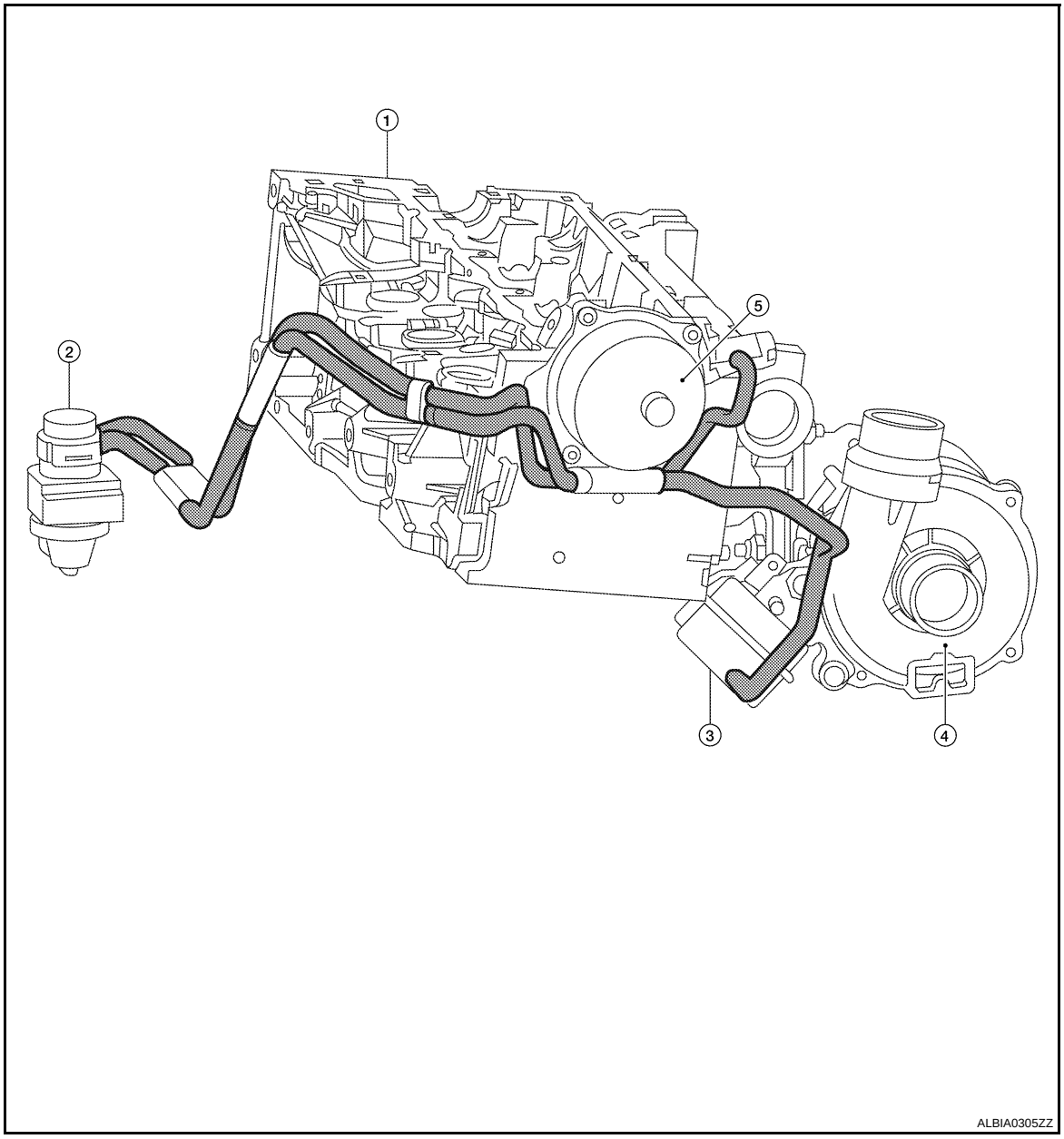
AWBIA0056ZZ

1. ASCD steering switch
2. ASCD switch
3. CANCEL switch
4. RESUME switch
5. SET - switch
6. SET + switch
7. Stop lamp switch
8. Brake pedal
9. ASCD clutch switch
10. Clutch pedal

TURBOCHARGER BOOST CONTROL

Vacuum Hose Drawing

INFOID:0000000001162532



1. Cylinder head
2. Turbocharger boost control solenoid valve
3. Turbocharger boost control actuator
4. Turbocharger
5. Vacuum pump

NOTE: Do not use soapy water or any type of solvent while installing vacuum hose.

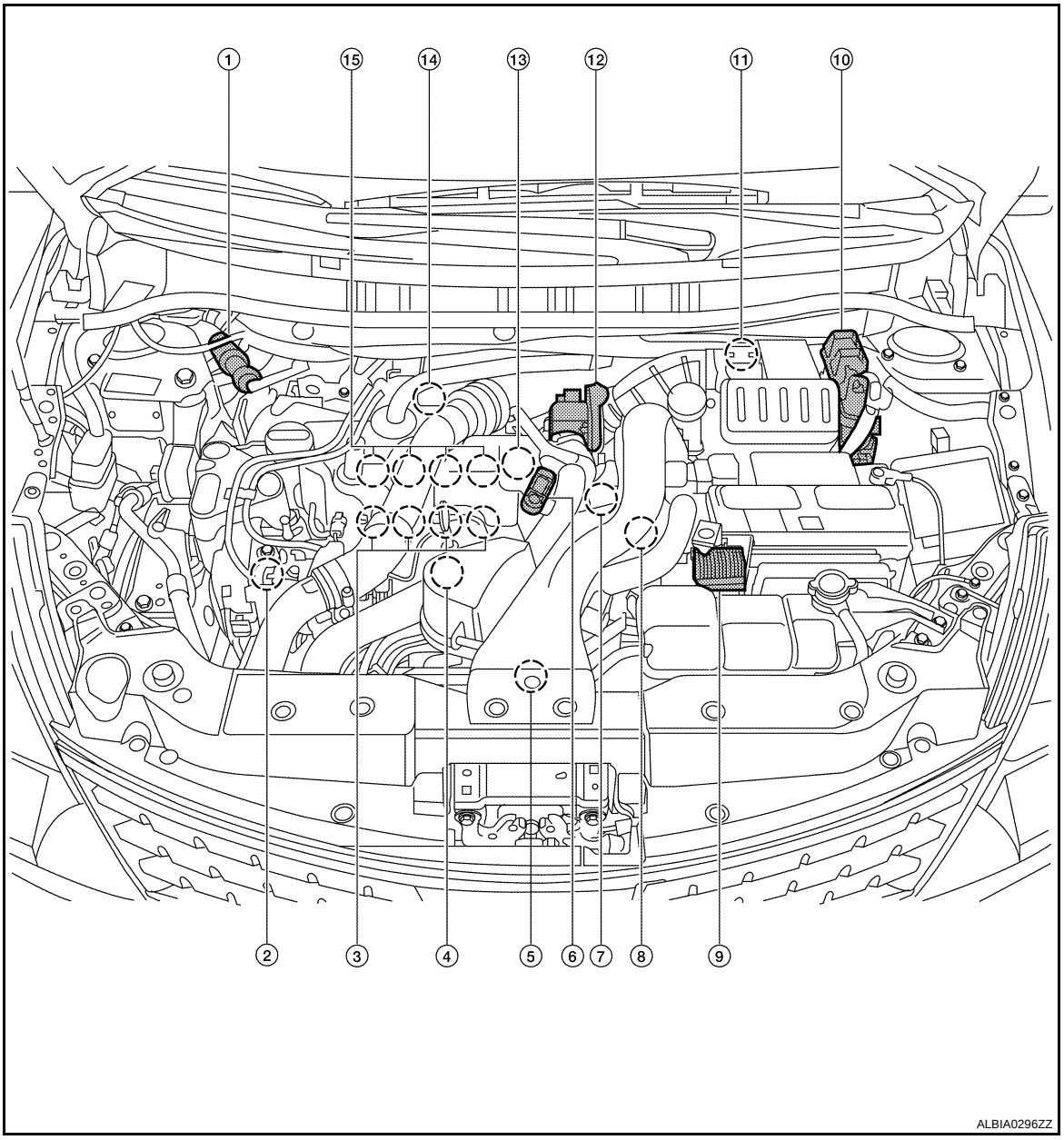
System Description

INFOID:0000000001162533

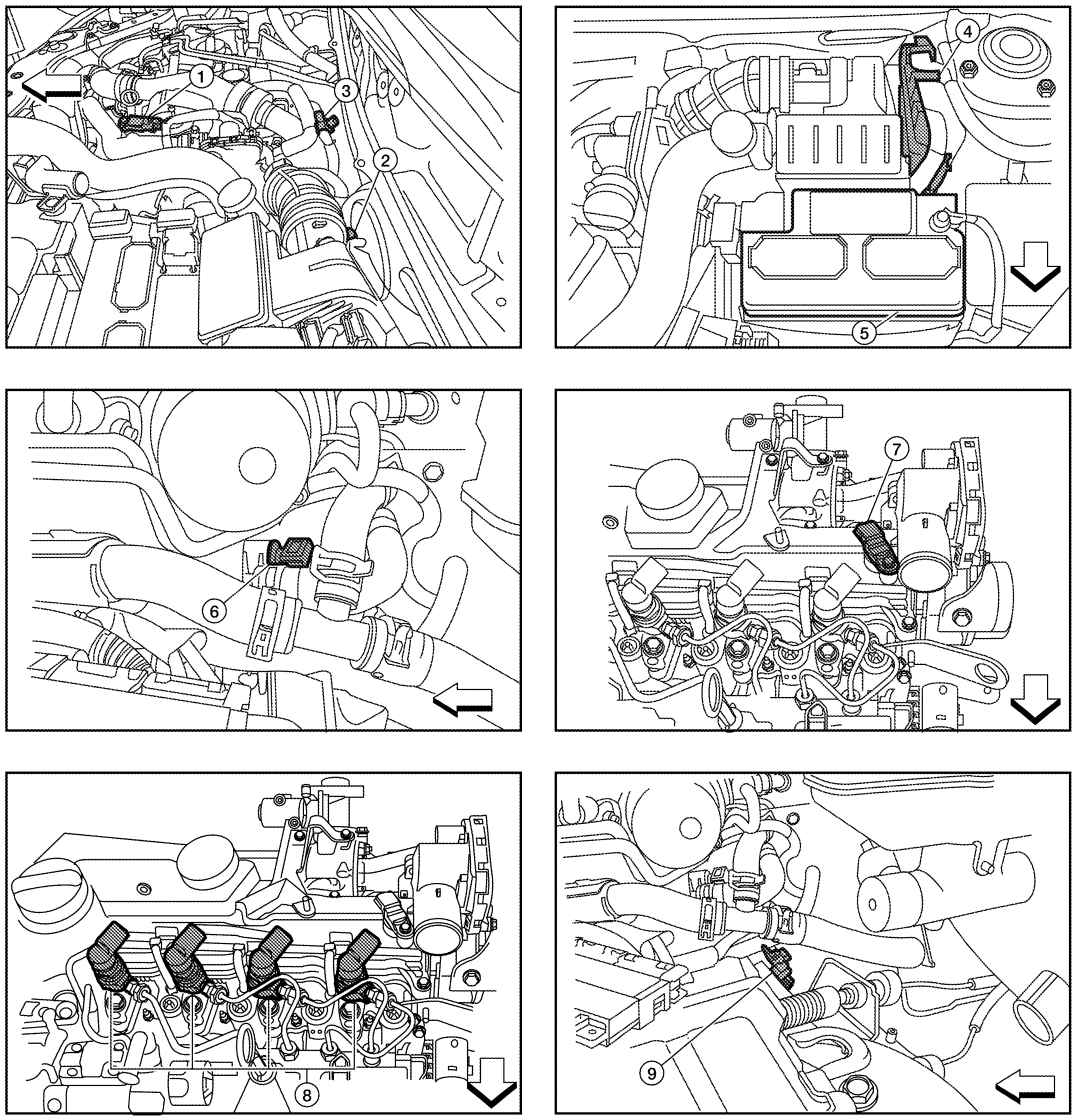
The turbocharger system consists of a solenoid valve connected to the vacuum pump circuit; this enables the vanes to be controlled by means of a diaphragm so as to create either an overpressure or a vacuum in the fresh air inlet circuit.

Component Parts Location

INFOID:0000000001611145



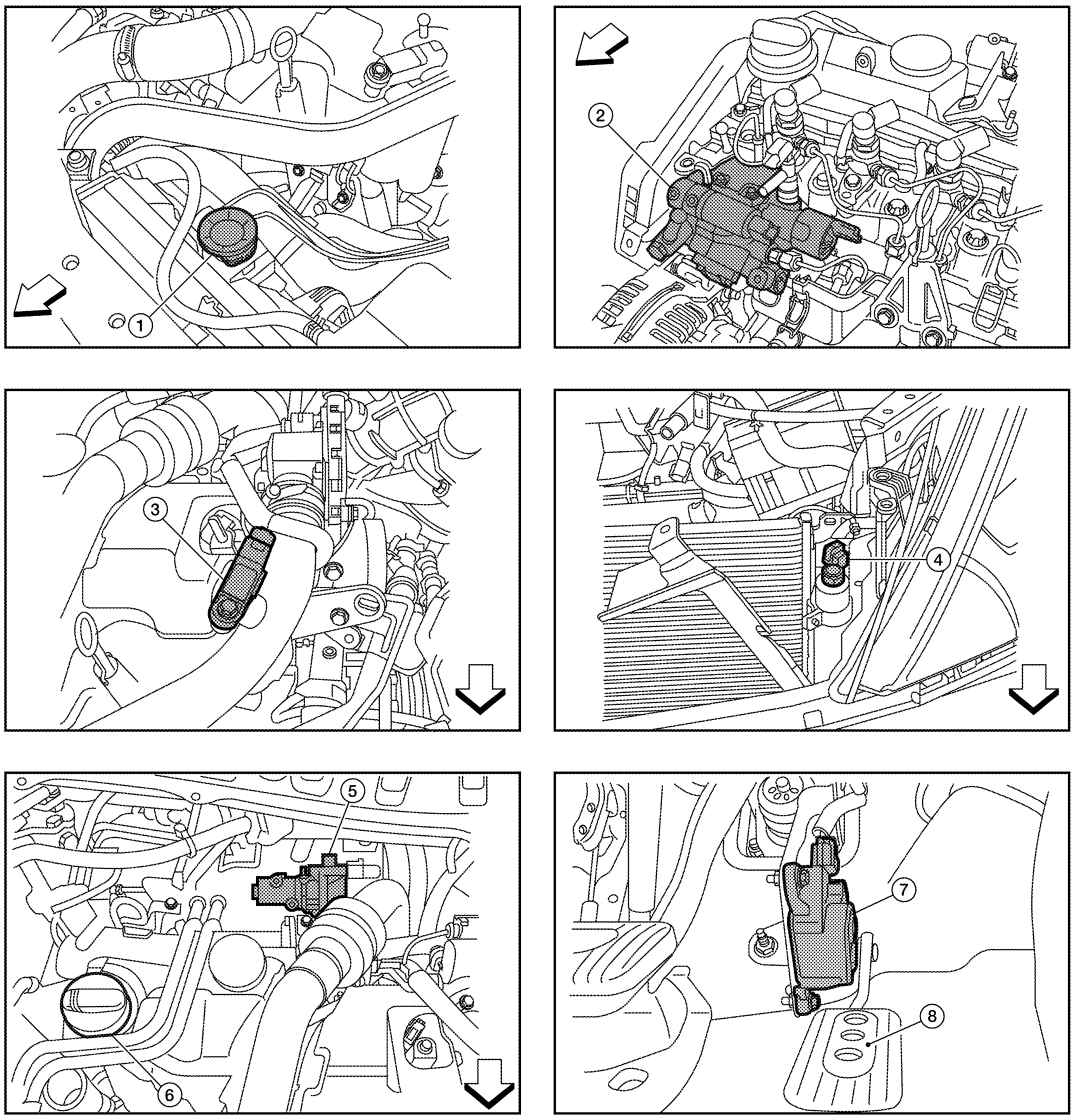
1. Priming pump
2. Fuel pump
3. Glow plug
4. Fuel rail
5. Turbocharger boost control solenoid valve
6. Turbocharger boost sensor
7. Engine coolant temperature sensor
8. Crankshaft position sensor
9. Glow relay
10. ECM
11. Mass air flow sensor
12. Electric throttle control actuator
13. Camshaft position sensor
14. EGR volume control valve
15. Fuel injector



ALBIA0297ZZ

1. Turbocharger boost sensor
2. Mass air flow sensor
3. EGR volume control valve
4. ECM
5. Battery
6. Engine coolant temperature sensor
7. Camshaft position sensor
8. Fuel injector
9. Crankshaft position sensor

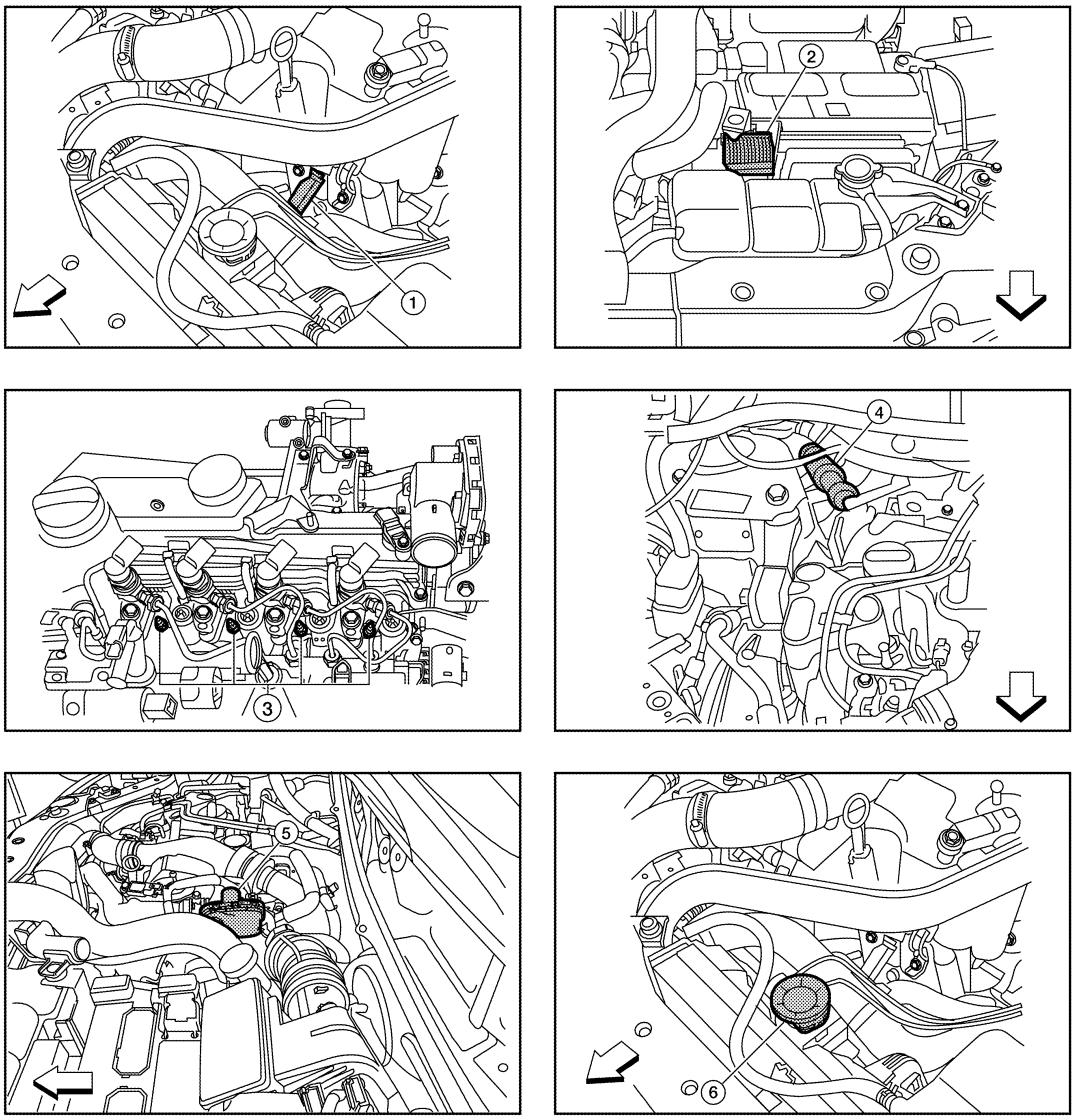
⇦ : Vehicle front



ALBIA0301ZZ

1. Turbocharger boost control solenoid valve
2. Fuel pump
3. Turbocharger boost sensor
4. Refrigerant pressure sensor
5. EGR volume control valve
6. Engine oil filler cap
7. Accelerator pedal position sensor
8. Accelerator pedal

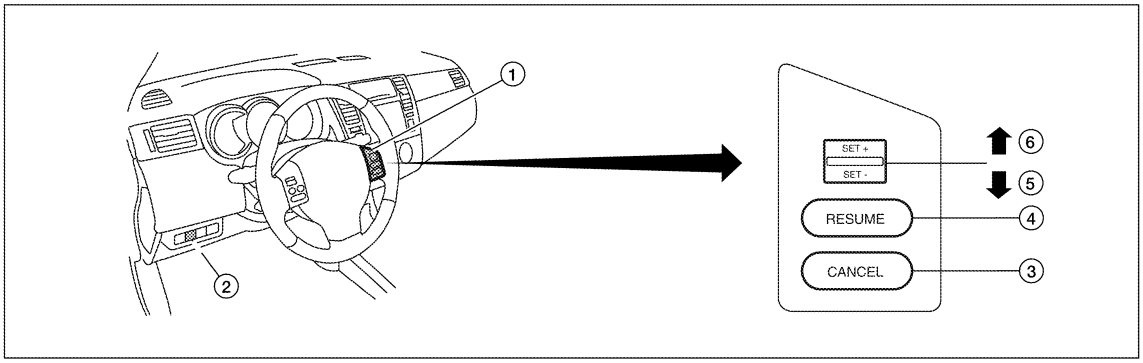
⇦ : Vehicle front

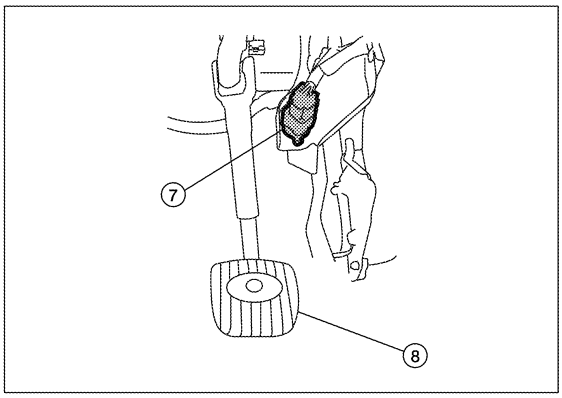


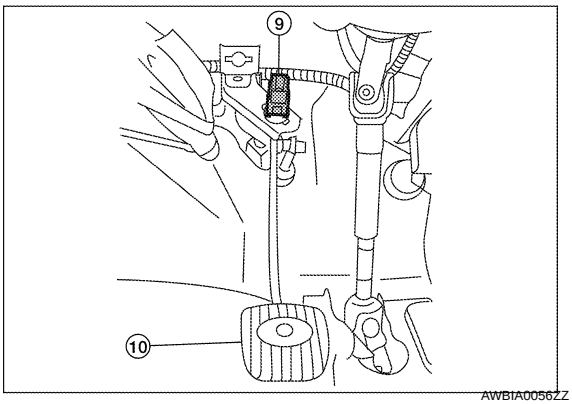
ALBIA0303ZZ

1. Fuel rail pressure sensor
2. Glow relay
3. Glow plug
4. Priming pump
5. Electronic throttle control actuator
6. Turbocharger boost control solenoid valve

⇦ : Vehicle front







AWBIA0056ZZ

1. ASCD steering switch
2. ASCD switch
3. CANCEL switch
4. RESUME switch
5. SET - switch
6. SET + switch
7. Stop lamp switch
8. Brake pedal
9. ASCD clutch switch
10. Clutch pedal

EGR SYSTEM

System Description

INFOID:0000000001162535

EGR SYSTEM

EGR Valve Control

The EGR (exhaust gas recirculation) system consists of a direct current EGR volume control valve fitted with a EGR volume control valve control position sensor. The EGR volume control valve is controlled in a closed-loop via the EGR volume control valve control position sensor. Up to a certain rate, exhaust gas recirculation enables nitrogen oxide (NOx) emissions to be reduced significantly.

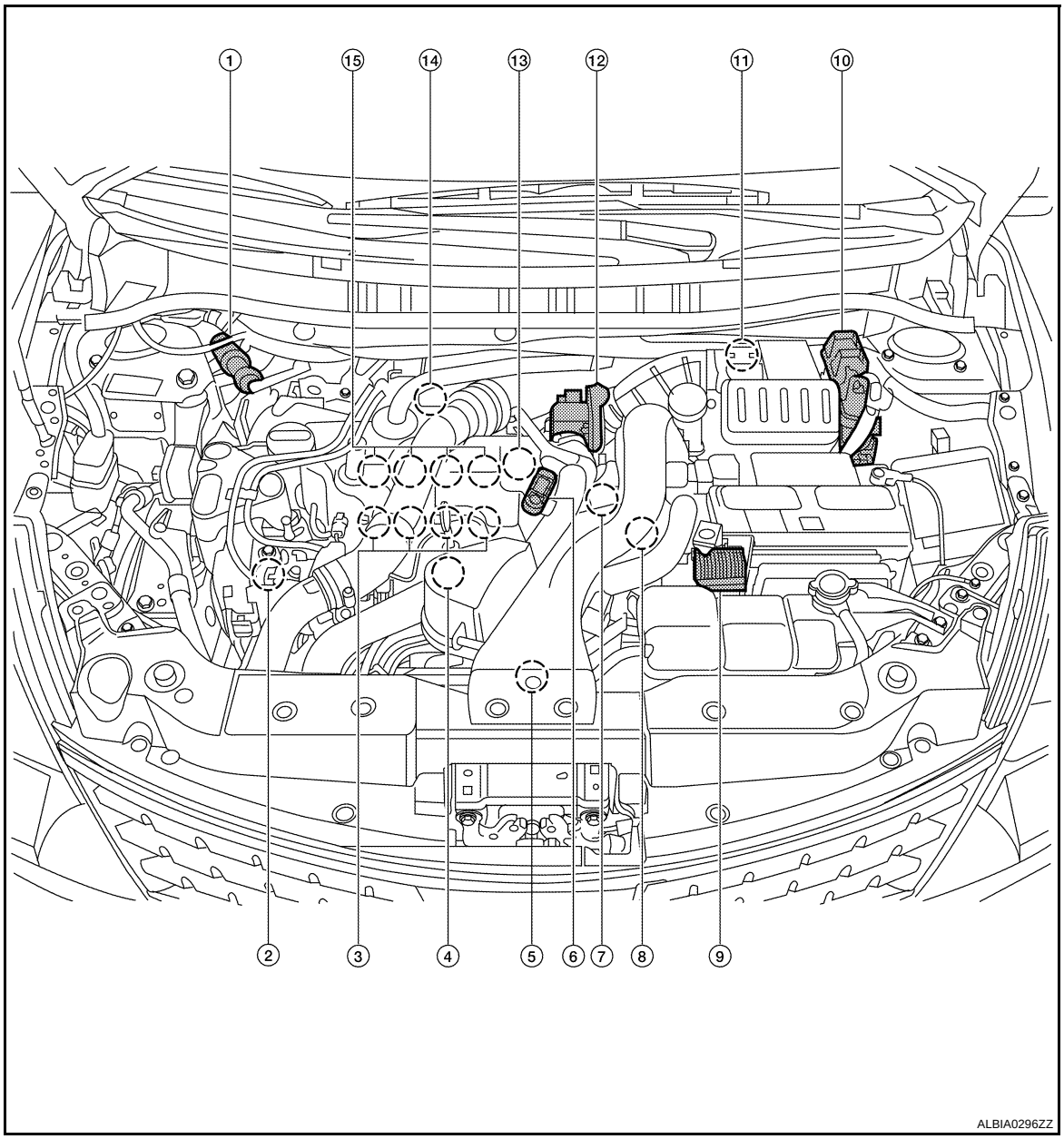
Measurement of the Fresh Air Flow

The flow of fresh air entering the engine is calculated by a mass air flow sensor (ratiometric hot-wire sensor). An intake air temperature sensor is integrated into the mass air flow sensor.

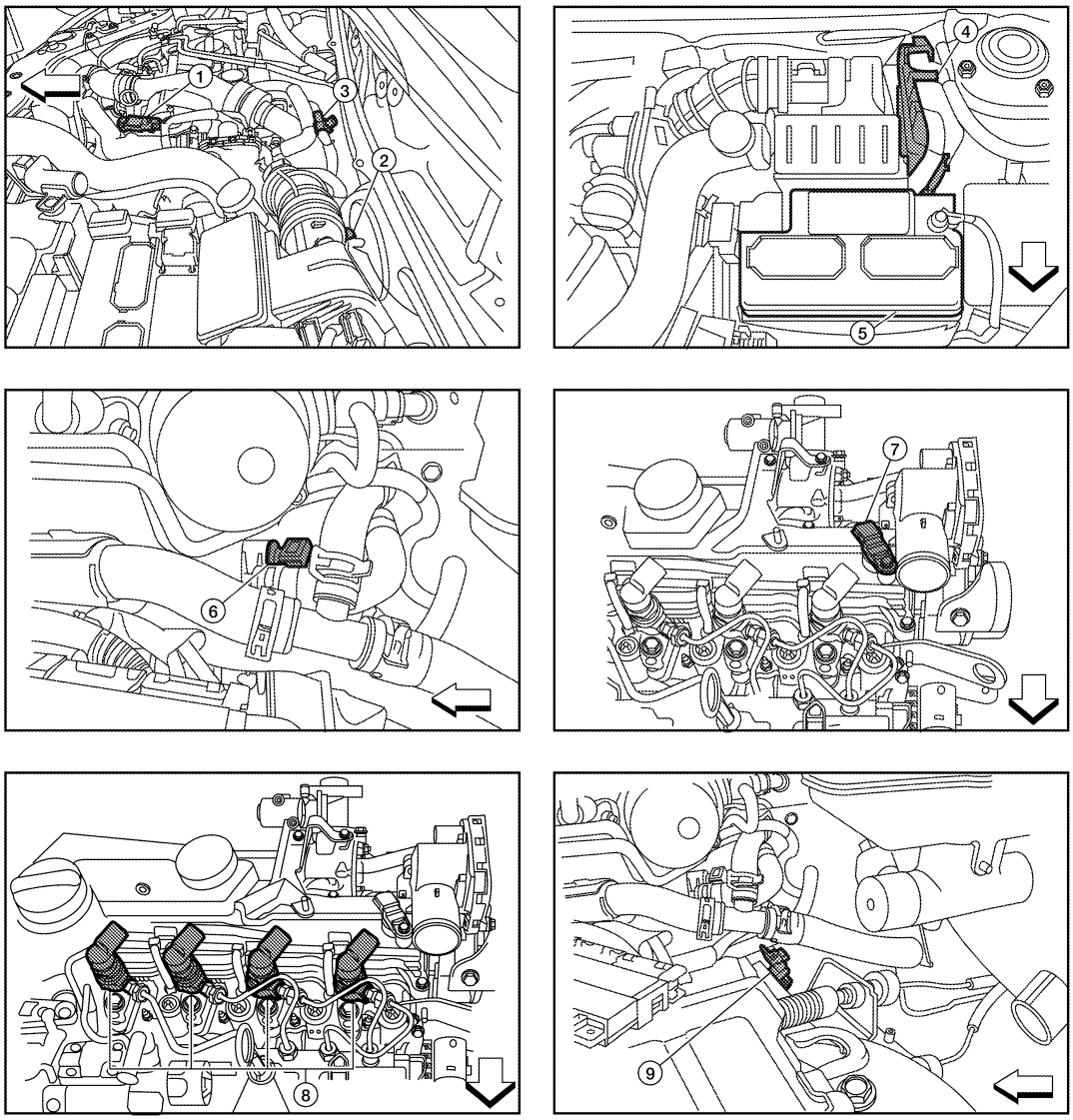
The mass air flow sensor facilitates control of the quantity of exhaust gas sent for recirculation, thus ensuring the best possible recirculation rates. Air flow measurement allows closed-loop control via the EGR valve.

Component Parts Location

INFOID:0000000001611146



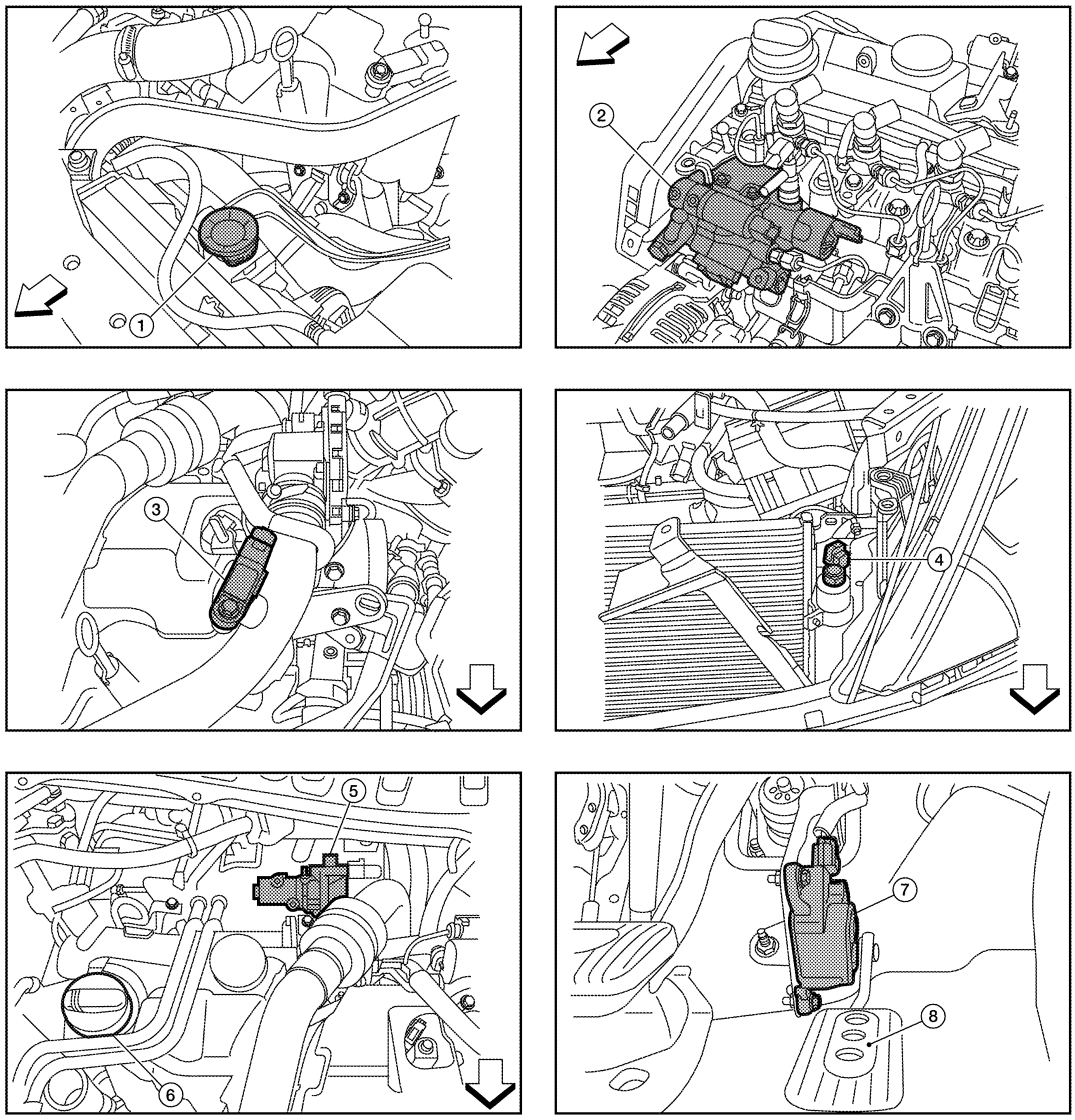
1. Priming pump
2. Fuel pump
3. Glow plug
4. Fuel rail
5. Turbocharger boost control solenoid valve
6. Turbocharger boost sensor
7. Engine coolant temperature sensor
8. Crankshaft position sensor
9. Glow relay
10. ECM
11. Mass air flow sensor
12. Electric throttle control actuator
13. Camshaft position sensor
14. EGR volume control valve
15. Fuel injector



ALBIA0297ZZ

1. Turbocharger boost sensor
2. Mass air flow sensor
3. EGR volume control valve
4. ECM
5. Battery
6. Engine coolant temperature sensor
7. Camshaft position sensor
8. Fuel injector
9. Crankshaft position sensor

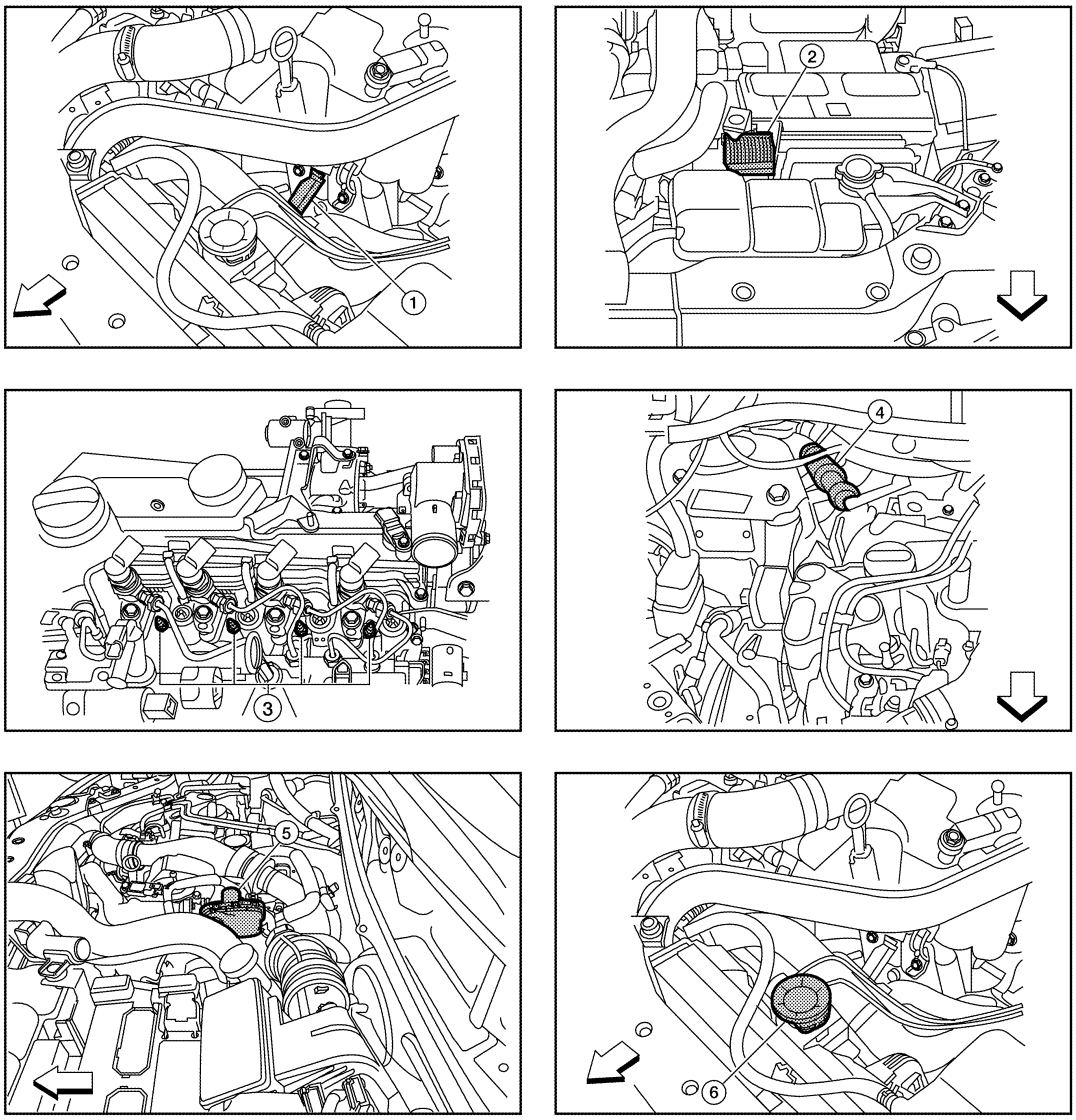
⇦ : Vehicle front



ALBIA0301ZZ

1. Turbocharger boost control solenoid valve
2. Fuel pump
3. Turbocharger boost sensor
4. Refrigerant pressure sensor
5. EGR volume control valve
6. Engine oil filler cap
7. Accelerator pedal position sensor
8. Accelerator pedal

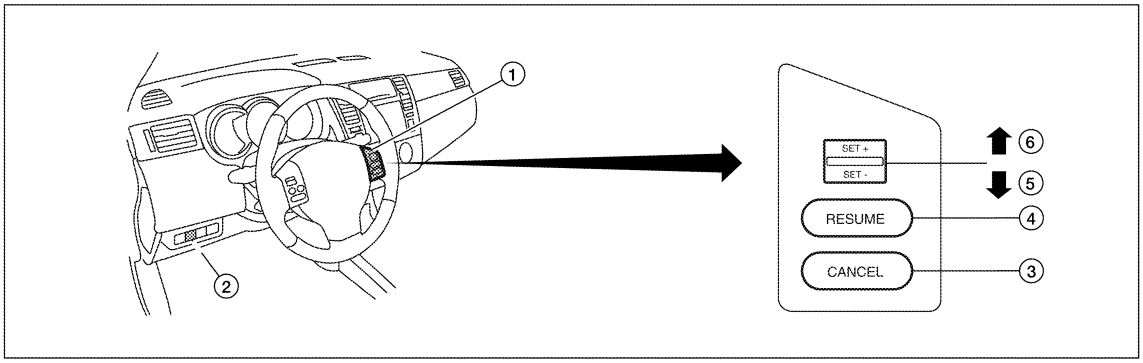
⇦ : Vehicle front

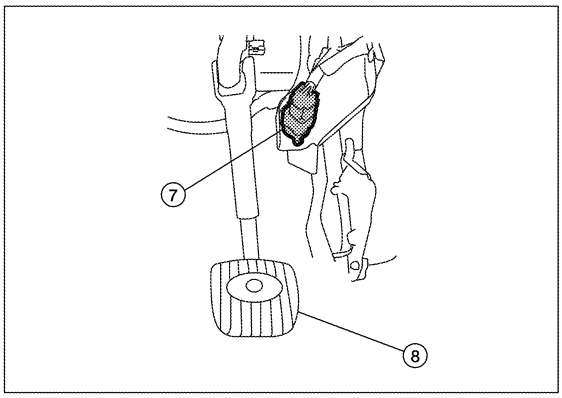


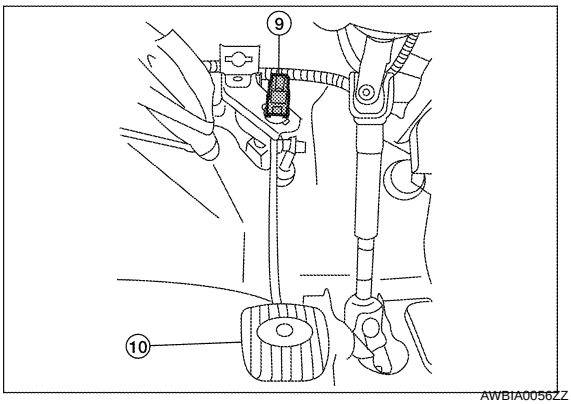
ALBIA0303ZZ

1. Fuel rail pressure sensor
2. Glow relay
3. Glow plug
4. Priming pump
5. Electronic throttle control actuator
6. Turbocharger boost control solenoid valve

⇦ : Vehicle front







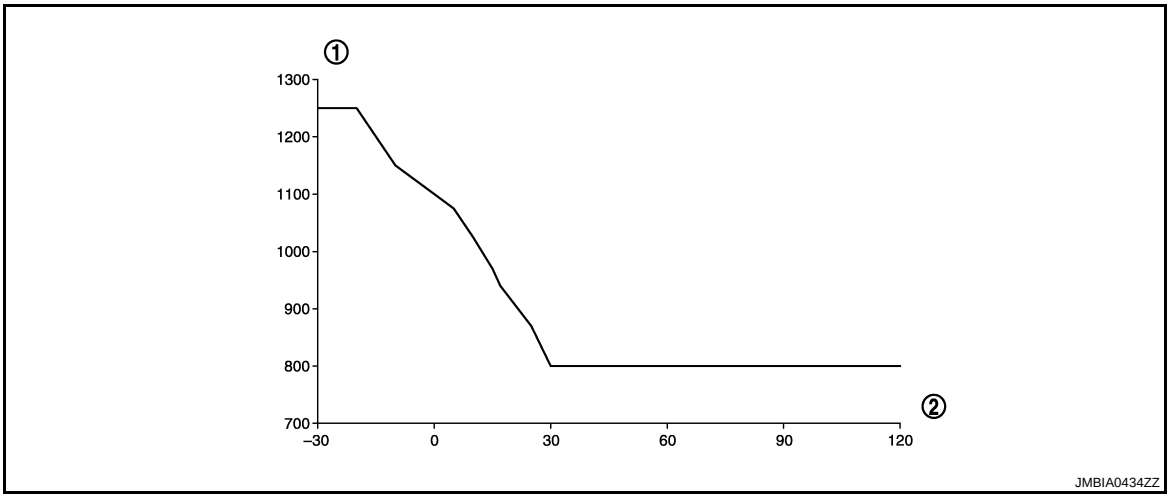
AWBIA0056ZZ

1. ASCD steering switch
2. ASCD switch
3. CANCEL switch
4. RESUME switch
5. SET - switch
6. SET + switch
7. Stop lamp switch
8. Brake pedal
9. ASCD clutch switch
10. Clutch pedal

IDLE SPEED CONTROL

System Diagram

INFOID:0000000001162537



1. Engine speed in rpm
2. Engine coolant temperature °C

System Description

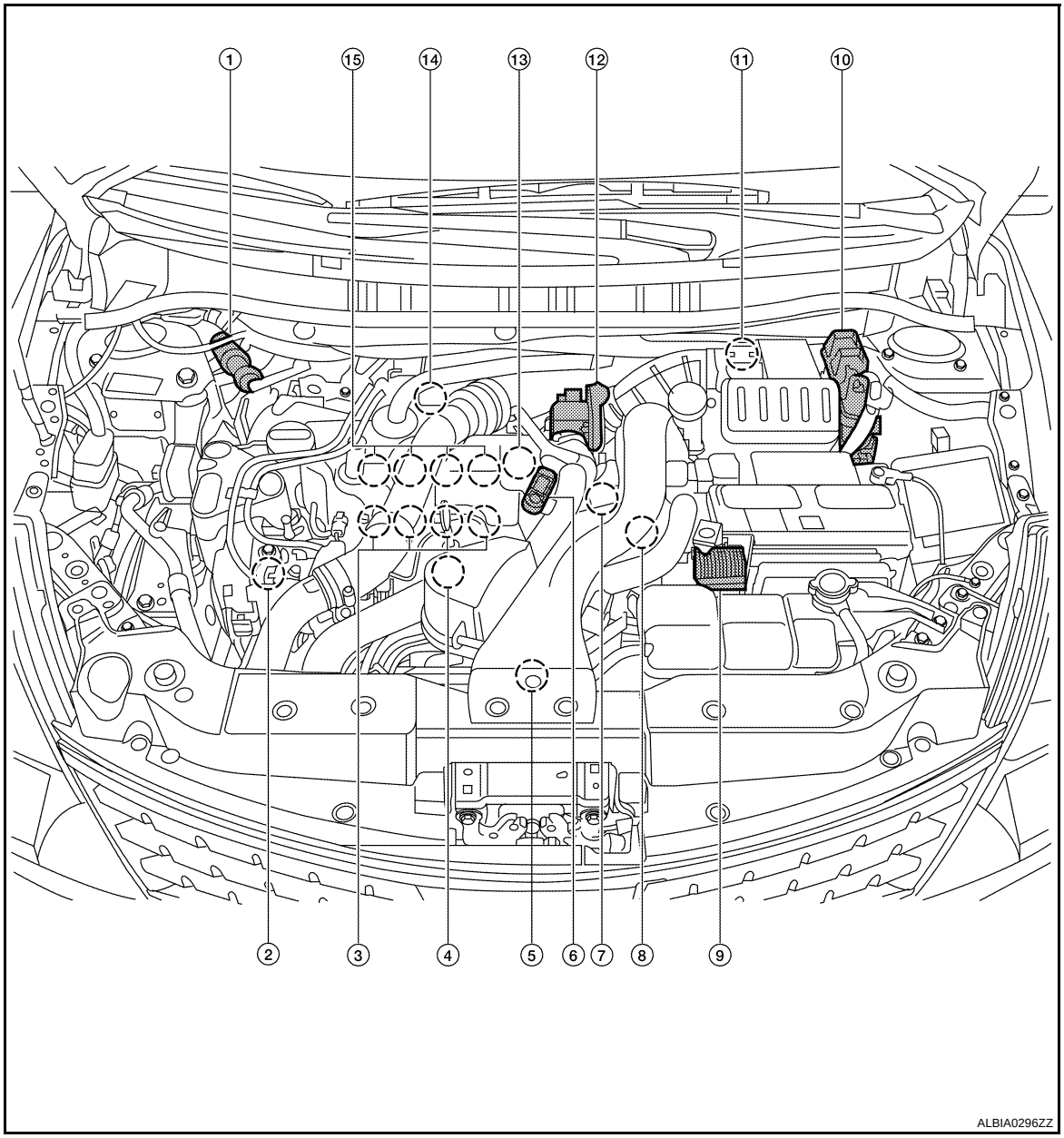
INFOID:0000000001162538

The ECM is responsible for regulating the idle speed as a function of the idle speed setpoint which it calculates.

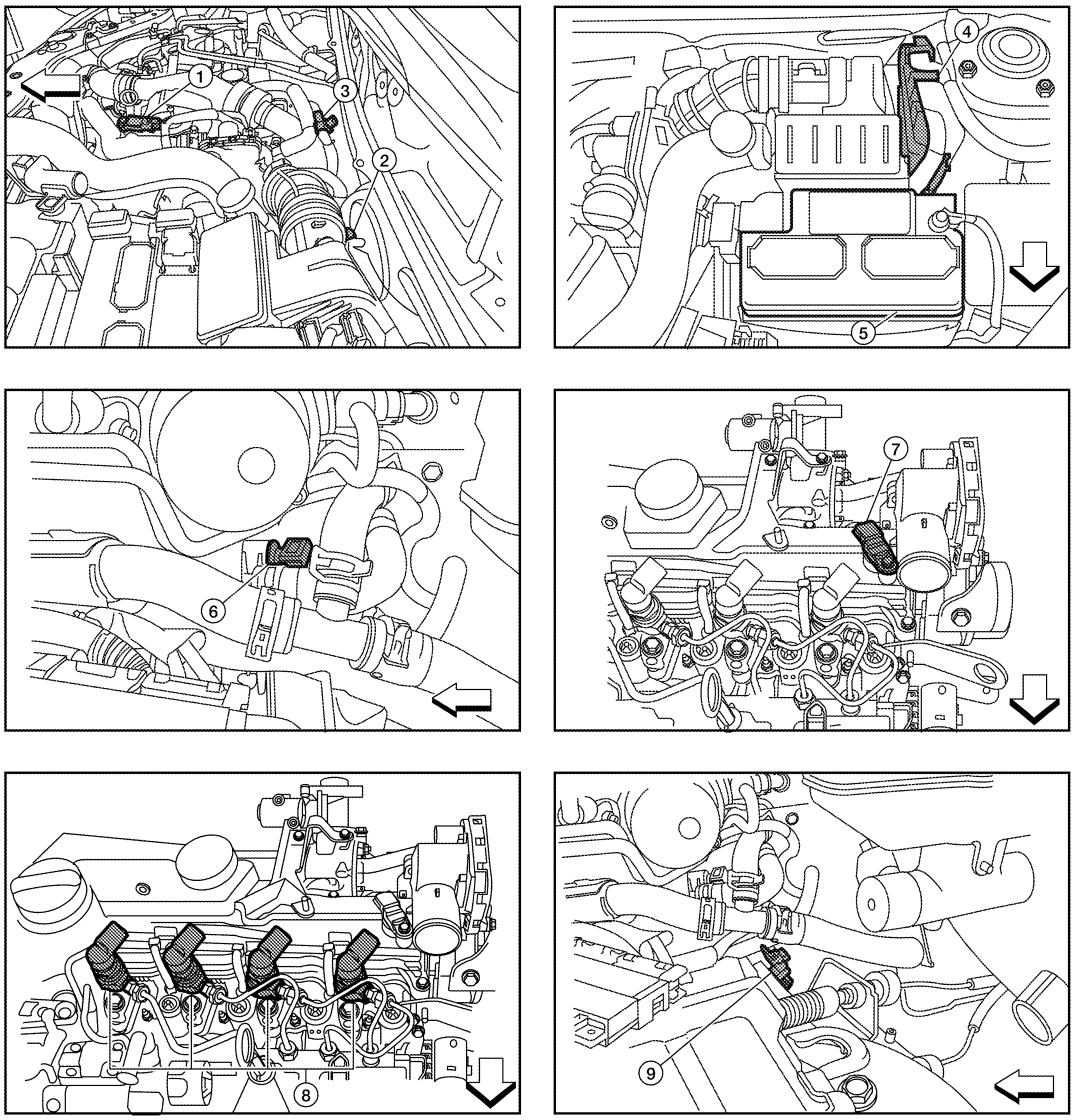
- The idle speed setpoint is dependent on:
- Engine coolant temperature
- Emission control program
- Air conditioning requirement
- Gear engaged
- Electrical load
- Battery voltage

Component Parts Location

INFOID:0000000001611147



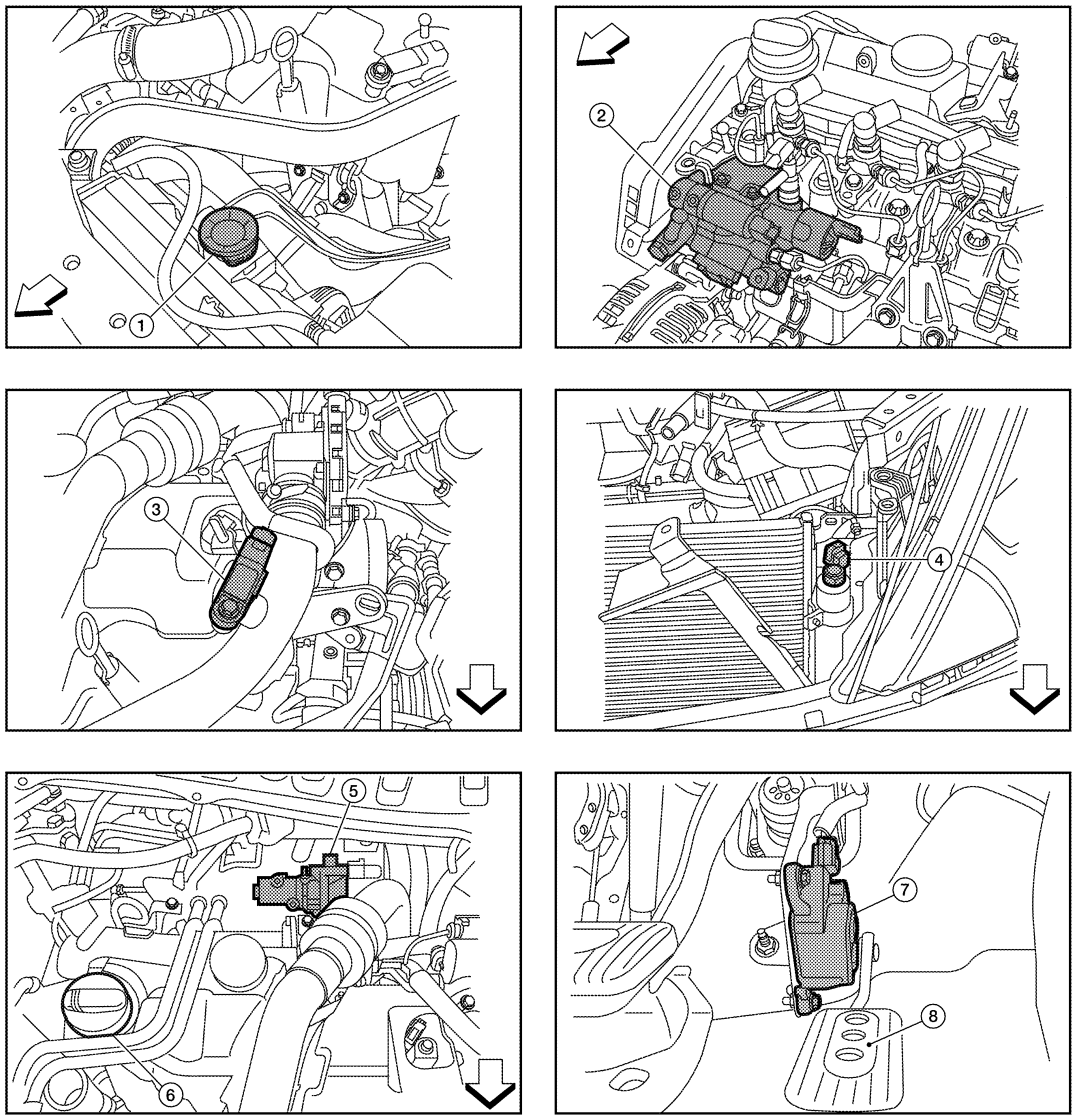
1. Priming pump
2. Fuel pump
3. Glow plug
4. Fuel rail
5. Turbocharger boost control solenoid valve
6. Turbocharger boost sensor
7. Engine coolant temperature sensor
8. Crankshaft position sensor
9. Glow relay
10. ECM
11. Mass air flow sensor
12. Electric throttle control actuator
13. Camshaft position sensor
14. EGR volume control valve
15. Fuel injector



ALBIA0297ZZ

1. Turbocharger boost sensor
2. Mass air flow sensor
3. EGR volume control valve
4. ECM
5. Battery
6. Engine coolant temperature sensor
7. Camshaft position sensor
8. Fuel injector
9. Crankshaft position sensor

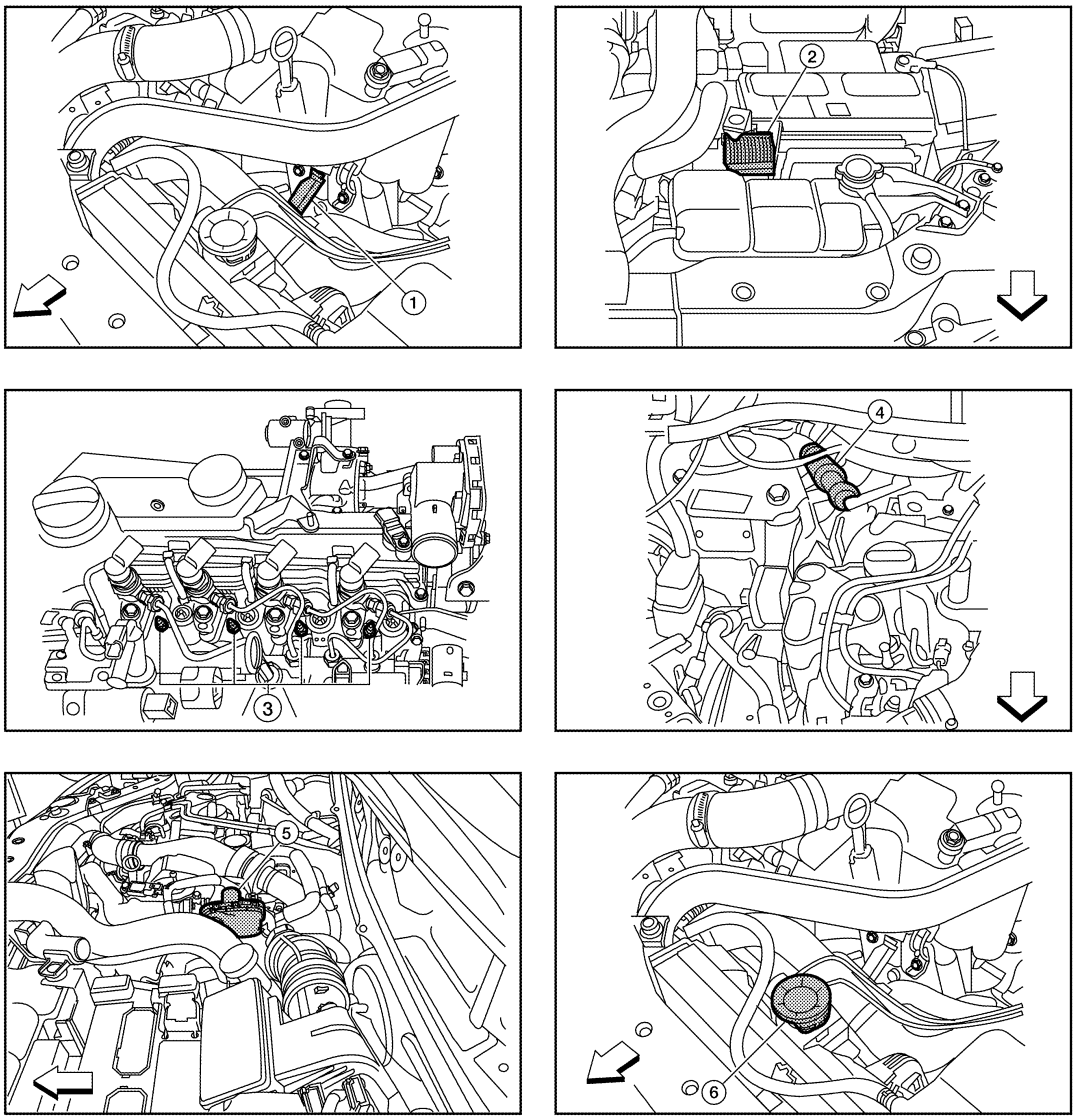
⇦ : Vehicle front



ALBIA0301ZZ

1. Turbocharger boost control solenoid valve
2. Fuel pump
3. Turbocharger boost sensor
4. Refrigerant pressure sensor
5. EGR volume control valve
6. Engine oil filler cap
7. Accelerator pedal position sensor
8. Accelerator pedal

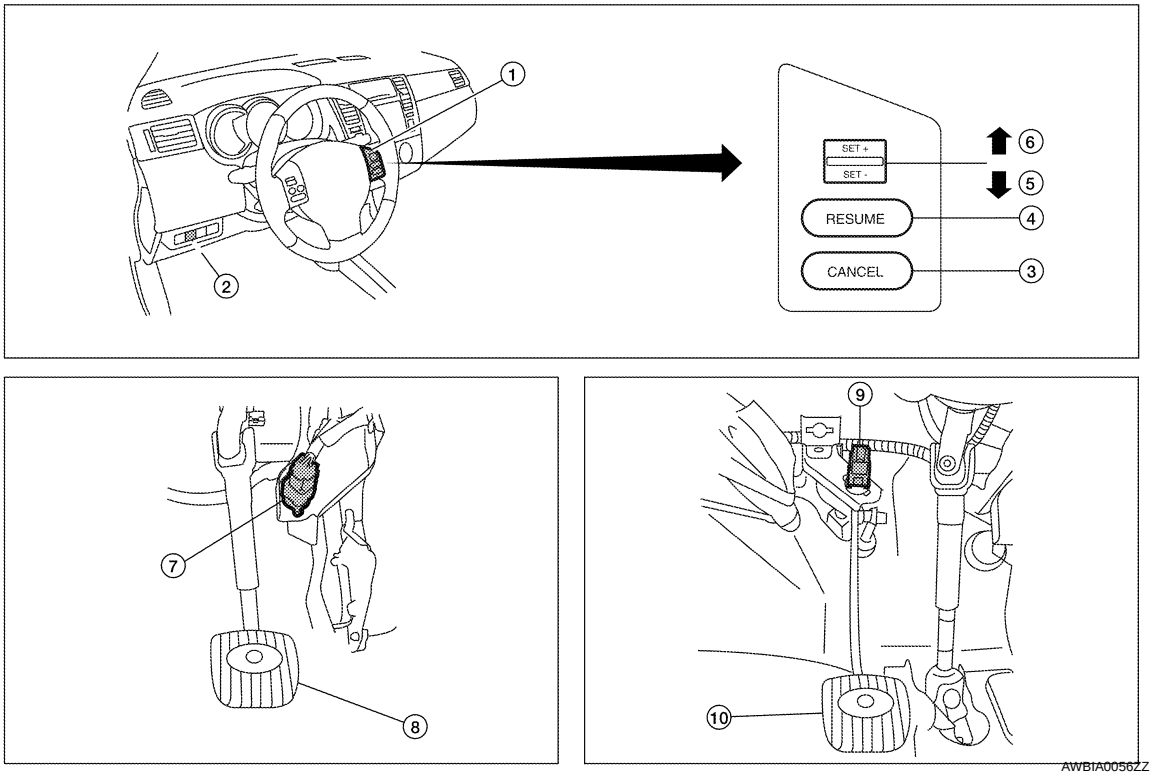
⇦ : Vehicle front



ALBIA0303ZZ

1. Fuel rail pressure sensor
2. Glow relay
3. Glow plug
4. Priming pump
5. Electronic throttle control actuator
6. Turbocharger boost control solenoid valve

⇦ : Vehicle front



1. ASCD steering switch
2. ASCD switch
3. CANCEL switch
4. RESUME switch
5. SET - switch
6. SET + switch
7. Stop lamp switch
8. Brake pedal
9. ASCD clutch switch
10. Clutch pedal

ENGINE TORQUE CONTROL

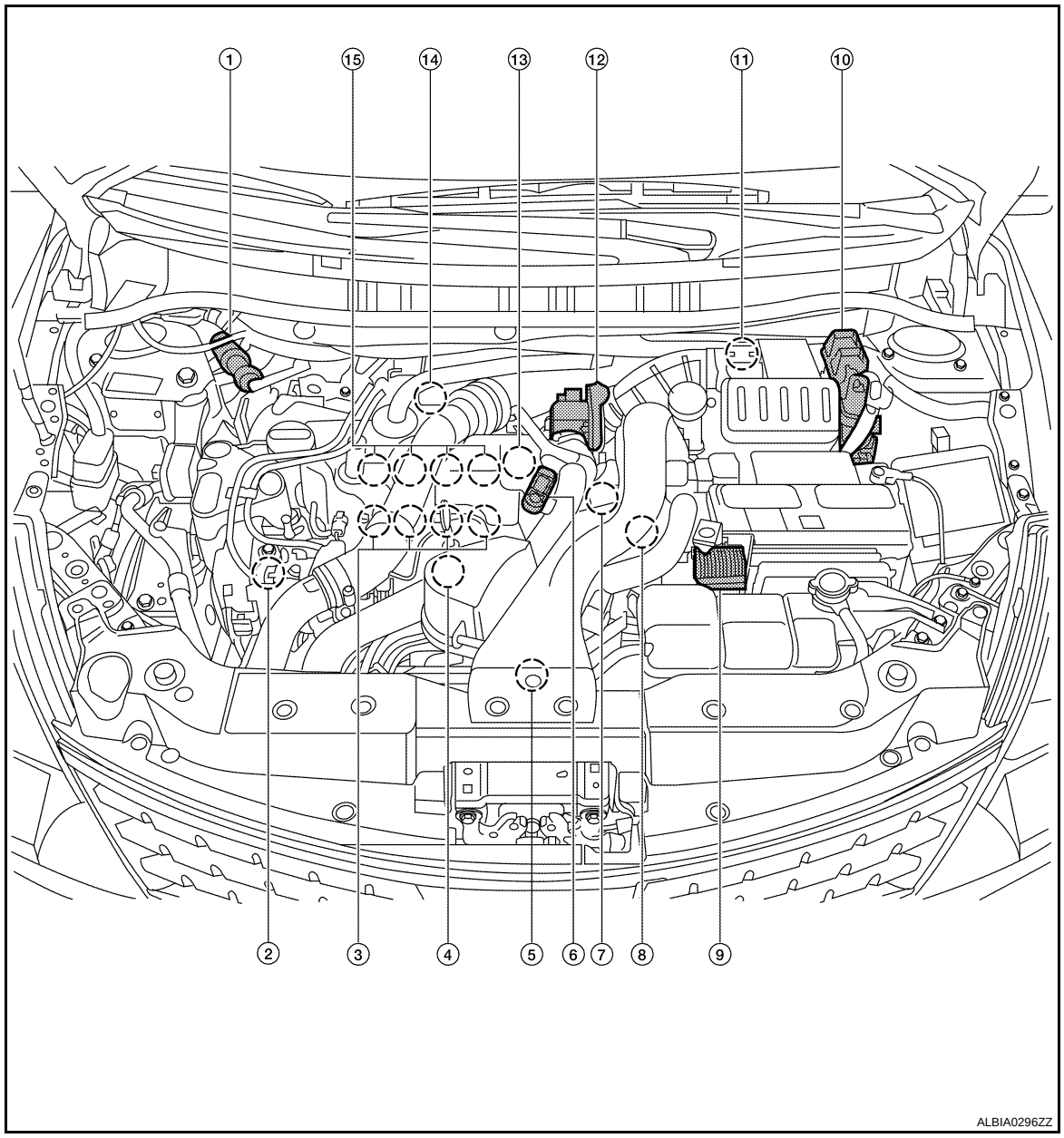
System Description

INFOID:0000000001162540

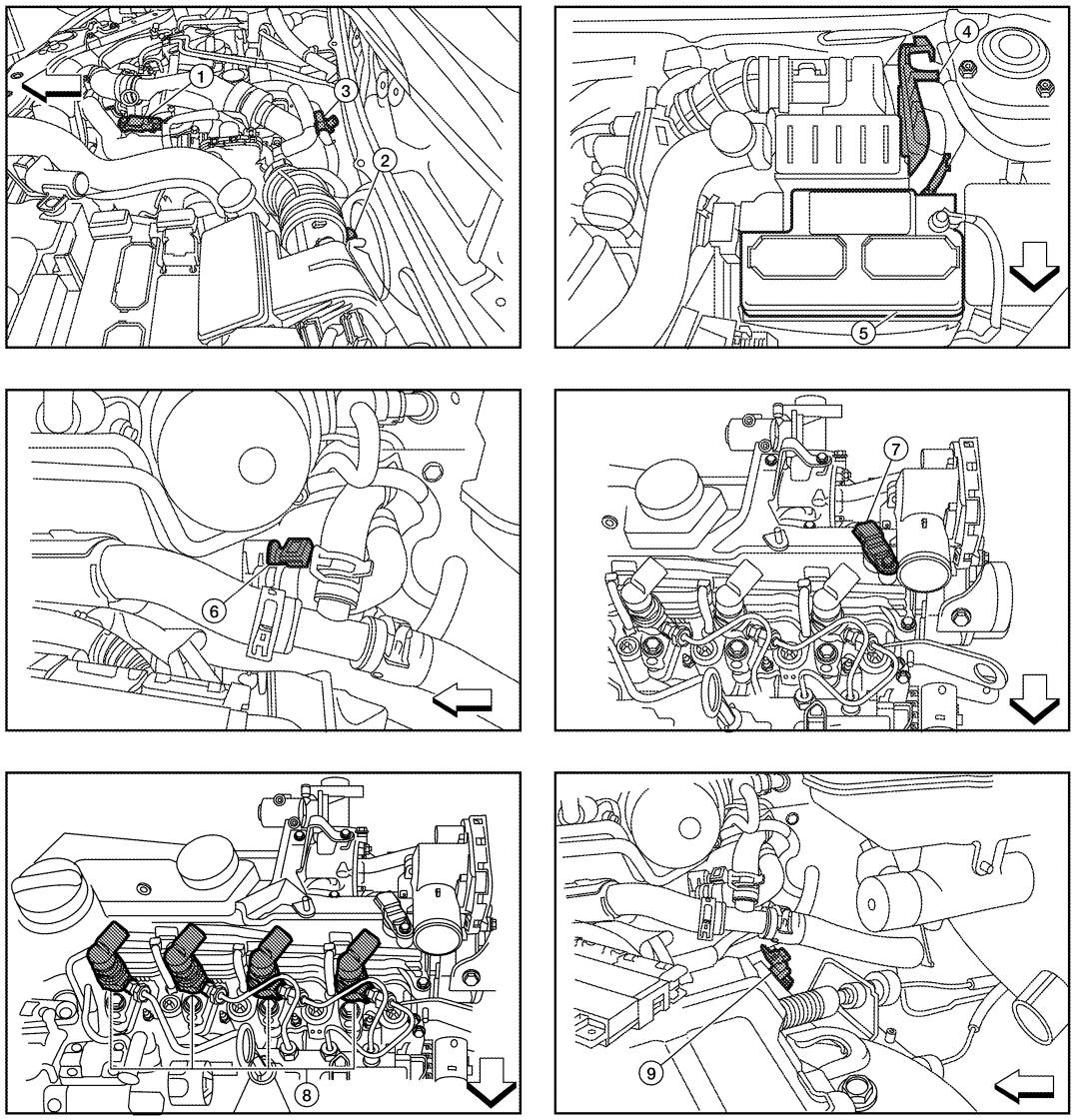
The torque structure is the system which translates the driver's request into a torque supplied by the engine. It is required for certain functions such as the electronic stability program (ESP), the automatic gearbox or the sequentialgearbox if fitted).
Each inter-system (ESP, automatic gearbox, sequential gearbox) sends the ECM a torque request viathe CAN communication. The computer arbitrates between the inter-system torque requests and the driver's request (comprised of the accelerator pedal or the cruise control/speed limiter function). The result of the arbitration gives thetorque setpoint.
From this torque setpoint, the computer determines the quantity of fuel to be injected (injection duration and numberof injections) and the amount of air required (turbocharging pressure and EGR rate) so that the engine is able toprovide the torque required in the best possible conditions (in terms of smooth running performance, pollutantemissions, etc.).

Component Parts Location

INFOID:0000000001611148



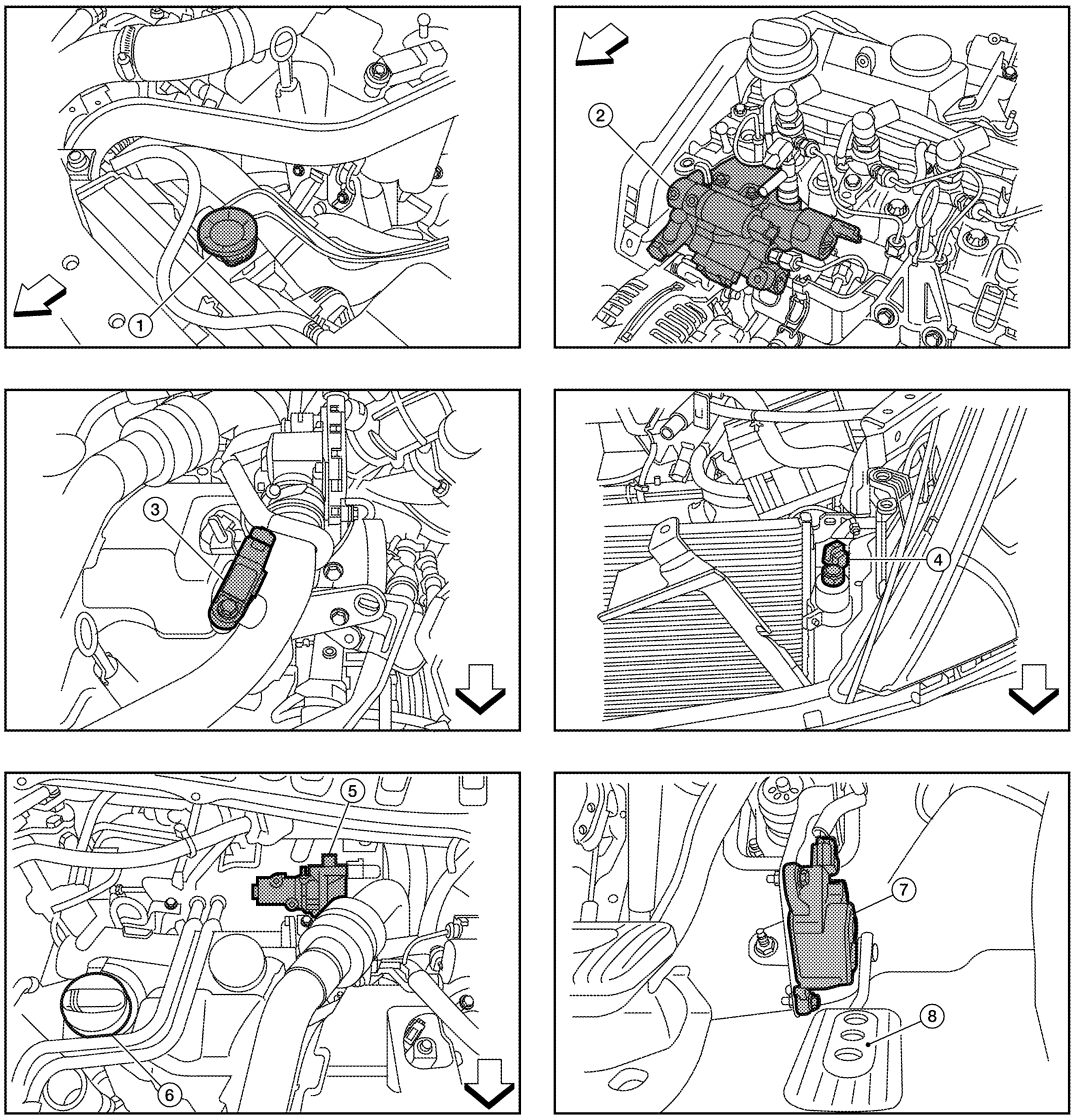
1. Priming pump
2. Fuel pump
3. Glow plug
4. Fuel rail
5. Turbocharger boost control solenoid valve
6. Turbocharger boost sensor
7. Engine coolant temperature sensor
8. Crankshaft position sensor
9. Glow relay
10. ECM
11. Mass air flow sensor
12. Electric throttle control actuator
13. Camshaft position sensor
14. EGR volume control valve
15. Fuel injector



ALBIA0297ZZ

1. Turbocharger boost sensor
2. Mass air flow sensor
3. EGR volume control valve
4. ECM
5. Battery
6. Engine coolant temperature sensor
7. Camshaft position sensor
8. Fuel injector
9. Crankshaft position sensor

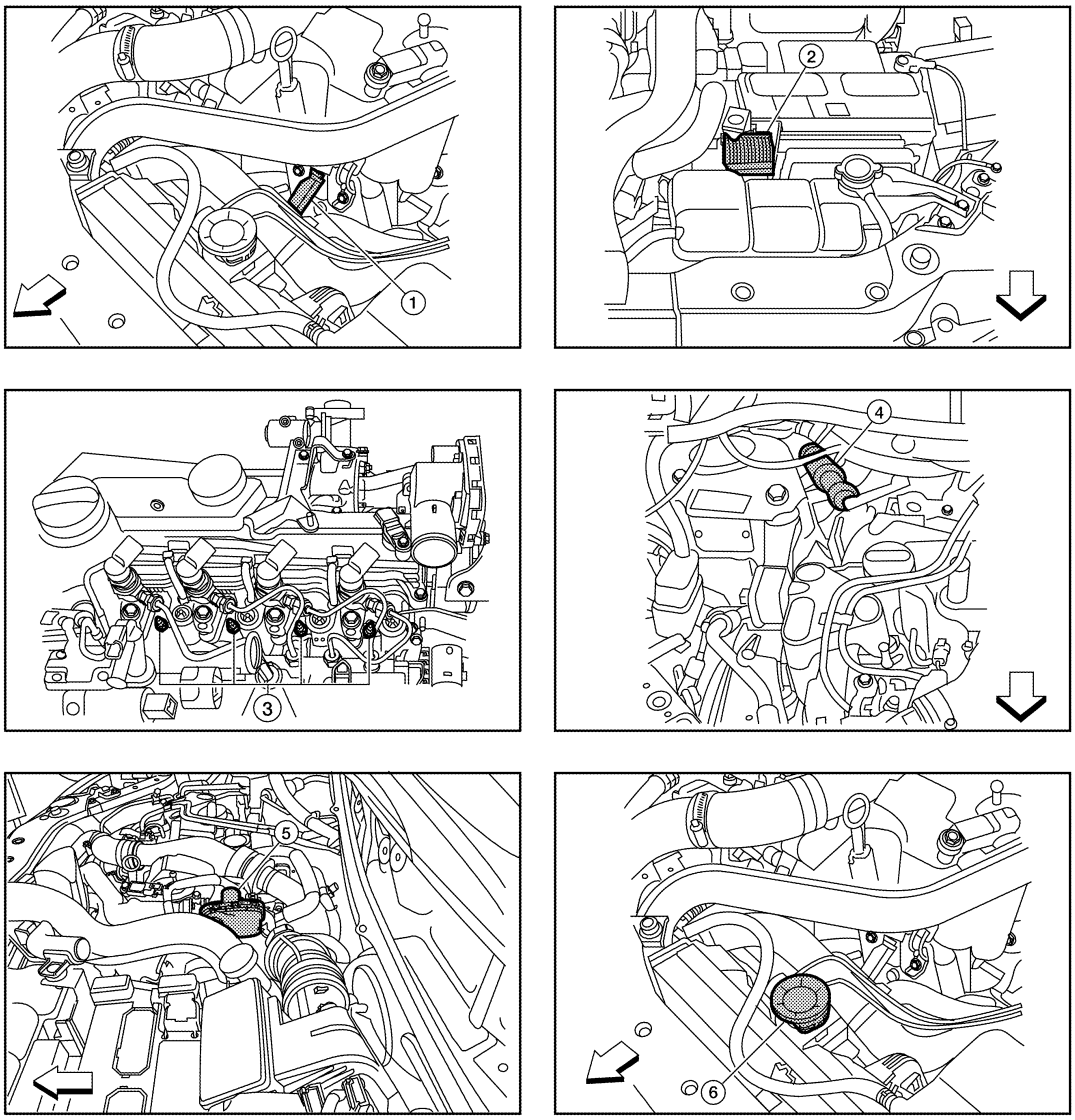
⇦ : Vehicle front



ALBIA0301ZZ

1. Turbocharger boost control solenoid valve
2. Fuel pump
3. Turbocharger boost sensor
4. Refrigerant pressure sensor
5. EGR volume control valve
6. Engine oil filler cap
7. Accelerator pedal position sensor
8. Accelerator pedal

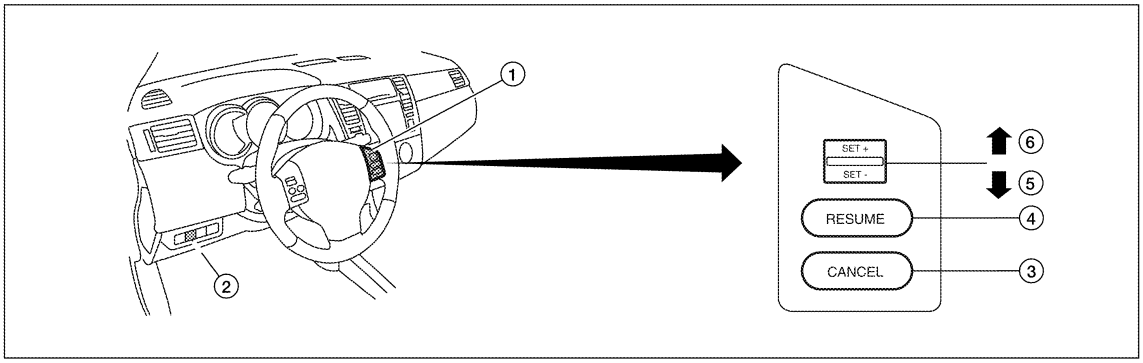
⇦ : Vehicle front

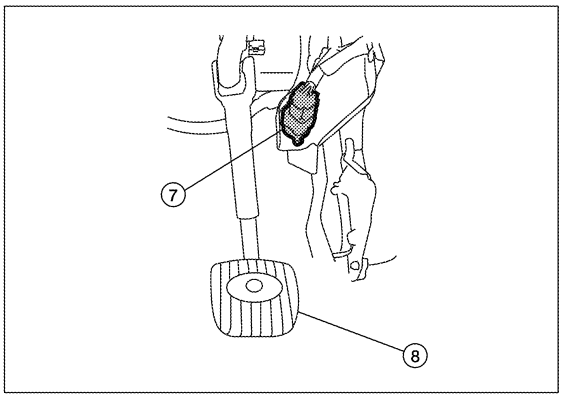


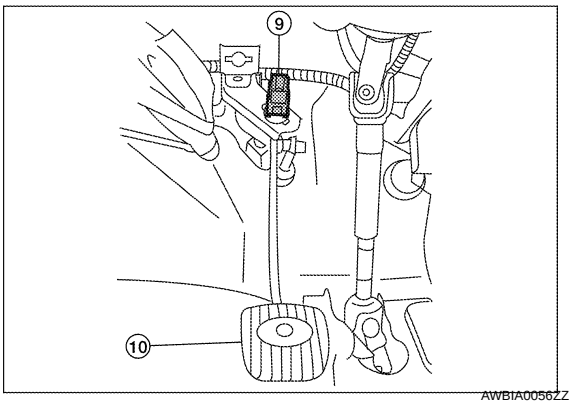
ALBIA0303ZZ

1. Fuel rail pressure sensor
2. Glow relay
3. Glow plug
4. Priming pump
5. Electronic throttle control actuator
6. Turbocharger boost control solenoid valve

⇦ : Vehicle front







AWBIA0056ZZ

1. ASCD steering switch
2. ASCD switch
3. CANCEL switch
4. RESUME switch
5. SET - switch
6. SET + switch
7. Stop lamp switch
8. Brake pedal
9. ASCD clutch switch
10. Clutch pedal

GLOW CONTROL

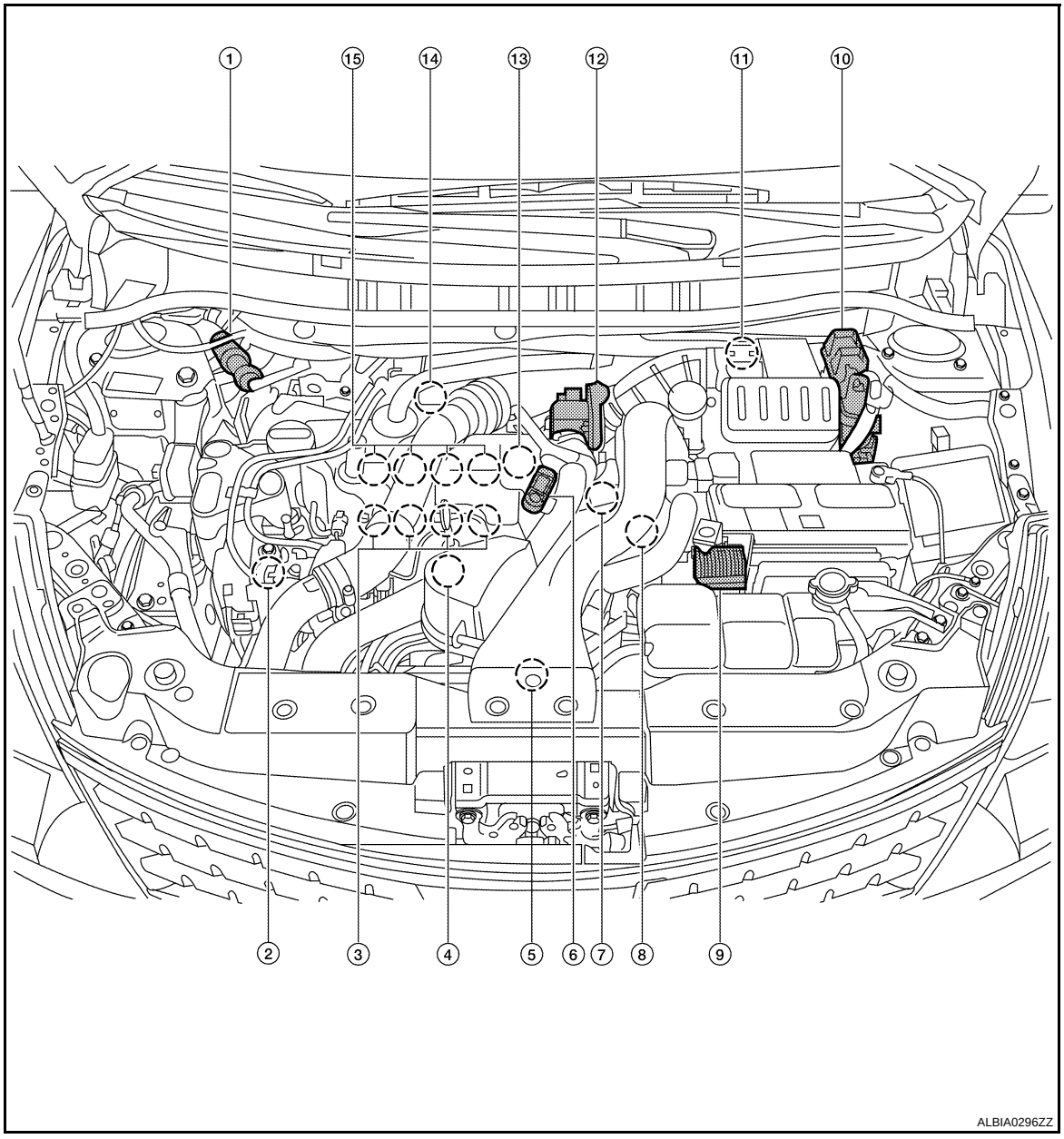
System Description

INFOID:0000000001162542

Glow control involves controlling the glow plugs and the glow plugs "on" indicator light on the instrument panel (via the can communication). The glow plugs are activated by a relay box and the power is provided by the battery.
After the ignition is switched on. Preheating is activated for a period of time. The indicator light comes on for the activation period which is dependent on the battery voltage, barometric pressure and engine coolant temperature. When the engine coolant temperature is below a certain threshold, a postheating function enables combustion stability, and thereby engine operation, to be improved (reduction in unburnt fuel and pollutant emissions).

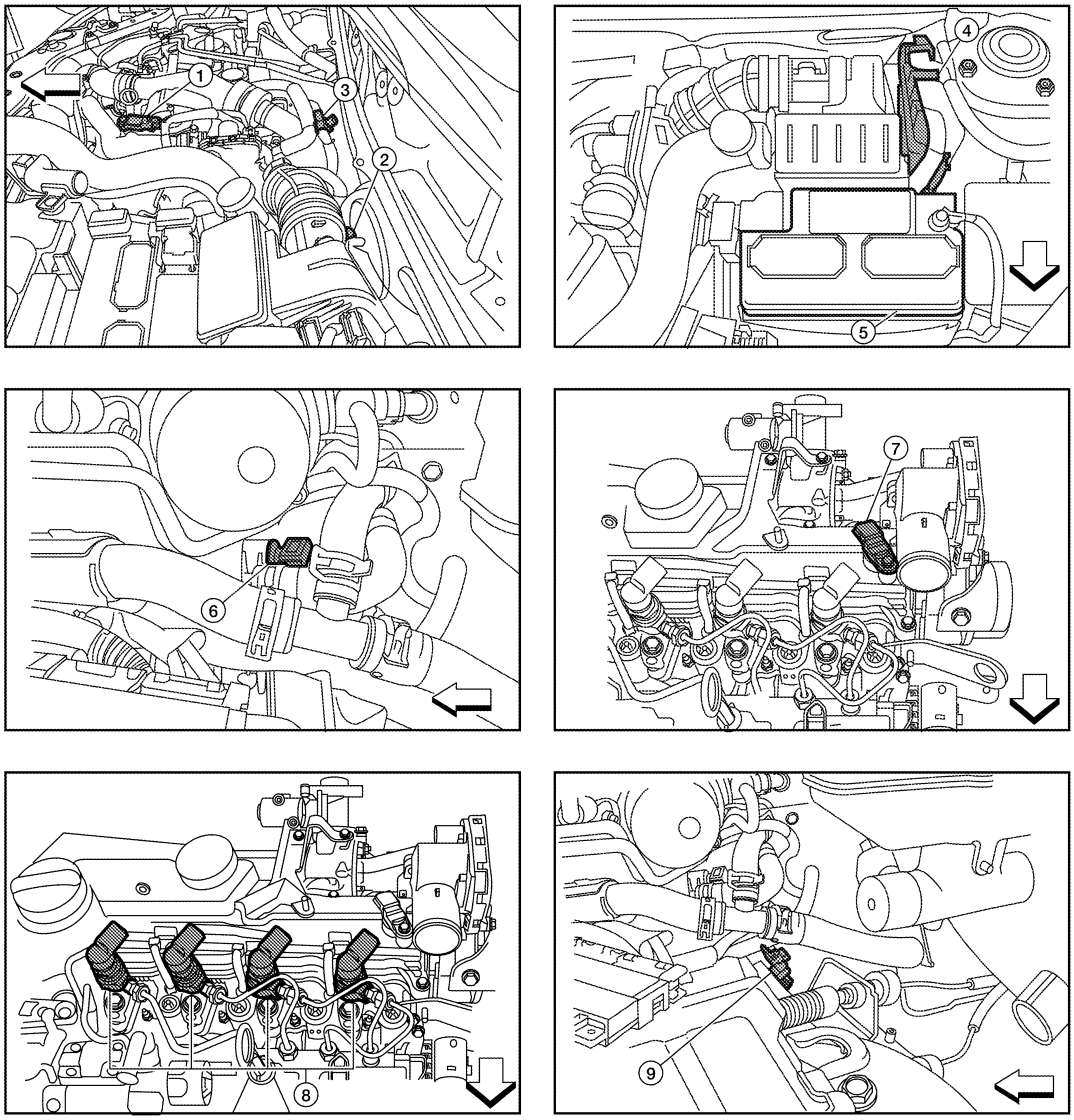
Component Parts Location

INFOID:0000000001611149



1. Priming pump
2. Fuel pump
3. Glow plug
4. Fuel rail
5. Turbocharger boost control solenoid valve
6. Turbocharger boost sensor

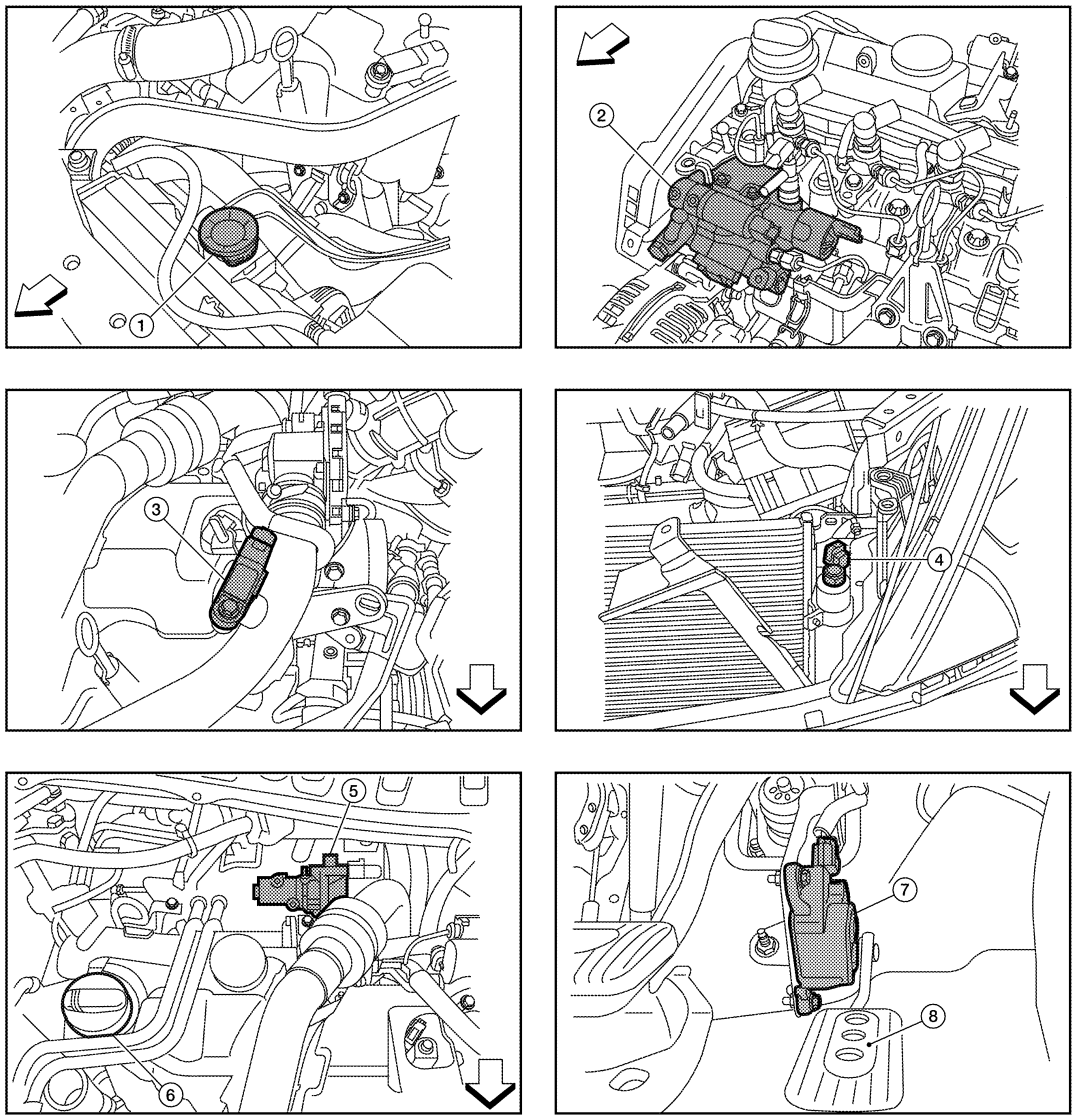
7. Engine coolant temperature sensor
8. Crankshaft position sensor
9. Glow relay
10. ECM
11. Mass air flow sensor
12. Electric throttle control actuator
13. Camshaft position sensor
14. EGR volume control valve
15. Fuel injector



ALBIA0297ZZ

1. Turbocharger boost sensor
2. Mass air flow sensor
3. EGR volume control valve
4. ECM
5. Battery
6. Engine coolant temperature sensor
7. Camshaft position sensor
8. Fuel injector
9. Crankshaft position sensor

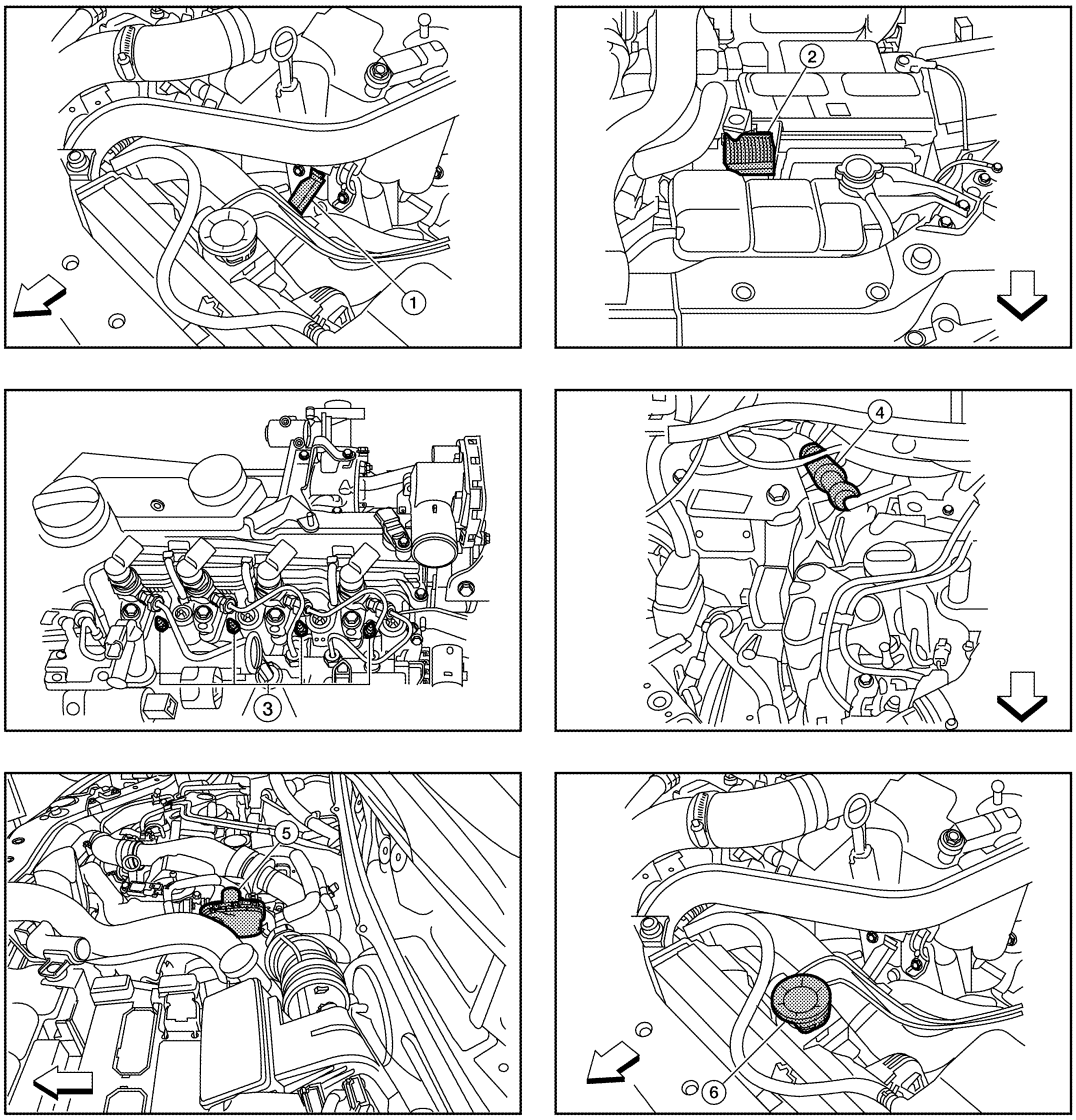
⇦ : Vehicle front



ALBIA0301ZZ

1. Turbocharger boost control solenoid valve
2. Fuel pump
3. Turbocharger boost sensor
4. Refrigerant pressure sensor
5. EGR volume control valve
6. Engine oil filler cap
7. Accelerator pedal position sensor
8. Accelerator pedal

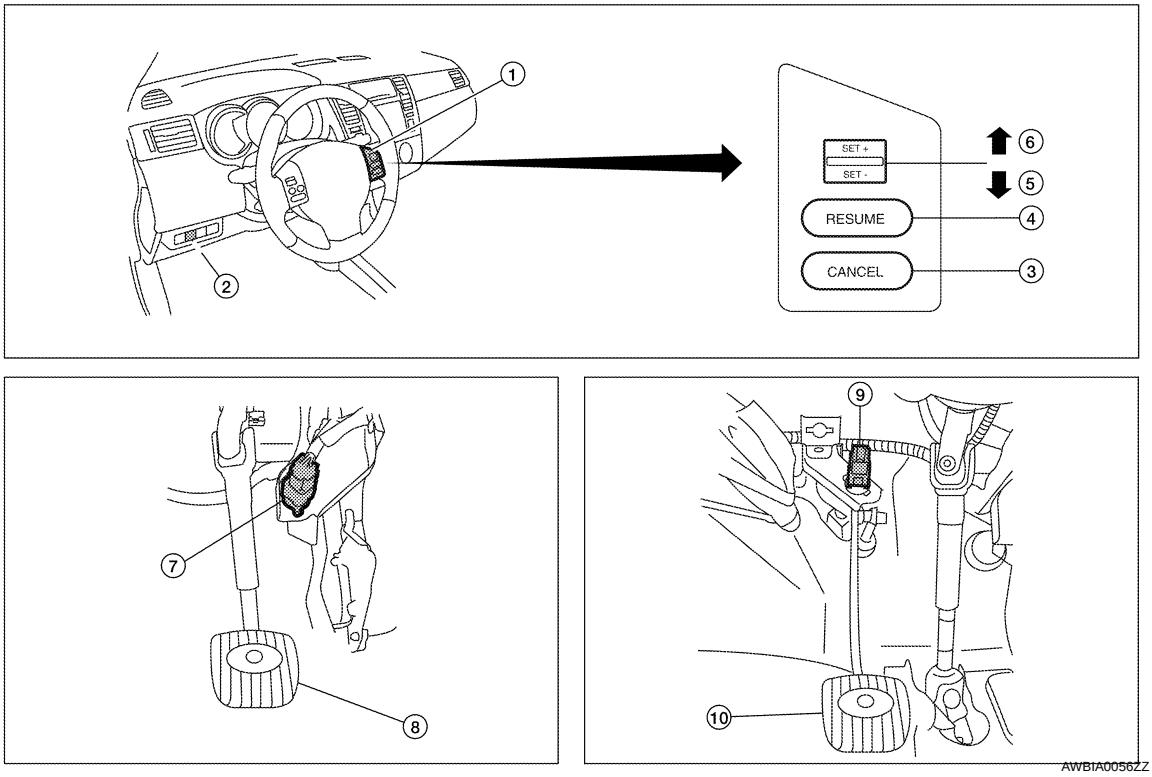
⇦ : Vehicle front



ALBIA0303ZZ

1. Fuel rail pressure sensor
2. Glow relay
3. Glow plug
4. Priming pump
5. Electronic throttle control actuator
6. Turbocharger boost control solenoid valve

⇦ : Vehicle front



1. ASCD steering switch
2. ASCD switch
3. CANCEL switch
4. RESUME switch
5. SET - switch
6. SET + switch
7. Stop lamp switch
8. Brake pedal
9. ASCD clutch switch
10. Clutch pedal

COOLING FAN CONTROL

System Description

INFOID:0000000001162544

The cooling fan motor is controlled by the ECM.

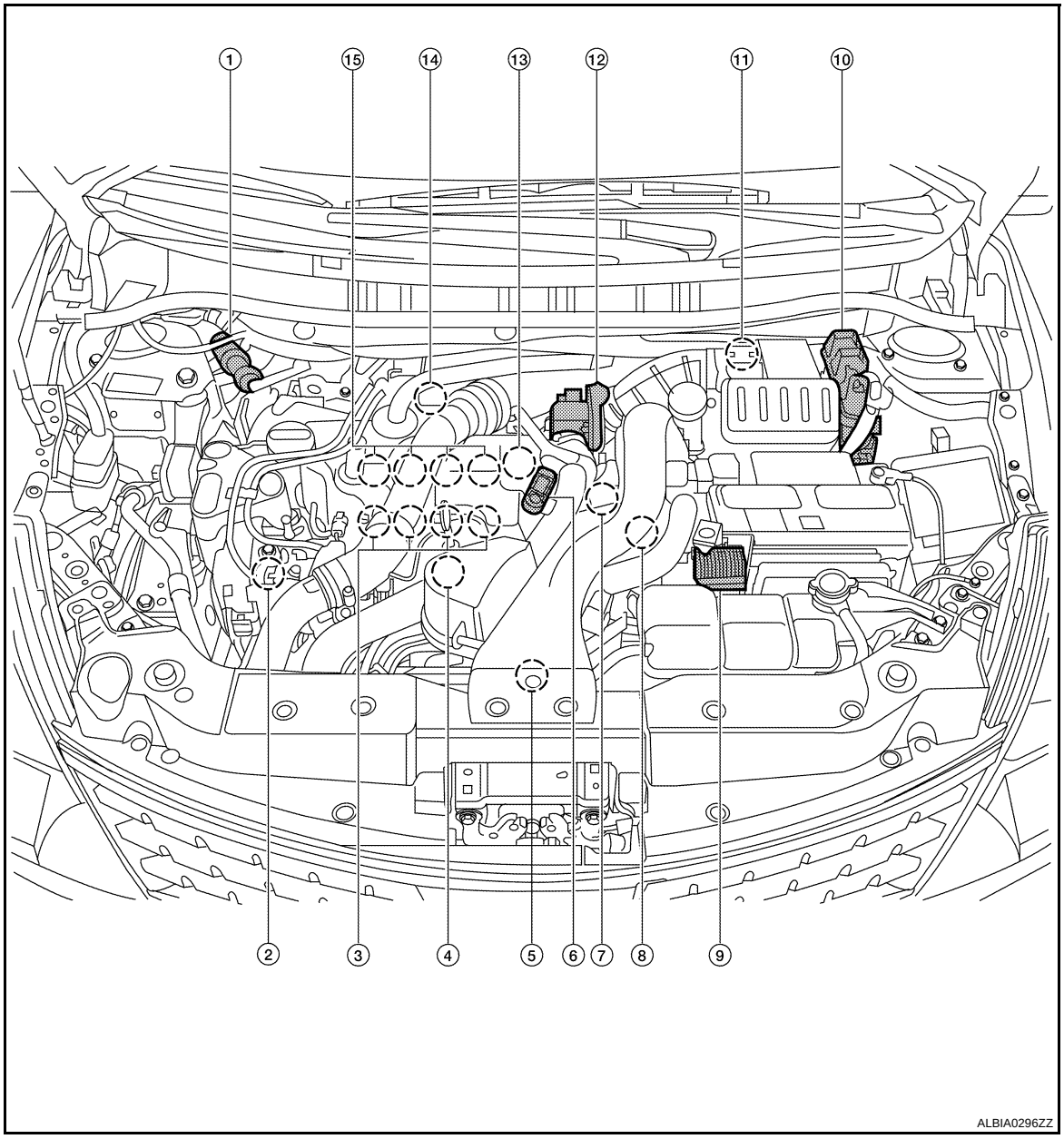
COOLING FAN OPERATION WITH THE ENGINE RUNNING

Cooling fan operate is guaranteed by a 2-speed fan assembly (LOW speed and HIGH speed).The ECM requests the IPDM E/R to actuate them via the can communication. To provide cooling:

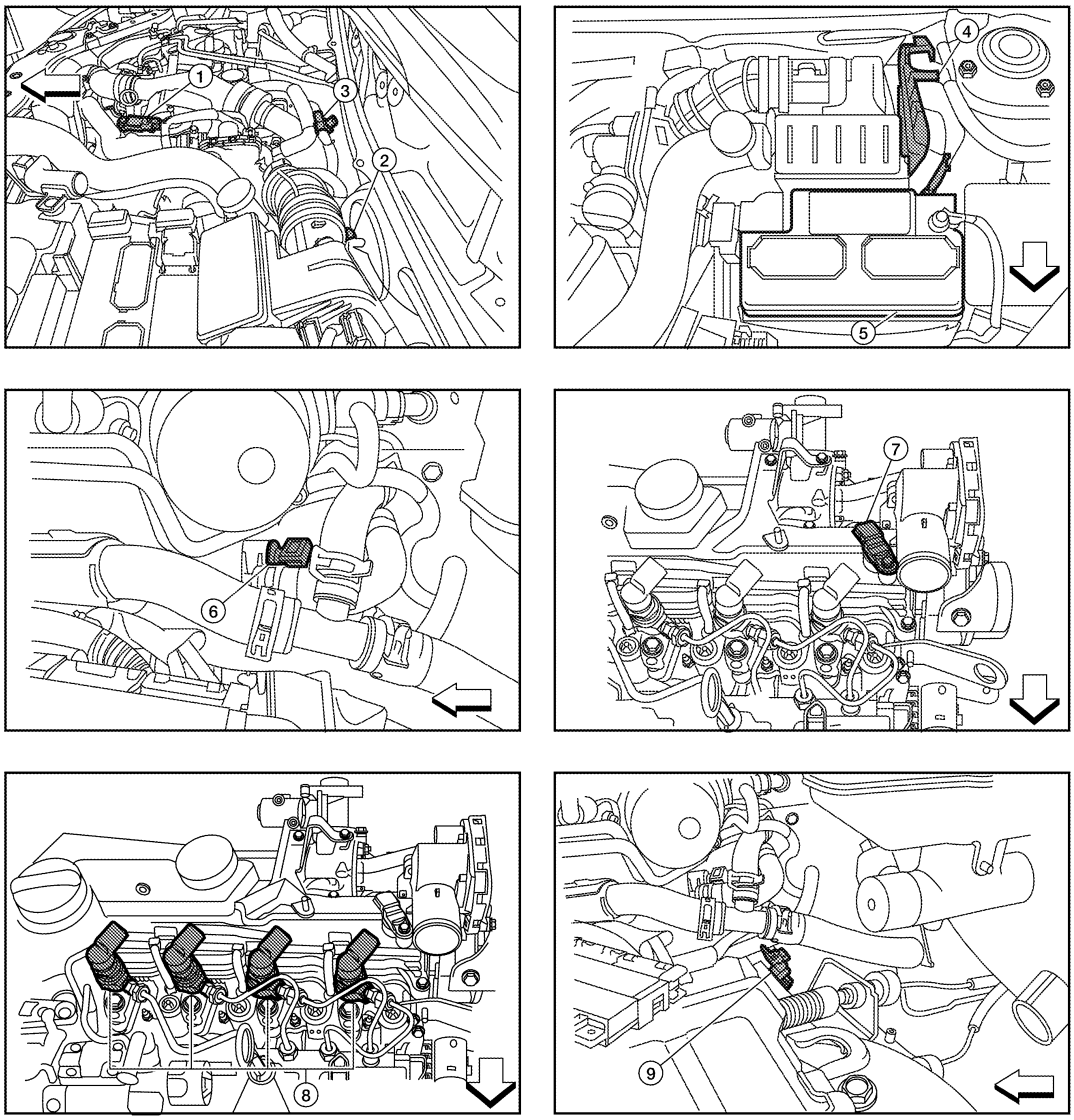
- Engine running
  - LOW speed is actuated when the engine coolant temperature exceeds 96 °C (205°F) and is deactivated when it drops below 94 °C (201°F).
  - HIGH speed is actuated when the engine coolant temperature exceeds 104 °C (219°F) and is deactivated when it drops below 102 °C (216°F).
- If the engine coolant temperature exceeds the threshold of 115°C (239°F), the ECM requests the IPDM E/R, via the CAN communication, to switch off the air conditioning compressor so as to reduce the load on the engine and attempt to limit the rise in temperature. The cut-off request is cancelled if the engine coolant temperature drops below 110°C (230°F).
- If a malfunction in the engine coolant temperature sensor circuit is detected, the ECM requests that HIGH speed operation.
- In addition to engine management, the ECM centralises the cooling requirements for the climate control and automatic transmission/sequential gearbox functions (where fitted).

Component Parts Location

INFOID:0000000001611150



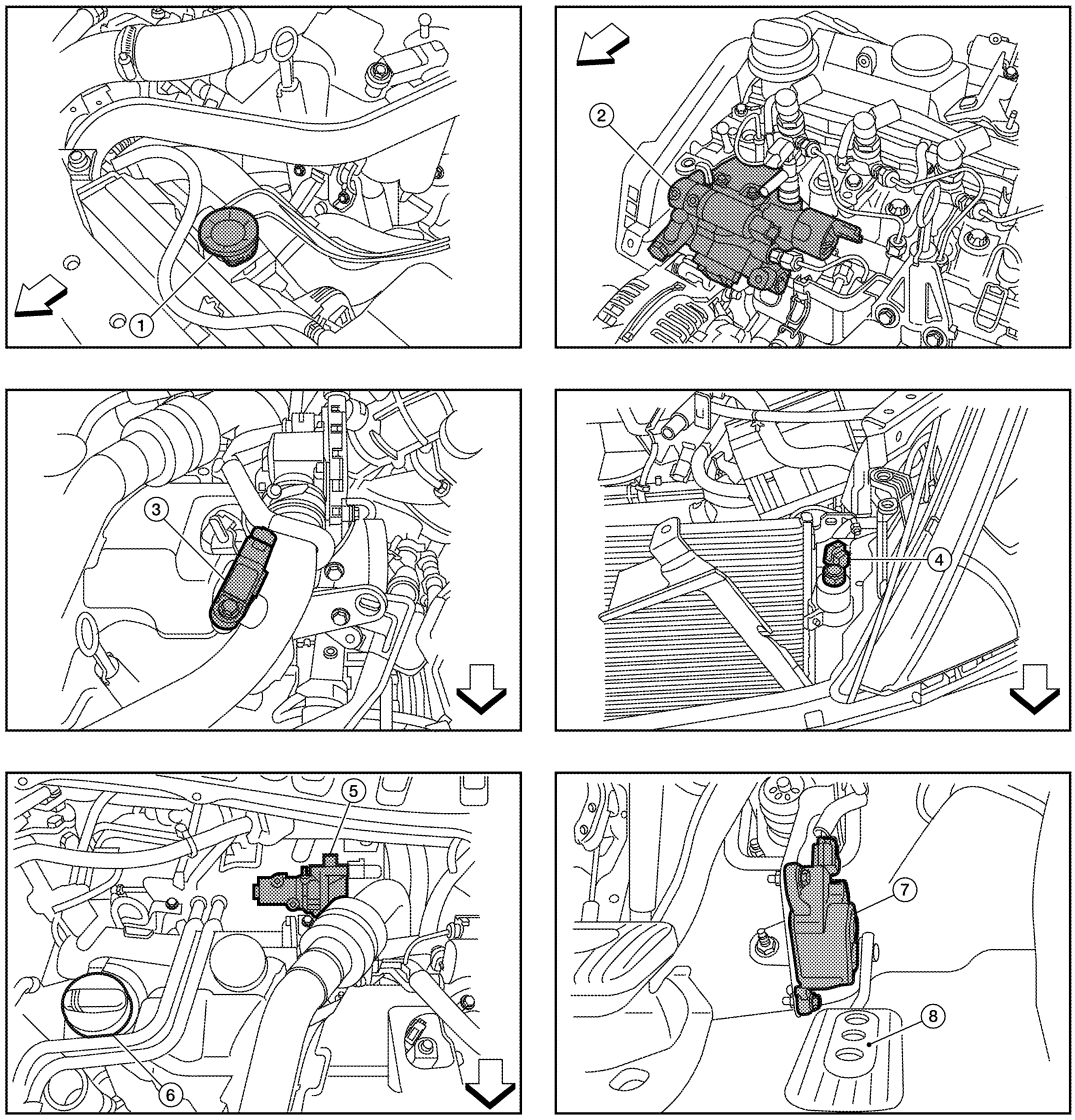
1. Priming pump
2. Fuel pump
3. Glow plug
4. Fuel rail
5. Turbocharger boost control solenoid valve
6. Turbocharger boost sensor
7. Engine coolant temperature sensor
8. Crankshaft position sensor
9. Glow relay
10. ECM
11. Mass air flow sensor
12. Electric throttle control actuator
13. Camshaft position sensor
14. EGR volume control valve
15. Fuel injector



ALBIA0297ZZ

1. Turbocharger boost sensor
2. Mass air flow sensor
3. EGR volume control valve
4. ECM
5. Battery
6. Engine coolant temperature sensor
7. Camshaft position sensor
8. Fuel injector
9. Crankshaft position sensor

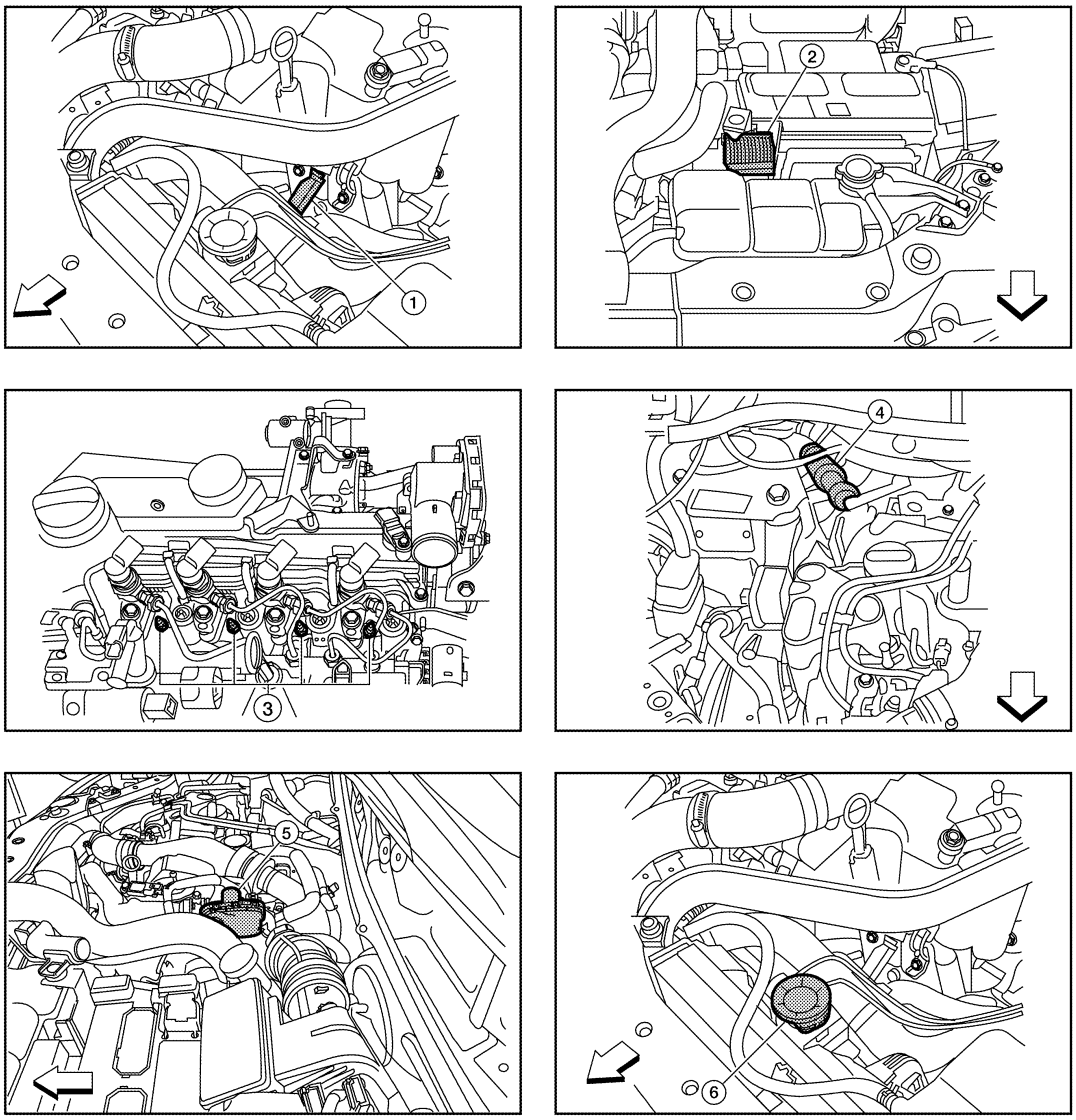
⇦ : Vehicle front



ALBIA0301ZZ

1. Turbocharger boost control solenoid valve
2. Fuel pump
3. Turbocharger boost sensor
4. Refrigerant pressure sensor
5. EGR volume control valve
6. Engine oil filler cap
7. Accelerator pedal position sensor
8. Accelerator pedal

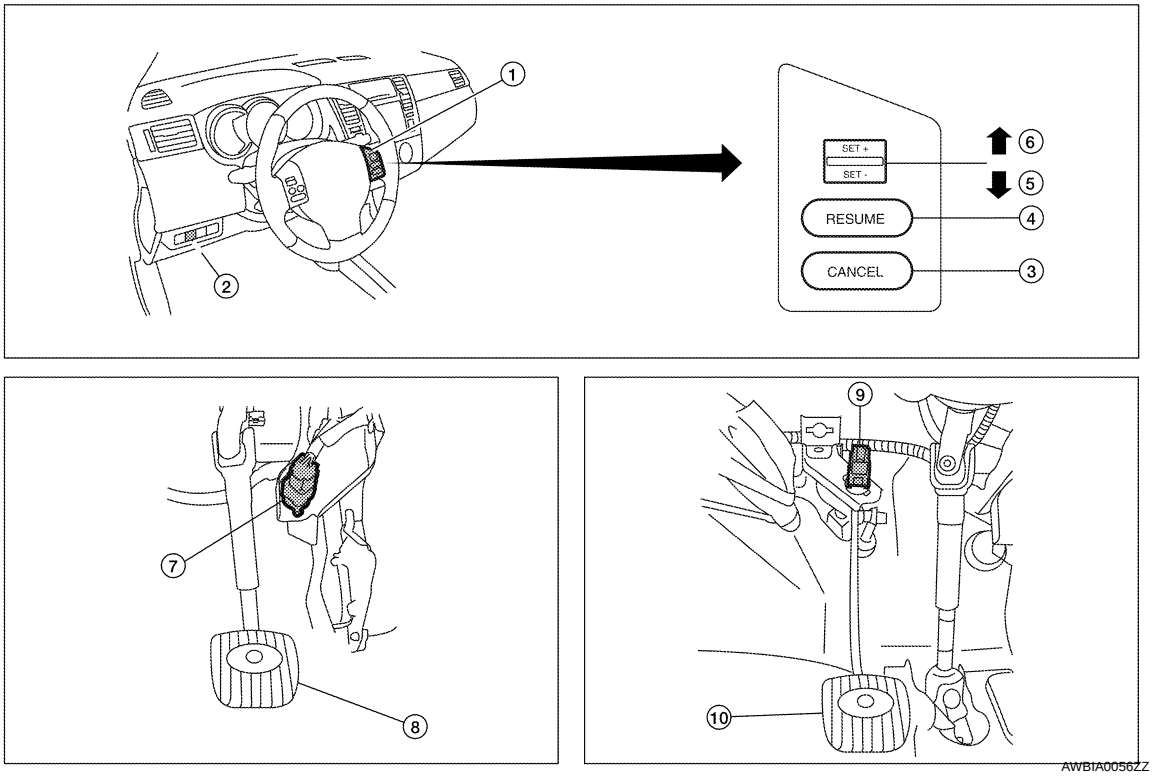
⇦ : Vehicle front



ALBIA0303ZZ

1. Fuel rail pressure sensor
2. Glow relay
3. Glow plug
4. Priming pump
5. Electronic throttle control actuator
6. Turbocharger boost control solenoid valve

⇦ : Vehicle front



1. ASCD steering switch
2. ASCD switch
3. CANCEL switch
4. RESUME switch
5. SET - switch
6. SET + switch
7. Stop lamp switch
8. Brake pedal
9. ASCD clutch switch
10. Clutch pedal

CAN COMMUNICATION

System Description

INFOID:0000000001162546

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-33, "CAN Communication Signal Chart", about CAN communication for detail.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000001162547

The ECM controls the display on the instrument panel of certain information relating to the operation of the engine.
Four functions are involved here: The OBD malfunction indicator [MI (Yellow)] for the EOBD (European On Board Diagnostics), the pre/post heating, the engine coolant temperature and engine malfunction [MI (Red)]. These four functions are represented by four lights given out by the ECM

GLOW LAMP

This lamp indicates that the glow control system has been activated.

ENGINE COOLANT TEMPERATURE LIGHT

This light is used as an indicator of engine overheating.
- In the event of overheating, it is up to the driver whether to stop the vehicle or not.

MALFUNCTION INDICATOR

The OBD malfunction indicator [MI (Yellow)] is used to alert the driver to the existence of engine control system malfunctions involving excessive pollution or if the EOBD system is deactivated.
The ECM makes a request for lighting of the MI (Yellow) only where there is a malfunction present at the end of three consecutive cycles.
The 3-second visual check upon powering up (automatic test procedure controlled by the IPDM E/R) is performed by the ECM.
In the event of a confirmed OBD malfunction by lighting of the MI, no flashing of the light must be observed following the lighting test.

DTCs Causing MI to Light

DTC	Description	Reference page
P0201	Cylinder 1 fuel injector control circuit	EC-1142
P0202	Cylinder 2 fuel injector control circuit	EC-1142
P0203	Cylinder 3 fuel injector control circuit	EC-1142
P0204	Cylinder 4 fuel injector control circuit	EC-1142
P0409	EGR Volume control valve control position sensor circuit	EC-1158
P0606	ECM	EC-1178
P2413	EGR volume control valve	EC-1202

ENGINE WARNING LIGHT

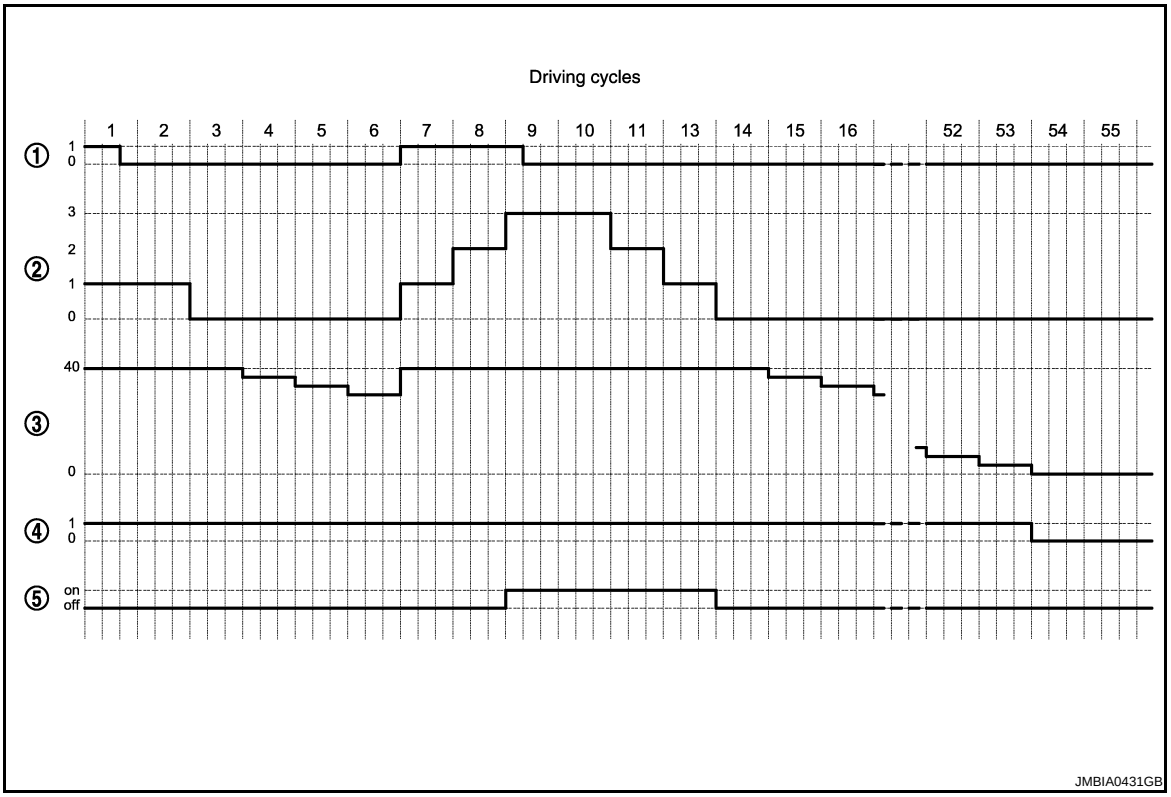
In the event of an engine malfunction, the ECM may request the display of an engine warning light [MI (Red)].

HOW TO ERASE DTC, 1ST TRIP DTC AND 2ND 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.

MI OPERATION CHART

Some malfunction must switch on MI to warn driver, that his engine emissions exceed OBD thresholds (Euro 3 x 2.5).
The rule is to switch on MI after 3 consecutive driving cycles (engine start + engine stop + power latch) with a present OBD malfunction.
To switch off the MI (without CONSULT-III), vehicle has to drive 3 consecutive cycles without present OBD malfunction.
Ignition switch OFF → ON transition, MI remains switched on in pre-drive check mode until engine start.If MI does not switch off whereas engine is running, there is at least one present OBD malfunction.



1. Present malfunction
2. Driving cycle counter
3. Warm up cycle counter
4. Memorised malfunction
5. MI state

NOTE: Driving cycle and warm up cycle are both detected in the same cycle.

COMPONENT DIAGNOSIS

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000001162548

1.INSPECTION START

Start engine.

Is engine running?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK GROUND CONNECTION-I

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "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 ON.
2. Check the voltage between ECM harness connector and ground.

+		–		Voltage
Connector	Terminal	Connector	Terminal	
F11	69	E16	123	Battery voltage
			124	
			125	
			126	

Is the inspection result normal?

YES >> GO TO 6.
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		
E60	123	Ground	Existed
	124		
	125		
	128		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to power in harness or connectors.

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- 15A fuse (No. 25)
- 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. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F11	53	Ground	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.
	54		

Is the inspection result normal?

YES >> GO TO 13.
NO-1 >> Battery voltage does not exist: GO TO 7.
NO-2 >> Battery voltage exists for more than a few seconds: GO TO 10.

7. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F11	60	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 10.

8. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E43.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E11	53	E43	4	Existed
	54		3	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 15.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E43.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F11	60	E43	7	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK 20A FUSE

1. Disconnect 20A fuse (No. 53) from IPDM E/R.
2. Check 20A fuse.

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace 20A fuse.

13. CHECK GROUND CONNECTION-II

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair or replace ground connection.

14. 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		
E60	123	Ground	Existed
	124		
	125		
	128		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair open circuit or short power in harness or connectors.

15. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair open circuit or short to power in harness or connectors.

P0001 FUEL PUMP

DTC Logic

INFOID:0000000001162549

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0001	HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) CIRCUIT • CO: Open circuit • CO.0: Short circuit to ground • CC.1: Short circuit to +12V • 1.DEF: Parameter at maximum level	• Harness or connectors [High pressure supply pump (volumetric control valve) circuit is open or shorted.] • High pressure supply pump (volumetric control valve) • Fuel line

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC becomes present after the engine is started.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001162550

1.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (volumetric control valve) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between high pressure supply pump (volumetric control valve) harness connector and ground.

High pressure supply pump (volumetric control valve)		Ground	Voltage
Connector	Terminal		
F54	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 for open or short between ECM and high pressure supply pump (volumetric control valve)
- Harness for open or short between IPDM E/R and high pressure supply pump (volumetric control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between high pressure supply pump (volumetric control valve) harness connector and ECM harness connector.

High pressure supply pump (volumetric control valve)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F54	2	F11	50	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 HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Refer to EC-1110, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace high pressure supply pump.

5. CHECK FUEL LINE

Check fuel line cleanliness.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Fuel line cleanliness.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001162551

1. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (volumetric control valve) harness connector.
3. Check resistance between high pressure supply pump (volumetric control valve) terminals as follows.

Terminals	Resistance
1 and 2	1.5 - 15Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure supply pump.

P0002 FUEL PUMP

DTC Logic

INFOID:0000000001162552

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0002	HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE) ADAPTIVE • 1.DEF: Parameter at maximum stop • 2.DEF: Parameter at maximum level	• Harness or connectors [High pressure supply pump (volumetric control valve) circuit is open or shorted.] (Fuel rail pressure sensor circuit is open or shorted.) • High pressure supply pump (volumetric control valve) • Fuel rail pressure sensor

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present when after the engine is started or following a load test.

Diagnosis Procedure

INFOID:0000000001162553

1.CHECK LOW PRESSURE FUEL SUPPLY SYSTEM

Refer to EC-1043, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

Is the inspection result normal?

OK >> GO TO 2.
NG >> Replace or replace. Then GO TO 9.

2.CHECK INTERNAL FUEL TRANSFER PUMP

Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

Is the inspection result normal?

OK >> GO TO 3.
NG >> Replace or replace. Then GO TO 9.

3.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 4.
NG >> Replace or replace. Then GO TO 9.

4.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Refer to EC-1045, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 5.
NG >> Replace or replace. Then GO TO 9.

5.CHECK RAIL HIGH PRESSURE REGULATION

Refer to EC-1048, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

Is the inspection result normal?

OK >> GO TO 6.
NG >> Replace or replace. Then GO TO 9.

6.CHECK MAJOR LEAK IN FUEL INJECTORS/FUEL INJECTORS OPEN

Refer to EC-1052, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/ Fuel Injectors Open)".

Is the inspection result normal?

OK >> GO TO 7.
NG >> Replace or replace. Then GO TO 9.

7.CHECK INCORRECT FUEL INJECTION QUANTITY

Refer to EC-1053, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

Is the inspection result normal?

OK >> GO TO 8.
NG >> Replace or replace. Then GO TO 9.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTIO END.
NO >> Repair or replace. Then GO TO 9.

9.CLEAR PRESSURE REGULATION

Perform “PRESS REG ADAPTIVE” in WORK SUPPORT mode with CONSULT-III.

>> **INSPECTION END**.

Component Inspection

INFOID:0000000001162554

1.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (volumetric control valve) harness connector.
3. Check resistance between high pressure supply pump (volumetric control valve) terminals as follows.

Terminals	Resistance
1 and 2	1.5 - 15Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure supply pump.

P0016 CKP - CMP CORRELATION

DTC Logic

INFOID:0000000001162555

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0016	CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION	• Harness or connectors (CMP sensor circuit is open or shorted.) • Camshaft position sensor • Timing belt • Signal plate

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present when cranking the engine or at idle speed.
- **If the DTC is present:**
  Longer starting time, requires several attempts to start the vehicle.

Diagnosis Procedure

INFOID:0000000001162556

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK CMP SENSOR

1. Turn ignition switch OFF.
2. Disconnect camshaft position (CMP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CMP sensor harness connector and ground.

CMP sensor		Ground	Voltage
Connector	Terminal		
F21	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E8, F8
- Harness for open or short between ECM and CMP sensor
- Harness for open or short between IPDM E/R and CMP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CMP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CMP sensor harness connector and ECM harness connector.

CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F21	1	F11	65	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 CMP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CMP sensor harness connector and ECM harness connector.

CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F21	2	F11	75	Existed

2. 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 CMP SENSOR

Refer to EC-1114, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace camshaft position sensor.

7.CHECK SPROCKET

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace sprocket.

8.CHECK TIMING BELT

Refer to EM-291, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace timing belt.

9.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

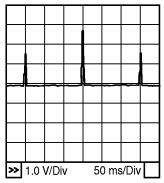
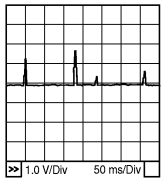
>> **INSPECTION END**

Component Inspection

INFOID:0000000001162557

1.CHECK CMP SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Measure the voltage signal between ECM harness connector and ground under the following conditions.

+		–		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	75 (CMP sensor signal)	E16	128	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 1V ★  MBIB1510E
				[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	0 - 1V ★  MBIB1511E

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace CMP sensor.

P0045 TC BOOST CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000001162558

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0045	TURBOCHARGER BOOST CONTROL SOLENOID VALVE CIRCUIT • CO: Open circuit • CO.0: Open circuit or short circuit to ground • CC.1: Short circuit to +12V	• Harness or connectors (The solenoid valve circuit is open or shorted.) • Turbocharger boost control solenoid valve

NOTE:
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001162559

1.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between turbocharger boost control solenoid valve harness connector and ground.

Turbocharger boost control solenoid valve		Ground	Voltage
Connector	Terminal		
E59	2	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 E8, F8
- Harness for open or short between IPDM E/R and turbocharger boost control solenoid valve
- Harness for open or short between ECM and turbocharger boost control solenoid valve

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK TURBOCHARGER BOOST 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 turbocharger boost control solenoid valve harness connector and ECM harness connector.

Turbocharger boost control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E59	1	F11	52	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between ECM and turbocharger boost control solenoid valve

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Refer to EC-1117, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace turbocharger boost control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001162560

1. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost control solenoid valve harness connector.
3. Check resistance between turbocharger boost control solenoid valve terminals as follows.

Terminals	Resistance
1 and 2	18.9 - 23.1Ω [at 23°C (73°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure supply pump.

P0069 TC BOOST SENSOR, BARO SENSOR CORRELATION

DTC Logic

INFOID:0000000001162561

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0069	TURBOCHARGER BOOST SENSOR - BAROMETRIC PRESSURE SENSOR CORRELATION • 1.DEF: Signal outside lower level • 2.DED: Signal outside upper level	• Harness or connectors (Turbocharger boost sensor) • Turbocharger boost sensor • Barometric pressure sensor

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC becomes present after the engine is started.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001162562

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK TUBOCHARGER BOOST SENSOR SUPPLY CIRCUIT

1. Disconnect turbocharger boost sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost sensor connector and ground.

Turbocharger boost sensor		Ground	Voltage
Connector	Terminal		
F50	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 TUBOCHARGER BOOST SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F50	2	F10	43	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK TUBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F50	3	F10	44	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 TUBOCHARGER BOOST SENSOR

Refer to EC-1119, "Component Inspection"

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace turbocharger boost sensor.

6. REPLACE ECM

1. Perform EC-1054, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".
2. Perform EGR volume control valve closed position learning. Refer to EC-1055, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001162563

1. CHECK TURBOCHARGER BOOST SENSOR-I

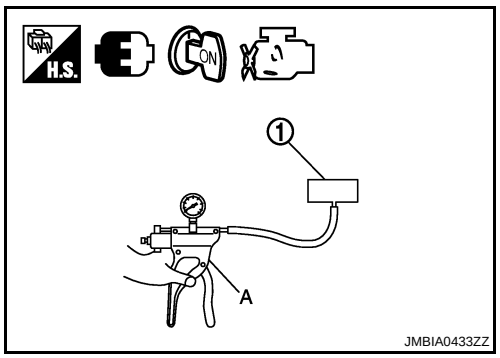
1. Turn ignition switch OFF.
2. Remove turbocharger boost sensor with its harness connected.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check “BOOST PRESS” and “ATOMOS PRESS” indication.

If the value is not very close to “ATOMOS PRESS”, maximum pressure difference between “ATOMOS PRESS” and “BOOST PRESS” with the ignition switch ON (engine stop) = ± 50 mbar?

YES >> GO TO 2.
NO >> Replace turbocharger boost sensor.

2. CHECK TURBOCHARGER BOOST SENSOR-II

1. Use pump to apply turbocharger boost sensor as shown in the figure.
2. Apply a pressure of between 10 kPa(0.100 bar, 0.102 kg/cm^2, 1.5 psi) - 13 kPa(0.130 bar, 0.133 kg/cm^2, 1.9 psi) [maximum pressure to be applied: 13 kPa(0.130 bar, 0.133 kg/cm^2, 1.9 psi)].
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Check “BOOST PRESS” indication with that given by the vacuum pump.



If there is no discrepancy?

YES >> INSPECTION END
NO >> Replace turbocharger boost sensor.

P0087 FUEL PUMP

DTC Logic

INFOID:0000000001162564

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0087	RAIL PRESSURE 1.DEF: Rail pressure too low on starting	• High pressure supply pump • High pressure supply pump (Pressure control valve) • High pressure supply pump (Volumetric control valve) • Fuel injector • Fuel rail pressure sensor • Air mixed with fuel • Lack of fuel • Fuel rail pressure relief valve • Fuel line • Harness or connector

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC becomes present during the first 30 seconds after the engine starts.
- In low ambient temperature conditions, diagnostic can.t make difference between a normal long engine start and abnormal long engine start. So, DTC must be take in account only if customer complains about too long or impossible engine start not only in cold conditions but also and especially in warm conditions. If customer complains only in cold conditions, root cause of the problem could elsewhere like low battery level, bad fuel specification (too viscous fuel). This DTC could appear after fuel filter too.
- **Special notes:**
  Starting and engine operation difficult or impossible.

Diagnosis Procedure

INFOID:0000000001162565

1.CHECK LOW PRESSURE FUEL SUPPLY SYSTEM

Refer to EC-1043, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

Is the inspection result normal?

OK >> GO TO 2.
NG >> Replace or replace. Then GO TO 7.

2.CHECK INTERNAL FUEL TRANSFER PUMP

Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

Is the inspection result normal?

OK >> GO TO 3.
NG >> Replace or replace. Then GO TO 7.

3.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 4.
NG >> Replace or replace. Then GO TO 7.

4.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Refer to EC-1045, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 5.

NG >> Replace or replace. Then GO TO 7.

5.CHECK RAIL HIGH PRESSURE REGULATION

Refer to EC-1048, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

Is the inspection result normal?

OK >> GO TO 6.
NG >> Replace or replace. Then GO TO 7.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTIO END.
NO >> Repair or replace. Then GO TO 7.

7.CLEAR PRESSURE REGULATION

Perform “PRESS REG ADAPTIVE” in WORK SUPPORT mode with CONSULT-III.

>> **INSPECTION END**.

P0090 FUEL PUMP

DTC Logic

INFOID:0000000001162566

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0090	HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) CIRCUIT • CO: Open circuit • CO.0: Short circuit to ground • CC.1: Short circuit to +12V • 1.DEF: Parameter at maximum level	• Harness or connectors [High pressure supply pump (pressure control valve) circuit is open or shorted.] • High pressure supply pump (pressure control valve)

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC becomes present after the engine is started.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001162567

1.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (pressure control valve) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between high pressure supply pump (pressure control valve) harness connector and ground.

High pressure supply pump (Pressure control valve)		Ground	Voltage
Connector	Terminal		
F53	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R
- Harness for open or short between IPDM E/R and high pressure supply pump (pressure control valve)
- Harness for open or short between ECM and high pressure supply pump (pressure control valve)

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between high pressure supply pump (pressure control valve) harness connector and ECM harness connector.

High pressure supply pump (Pressure control valve)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F53	4	F11	49	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. HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE) CHECK

Refer to EC-1123, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 5.
No >> Replace high pressure supply pump.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTIO END

Component Inspection

INFOID:0000000001162568

1. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

1. Turn ignition switch OFF.
2. Disconnect high pressure supply pump (pressure control valve) harness connector.
3. Check resistance between high pressure supply pump (pressure control valve) terminals as follows.

Terminals	Resistance
3 and 4	1.5 - 15Ω

Is the inspection result normal?

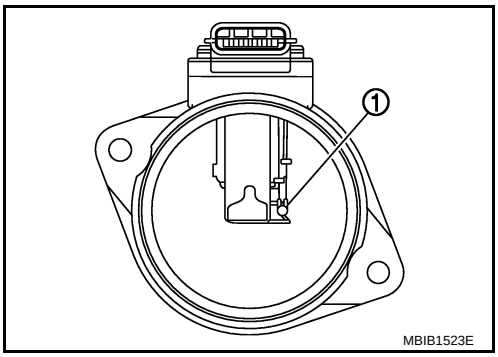
YES >> INSPECTION END
NO >> Replace high pressure supply pump.

P0100 MAF SENSOR

Description

INFOID:0000000001162569

The mass air flow sensor is placed in the stream of intake air.
- Intake air temperature sensor (1)



DTC Logic

INFOID:0000000001162570

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0100	MASS AIR FLOW SENSOR CIRCUIT • CC.0: Short circuit to ground • CO.1: Open circuit or short circuit to +12V	• Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Mass air flow sensor

NOTE:
- **If DTC P0100 is displayed with DTC P0641, first perform trouble diagnosis for DTC P0641. Refer to EC-1180, "DTC Logic".**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on.

Diagnosis Procedure

INFOID:0000000001162571

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between mass air flow sensor harness connector and ground.

Mass air flow sensor		Ground	Voltage
Connector	Terminal		
F31	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8

- Harness for open or short between IPDM E/R and mass air flow sensor
- Harness for open or short between ECM and mass air flow sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT-II

Check the voltage between mass air flow sensor harness connector and ground.

Mass air flow sensor		Ground	Voltage
Connector	Terminal		
F31	5	Ground	Approx. 5V

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 MASS AIR FLOW SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

Mass air flow sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	2	F10	30	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 MASS AIR FLOW SENSOR NPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

Mass air flow sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	6	F10	35	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 MASS AIR FLOW SENSOR

Refer to EC-1125, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace mass air flow sensor.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001162572

1. CHECK MASS AIR FLOW SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Check the voltage between mass air flow sensor harness connector.

Mass air flow sensor			Voltage
Connector	Terminal		
F31	2 (Mass air flow sensor ground)	6 (Mass air flow sensor signal)	0.3 - 0.7V

Is the inspection result normal?

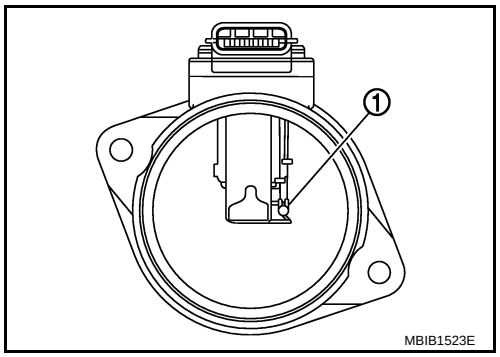
YES >> **INSPECTION END**
NO >> Replace mass air flow sensor.

P0101 MAF SENSOR

Description

INFOID:0000000001162573

The mass air flow sensor is placed in the stream of intake air.
- Intake air temperature sensor (1)



DTC Logic

INFOID:0000000001162574

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0101	REQUESTED AIR FLOW • 1.DEF: Signal outside lower level • 2.DEF: Signal outside upper level	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor • Intake air leaks • Intake air duct obstructed • Air filter obstructed

NOTE:
- **If DTC P0101 is displayed with DTC P0641, first perform trouble diagnosis for DTC P0641. Refer to EC-1180, "DTC Logic".**

Diagnosis Procedure

INFOID:0000000001162575

1.CHECK AIR FILTER

Check that air filter is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 2.

2.CHECK INTAKE AIR DUCT

Check that intake air duct is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 3.

3.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace ground connection.

4.CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between mass air flow sensor harness connector and ground.

Mass air flow sensor		Ground	Voltage
Connector	Terminal		
F31	4	Ground	Battery voltage

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 MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT-II

Check the voltage between mass air flow sensor harness connector and ground.

Mass air flow sensor		Ground	Voltage
Connector	Terminal		
F31	5	Ground	Approx. 5V

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 MASS AIR FLOW SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

Mass air flow sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	2	F10	30	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 MASS AIR FLOW SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

Mass air flow sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	6	F10	35	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR

Refer to EC-1129, "Component Inspection"

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001162576

1. CHECK MASS AIR FLOW SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Check the voltage between mass air flow sensor harness connector.

Mass air flow sensor			Voltage
Connector	Terminal		
F31	2 (Mass air flow sensor ground)	6 (Mass air flow sensor signal)	0.3 - 0.7V

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace mass air flow sensor.

P0110 IAT SENSOR

Description

INFOID:0000000001162577

The intake air temperature sensor is built into mass air flow sensor. 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.

DTC Logic

INFOID:0000000001162578

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0110	INTAKE AIR TEMPERATURE SENSOR CIRCUIT • CC.0: Short circuit to ground • CO.1: Open circuit or short circuit to +12V • 1.DEF: Micro-breaks	• Harness or connectors (Intake air temperature sensor circuit is open or shorted.) • Intake air temperature sensor

NOTE:
- **If DTC P0110 is displayed with DTC P0641, first perform trouble diagnosis for DTC P0641. Refer to EC-1180, "DTC Logic".**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on for at least 10 seconds.

Diagnosis Procedure

INFOID:0000000001162579

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "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-II

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.

Mass air flow sensor		Ground	Voltage
Connector	Terminal		
F31	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 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.

Mass air flow sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	2	F10	30	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-1131, "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-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001162580

1. CHECK INTAKE AIR TEMPERATURE SENSOR

Check resistance between mass air flow sensor terminals 1 and 2 under the following conditions.

Condition	Resistance (Ω)
10°C (50°F)	3,714 ± 161
20°C (68°F)	2,448 ± 95
30°C (86°F)	1,671 ± 58

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace mass air flow sensor (with intake air temperature sensor).

P0115 ECT SENSOR

Description

INFOID:0000000001162581

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.

DTC Logic

INFOID:0000000001162582

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0115	ENGINE COOLANT TEMPERATURE SENSOR CIRCUIT • CC.0: Short circuit to ground • CO.1: Open circuit or short circuit to +12V • 1.DEF: Micro-breaks • 2.DEF: Signal incoherence	• Harness or connectors (Engine coolant temperature sensor circuit is open or shorted.) • Engine coolant temperature sensor

NOTE:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on for at least 10 seconds.
- **If the DTC is present:**

- Cooling fan motor is always operate.
- Air conditioner is not operate.

Diagnosis Procedure

INFOID:0000000001162583

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR SUPPLY CIRCUIT

1. Disconnect engine coolant temperature sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between engine coolant temperature sensor connector and ground.

Engine coolant temperature sensor		Ground	Voltage
Connector	Terminal		
F6	3	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 ENGINE COOLANT TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between engine coolant temperature sensor harness connector and ECM harness connector.

Engine coolant temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F6	2	F10	33	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1133, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001162584

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance between engine coolant temperature sensor terminals 2 and 3 under the following conditions.

Terminal	Condition	Resistance (Ω)
2 and 3	25°C (77°F)	2,252 ± 112.16
	50°C (112°F)	810 ± 39
	80°C (176°F)	283 ± 8

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace Engine coolant temperature sensor.

P0120 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

INFOID:0000000001162585

By default the valve is open when in the rest position and is actuated only when the engine is stopped; this has a damping effect and helps to stop the engine.

DTC Logic

INFOID:0000000001162586

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0120	ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT • CC.0: Short circuit to ground • CC.1: Short circuit to +12V • CO: Open circuit	• Harness or connectors (Electric throttle control actuator circuit is open or shorted.) • Throttle position sensor • Throttle control motor

NOTE:
- The electric throttle control actuator function is no longer ensured when the engine is stopped or the valve is closed, then the engine stalls or starting is impossible.

Diagnosis Procedure

INFOID:0000000001162587

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F7	1	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 connectors E8, F8
- Harness for open or short between IPDM E/R and electric throttle control actuator
- Harness for open or short between ECM and electric throttle control actuator

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT

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	
F7	5	F11	72	Existed
	2		94	
	4		90	

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 INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace electric throttle control actuator.
NO >> Repair or replace.

P0180 FPT SENSOR

Description

INFOID:0000000001162588

Fuel pump temperature sensor is built in the fuel pump. The sensor detects the fuel temperature in the fuel pump and calibrates the fuel injection amount change by fuel temperature.

DTC Logic

INFOID:0000000001162589

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0180	FUEL PUMP TEMPERATURE SENSOR CIRCUIT • CC.0: Short circuit to ground • CO.1: Open circuit or short circuit to +12V • 1.DEF: Micro-breaks • 2.DEF: Signal incoherence	• Harness or connectors (Fuel pump temperature sensor circuit is open or shorted.) • Fuel pump temperature sensor

NOTE:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on for at least 10 seconds.

Diagnosis Procedure

INFOID:0000000001162590

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK FUEL PUMP TEMPERATURE SENSOR SUPPLY CIRCUIT

1. Disconnect fuel pump temperature sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between fuel pump temperature sensor connector and ground.

Fuel pump temperature sensor		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 FUEL PUMP TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel pump temperature sensor harness connector and ECM harness connector.

Fuel pump temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	2	F10	29	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 FUEL PUMP TEMPERATURE SENSOR

Refer to EC-1137, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace fuel pump temperature sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001162591

1.CHECK FUEL PUMP TEMPERATURE SENSOR

Check resistance between fuel pump temperature sensor terminals 1 and 2 under the following conditions.

Condition	Resistance (Ω)
25°C (77°F)	2,051 ± 123
50°C (112°F)	811 ± 47
80°C (176°F)	309 ± 17

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace Engine coolant temperature sensor.

P0190 FRP SENSOR

Description

INFOID:0000000001162592

The fuel rail pressure (FRP) sensor is placed to the fuel rail. It measures the fuel pressure in the fuel rail. The sensor sends voltage signal to the ECM. As the pressure increases, the voltage rises.The ECM controls the fuel pressure in the fuel rail. The ECM uses the signal from fuel rail pressure sensor as a feedback signal.

DTC Logic

INFOID:0000000001162593

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0190	FUEL RAIL PRESSURE SENSOR CIRCUIT • CO.0: Short circuit to ground • CO.1: Open circuit or short circuit to +12V • 1.DEF: malfunctioning sensor • 2.DEF: Signal outside upper level • 3.DEF: Micro-breaks	• Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.) • Fuel rail pressure sensor

NOTE:

- **If DTC P0190 is displayed with DTC P0641, first perform trouble diagnosis for DTC P0641. Refer to EC-1180, "DTC Logic".**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
- The DTC is declared present after the ignition is switched on when the engine is running outside idle speed.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001162594

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK FUEL RAIL PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect fuel rail pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between fuel rail pressure sensor connector and ground.

Fuel rail pressure sensor		Ground	Voltage
Connector	Terminal		
F51	3	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 FUEL RAIL PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

Fuel rail pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F51	2	F10	15	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 FUEL RAIL PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

Fuel rail pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F51	1	F10	19	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 FUEL RAIL PRESSURE SENSOR

Refer to EC-1139, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace fuel rail pressure sensor.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001162595

1.CHECK FUEL RAIL PRESSURE SENSOR

1. Turn ignition switch OFF and wait at least 1 minutes.
2. Reconnect harness connector disconnected.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check that the “RAIL PRESSURE” indication.

If the value is lower than 30 bar?

YES >> **INSPECTION END**.
NO >> Replace fuel rail pressure sensor.

P0200 FUEL INJECTOR

DTC Logic

INFOID:0000000001162596

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0200	FUEL INJECTOR CONTROL • 1.DEF: Voltage outside permitted range of values • 2.DEF: Configuration/ Initialisation • 3.DEF: Signal incoherence	• Harness or connectors (The fuel injector circuit is open or shorted.) • Fuel injector

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the engine has been started.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001162597

1.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.
4. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F17	1	F10	8	Existed
2	F18	1	F10	7	
3	F19	1	F10	6	
4	F20	1	F10	5	

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 FUEL INJECTOR OUTPUT CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F17	2	F10	4	Existed
2	F18	2	F10	3	
3	F19	2	F10	2	
4	F20	2	F10	1	

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 FUEL INJECTOR

Refer to EC-1141, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace malfunctioning fuel injector.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001162598

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	150 - 250Ω [at 20°C (68°F)]

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace malfunctioning fuel injector.

P0201, P0202, P0203, P0204 FUEL INJECTOR

DTC Logic

INFOID:0000000001162599

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0201	NO. 1 CYLINDER FUEL INJECTOR CIRCUIT • CO: Open circuit • CC: Short circuit • 1.DEF: Line in open circuit • 2.DEF: Open circuit or internal electronic malfunction	• Harness or connectors (The fuel injector circuit is open or shorted.) • Fuel injector
P0202	NO. 2 CYLINDER FUEL INJECTOR CIRCUIT • CO: Open circuit • CC: Short circuit • 1.DEF: Line in open circuit • 2.DEF: Open circuit or internal electronic malfunction	
P0203	NO. 3 CYLINDER FUEL INJECTOR CIRCUIT • CO: Open circuit • CC: Short circuit • 1.DEF: Line in open circuit • 2.DEF: Open circuit or internal electronic malfunction	
P0204	NO. 4 CYLINDER FUEL INJECTOR CIRCUIT • CO: Open circuit • CC: Short circuit • 1.DEF: Line in open circuit • 2.DEF: Open circuit or internal electronic malfunction	

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the engine has been started.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**
- **Malfunction indicator (Yellow) lights up.**

Diagnosis Procedure

INFOID:0000000001162600

1.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.
4. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F17	1	F10	8	Existed
2	F18	1	F10	7	
3	F19	1	F10	6	
4	F20	1	F10	5	

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 FUEL INJECTOR OUTPUT CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F17	2	F10	4	Existed
2	F18	2	F10	3	
3	F19	2	F10	2	
4	F20	2	F10	1	

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 FUEL INJECTOR

Refer to EC-1143, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace malfunctioning fuel injector.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001162601

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	150 - 250Ω [at 20°C (68°F)]

Is the inspection result normal?

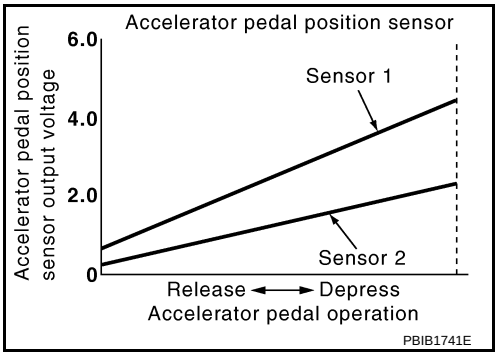
YES >> **INSPECTION END**
NO >> Replace malfunctioning fuel injector.

P0225 APP SENSOR

Description

INFOID:0000000001162604

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.



DTC Logic

INFOID:0000000001162605

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0225	ACCELERATOR PEDAL POSITION SENSOR 1 AND ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT • CC.1: Short circuit to +12V • 1.DEF: Signal incoherence • 2.DEF: No signal • CO.0: Open circuit or short circuit to ground	• Harness or connectors (APP sensor 1 and 2 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2.)

NOTE:
- **If DTC P0225 is displayed with DTC P0641, first perform trouble diagnosis for DTC P0641. Refer to EC-1180, "DTC Logic".**
- **If DTC P0225 is displayed with DTC P0651, first perform trouble diagnosis for DTC P0651. Refer to EC-1182, "DTC Logic".**
- **If DTC P2120 is present at the same time, check that the APP sensor connector is connected correctly.**
- Conditions for applying the diagnostic procedure to the stored DTCs:
- The DTC is declared present after a series of full load/no load action on the accelerator.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001162606

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between accelerator pedal position sensor connector and ground.

Accelerator pedal position sensor			Ground	Voltage
Sensor	Connector	Terminal		
1	E12 (LHD models) M204 (RHD models)	4	Ground	Approx. 5V
2		5		

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

- Harness connectors E7, M69 (RHD models)
- Harness connectors M25, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connector.

4. CHECK ACCELERATOR PEDAL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E12 (LHD models) M204 (RHD models)	2	E16	127	Existed
2		1		120	

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

- Harness connectors E7, M69 (RHD models)
- Harness connectors M25, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connector.

6. CHECK ACCELERATOR PEDAL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E12 (LHD models) M204 (RHD models)	3	E16	126	Existed
2		6		119	

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

- Harness connectors E7, M69 (RHD models)
- Harness connectors M25, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connector.

8. CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to EC-1146, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace accelerator pedal position sensor.

9.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001162607

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position sensor harness connector.
3. Check resistance between accelerator pedal position sensor as follows.

Sensor	Terminals	Resistance
1	2 and 4	1.7 ± 0.9 KΩ
2	1 and 5	2.85 ± 2.05 KΩ

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace accelerator pedal position sensor.

P0235 TC BOOST SENSOR

Description

INFOID:0000000001162608

The turbocharger boost sensor detects pressure in the exit side of the charge air cooler. The sensor output voltage to the ECM increases as pressure increases.

DTC Logic

INFOID:0000000001162609

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0235	• CC.1: short circuit to +12V • CO.0: Open circuit or Short circuit to ground • 1.DEF: Micro-breaks • 2.DEF: Signal outside lower level • 3.DEF: Signal outside upper level	• Harness or connectors (Turbocharger boost sensor circuit is open or shorted.) • Turbocharger boost sensor

NOTE:

- **If DTC P0235 is displayed with DTC P0651, first perform trouble diagnosis for DTC P0651. Refer to EC-1182, "DTC Logic".**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on for 1 second, with a warm engine when the vehicle is stationary.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001162610

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CHECK TUBOCHARGER BOOST SENSOR SUPPLY CIRCUIT

1. Disconnect turbocharger boost sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost sensor connector and ground.

Turbocharger boost sensor		Ground	Voltage
Connector	Terminal		
F50	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 TUBOCHARGER BOOST SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F50	2	F10	43	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK TUBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F50	3	F10	44	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 TUBOCHARGER BOOST SENSOR

Refer to EC-1148, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace turbocharger boost sensor.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001162611

1.CHECK TURBOCHARGER BOOST SENSOR-I

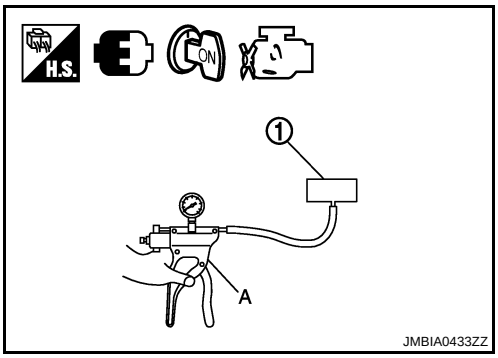
1. Turn ignition switch OFF.
2. Remove turbocharger boost sensor with its harness connected.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Check “BOOST PRESS” and “ATOMOS PRESS” indication.

If the value is not very close to “ATOMOS PRESS”, maximum pressure difference between “ATOMOS PRESS” and “BOOST PRESS” with the ignition switch ON (engine stop) = ± 50 mbar?

YES >> GO TO 2.
NO >> Replace turbocharger boost sensor.

2.CHECK TURBOCHARGER BOOST SENSOR-II

1. Use pump to apply turbocharger boost sensor as shown in the figure.
2. Apply a pressure of between 10 kPa(0.100 bar, 0.102 kg/cm^2, 1.5 psi) - 13 kPa(0.130 bar, 0.133 kg/cm^2, 1.9 psi) [maximum pressure to be applied: 13 kPa(0.130 bar, 0.133 kg/cm^2, 1.9 psi)].
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Check “BOOST PRESS” indication with that given by the vacuum pump.



If there is no discrepancy?

YES >> INSPECTION END
NO >> Replace turbocharger boost sensor.

P0335 CKP SENSOR

DTC Logic

INFOID:0000000001162612

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0335	CRANKSHAFT POSITION SENSOR CIRCUIT • 1.DEF: Signal incoherence • 2.DEF: No signal • 3.DEF: Signal out side level • 4.DEF: Value out side level • 5.DEF: Configuration/ initialisation	• Harness or connectors (The sensor circuit is open or shorted.) • Crankshaft position sensor • Signal plate

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present with the engine cranking or idling.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001162613

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK CKP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect crankshaft position (CKP) sensor harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F15	2	F11	88	Existed

5. 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 CKP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CKP sensor harness connector and ECM harness connector.

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F15	1	F11	84	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CKP SENSOR

Refer to EC-1150, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace crankshaft position sensor.

5.CHECK GEAR TOOTH

Visually check for chipping flywheel gear tooth.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace signal plate.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001162614

1.CHECK CKP SENSOR

1. Turn ignition switch OFF.
2. Disconnect CKP sensor harness connector.
3. Check resistance between CKP sensor terminals as follows.

Terminals	Resistance
1 and 2	612 - 748Ω

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace CKP sensor.

P0340 CMP SENSOR

DTC Logic

INFOID:0000000001162615

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0340	CAMSHAFT POSITION SENSOR CIRCUIT • 1.DEF: Signal incoherence • 2.DEF: No signal • 3.DEF: Value out side level • 4.DEF: Configuration/ initialisation	• Harness or connectors (The sensor circuit is open or shorted.) • Camshaft position sensor • Timing belt • Signal plate

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the engine is started or following a load test.
- **Special note:**
  Longer starting time, requires several attempts to start the vehicle.

Diagnosis Procedure

INFOID:0000000001162616

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK CMP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect camshaft position (CMP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CMP sensor harness connector and ground.

CMP sensor		Ground	Voltage
Connector	Terminal		
F21	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between ECM and CMP sensor
- Harness for open or short between IPDM E/R and CMP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK CMP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CMP sensor harness connector and ECM harness connector.

CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F21	1	F11	65	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 CMP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CMP sensor harness connector and ECM harness connector.

CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F21	2	F11	75	Existed

2. 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 CMP SENSOR

Refer to EC-1152, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace camshaft position sensor.

7.CHECK SPROCKET

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace sprocket.

8.CHECK TIMING BELT

Refer to EM-291, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace timing belt.

9.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

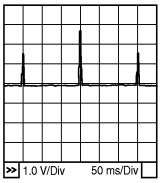
>> **INSPECTION END**

Component Inspection

INFOID:0000000001162617

1.CHECK CMP SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Measure the voltage signal between ECM harness connector and ground under the following conditions.

+		-		Condition	Voltage
Connector	Terminal	Connector	Terminal		
F11	75 (CMP sensor signal)	E16	128	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 1V ★  MBIB1510E
				[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	0 - 1V ★  MBIB1511E

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace CMP sensor.

P0380 GLOW RELAY

DTC Logic

INFOID:0000000001162618

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0380	GLOW PLUG DIAGNOSTIC CONNECTION • CO: Open circuit • CC.0: Short circuit to ground • CC.1: Short circuit to +12V	• Harness or connectors (The glow relay circuit is open or shorted.) • Glow relay

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after attempts have been made to start the engine.
- **Special notes:**
  If the DTC is present, it will be difficult to start the vehicle, or even impossible when cold, or preheating will be continuous and the heater plugs will deteriorate.

Diagnosis Procedure

INFOID:0000000001162619

1.CHECK GLOW RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect glow relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between glow relay connector and ground.

Glow relay		Ground	Voltage
Connector	Terminal		
F55	3	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 E8, F8
- Harness for open or short between ECM and glow relay
- Harness for open or short between IPDM E/R and glow relay
- Harness for open and short between glow relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK GLOW RELAY INPUT CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between glow relay harness connector and ECM harness connector.

Glow relay		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F55	9	F11	80	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 GLOW RELAY OUTPUT CIRCUIT FOR OPEN AND SHORT-II

1. Check the continuity between glow relay harness connector and ECM harness connector.

Glow relay		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F55	8	F11	76	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 INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace glow relay.
NO >> Repair or replace.

P0381 GLOW CONTROL SYSTEM

DTC Logic

INFOID:0000000001162620

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0381	GLOW CONTROL UNIT CIRCUIT • CC.0: Short circuit to ground • CO.1: Open circuit or short circuit to +12V	• Harness or connectors (The glow relay circuit is open or shorted.) • Glow relay • Glow plug

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after several attempts have been made to start the engine.
- **Special notes:**
  If the DTC is present, it will be difficult to start the vehicle, or even impossible when cold, or preheating will be continuous and the heater plugs will deteriorate.

Diagnosis Procedure

INFOID:0000000001162621

1.CHECK GLOW RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect glow relay harness connector.
3. Turn ignition switch ON.
4. Check the voltage between glow relay connector and ground.

Glow relay		Ground	Voltage
Connector	Terminal		
F55	3	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 E8, F8
- Harness for open or short between ECM and glow relay
- Harness for open or short between IPDM E/R glow relay
- Harness for open and short between glow relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK GLOW RELAY INPUT CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between glow relay harness connector and ECM harness connector.

Glow relay		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F55	9	F11	80	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 GLOW RELAY OUTPUT CIRCUIT FOR OPEN AND SHORT-II

1. Check the continuity between glow relay harness connector and ECM harness connector.

Glow relay		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F55	8	F11	76	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 GLOW RELAY OUTPUT CIRCUIT FOR OPEN AND SHORT

1. Disconnect glow plug harness connector.
2. Check the continuity between glow plug harness connector and ECM harness connector.

Glow relay			Glow plug		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F55	6	F56	1	Existed
2		7	F57	1	
3		1	F58	1	
4		2	F59	1	

3. 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 GLOW PLUG

Refer to EC-1157, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace malfunctioning glow plug.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace glow relay.
NO >> Repair or replace.

Component Inspection

INFOID:0000000001162622

1.CHECK GLOW PLUG

1. Turn ignition switch OFF.
2. Disconnect glow plug harness connector.
3. Check resistance between glow plug terminals as follows.

Terminal	Resistance
1 and ground	Not less than 2Ω [at 20°C (68°F)]

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace malfunctioning glow plug.

P0409 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR

DTC Logic

INFOID:0000000001162623

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible Cause
P0409	EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR CIRCUIT • CO.0: Open circuit or short circuit to ground • CC.1: Short circuit to +12V	• Harness or connectors (The EGR volume control valve control position sensor circuit is open or shorted.) • EGR volume control valve control position sensor

NOTE:
- **If DTC P0409 is displayed with DTC P0651, first perform trouble diagnosis for DTC P0651. Refer to EC-1182, "DTC Logic".**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the engine started.
- **If the DTC is present:**
- **Malfunction indicator (Yellow) lights up.**

Diagnosis Procedure

INFOID:0000000001162624

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.
2. Turn ignition switch ON.
3. Check the voltage between EGR volume control valve control position sensor connector and ground.

EGR volume control valve control position sensor		Ground	Voltage
Connector	Terminal		
F52	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 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume control valve control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F52	3	E16	82	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 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR INPUT CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume control valve control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F52	5	E16	86	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 INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6. REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.
2. Perform EC-1055, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> **INSPECTIO END**

P0487 EGR VOLUME CONTROL VALVE

DTC Logic

INFOID:0000000001162625

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0487	EGR VOLUME CONTROL VALVE CIRCUIT • CO: Open circuit • CC.0: Short circuit to ground • CC.1: Short circuit to +12V • 1.DEF: Values outside the level • CC: Short circuit	• Harness or connectors (The EGR volume control valve control motor circuit is open or shorted.) • EGR volume control motor valve

NOTE:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present with the engine idle speed.

Diagnosis Procedure

INFOID:0000000001162626

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR CIRCUIT

1. Disconnect EGR volume control valve harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F52	2	E16	95	Existed
			96	Not existed
	6		95	Not existed
			96	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 EGR VOLUME CONTROL VALVE

Refer to EC-1161, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.
2. Perform EC-1055, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> **INSPECTIO END**

5.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> **INSPECTION END**

Component Inspection

INFOID:0000000001162627

1.CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Check resistance between EGR volume control valve terminals as follows.

Terminals	Resistance
2 and 6	2.3 Ω

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> GO TO 2.

2.REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.
2. Perform EC-1055, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> **INSPECTIO END**

P0488 EGR SYSTEM

DTC Logic

INFOID:0000000001162628

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0488	EGR VOLUME CONTROL • 1.DEF: Signal incoherence • 2.DEF: Signal outside lower level • 3.DEF: Signal outside upper level • 4.DEF: Valve outside level • 5.DEF: Defective sensor	• Harness or connectors (The EGR volume control valve circuit is open or shorted.) (The EGR volume control valve control position sensor circuit is open or shorted.) • EGR volume control valve • EGR volume control valve control position sensor • Incorrect EGR volume control valve installation • EGR volume control valve stuck closed • EGR passage clogged

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the engine is started.
- **Special notes:**

- Engine instability, possibly even stalling.
- Difficult to start engine or even impossible when cold.
- Loss of performance.
- Possible smoke emissions.
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001162629

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK EGR VOLUME CONTROL VALVE INSTALLATION

Check that EGR volume control valve is installed properly.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Install EGR volume control valve properly.

3.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.
2. Turn ignition switch ON.
3. Check the voltage between EGR volume control valve control position sensor connector and ground.

GR volume control valve control position sensor		Ground	Voltage
Connector	Terminal		
F52	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 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR GROUND CIRCUIT FOR

OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume control valve control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F52	3	F11	82	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 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR INPUT CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume control valve control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F52	5	F11	86	Existed

2. 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 EGR VOLUME CONTROL VALVE CONTROL MOTOR CIRCUIT

1. Check harness continuity between the following terminals.

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F52	2	F11	95	Existed
			96	Not existed
	6		95	Not existed
			96	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 EGR VOLUME CONTROL VALVE VISUALLY

1. Remove the EGR volume control valve
2. Check if foreign matter is caught between the EGR volume control valve and the housing.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Remove the foreign matter and clean the EGR volume control valve.

8.CHECK EGR PASSAGE

Check the following for clogging and cracks.
- EGR tube

- EGR hose
- EGR cooler

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace EGR passage.

9.CHECK EGR VOLUME CONTROL VALVE

Refer to EC-1164, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 11.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11.REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.
2. Perform EC-1055, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> **INSPECTIO END**

Component Inspection

INFOID:0000000001162630

1.CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Check resistance between EGR volume control valve terminals as follows.

Terminals	Resistance
2 and 6	2.3 Ω

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> GO TO 2.

2.REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.
2. Perform EC-1055, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> **INSPECTIO END**

P0500 VSS

Description

INFOID:0000000001162631

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:0000000001162632

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0500	VEHICLE SPEED SIGNAL • 1.DEF: Value outside level	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The vehicle speed signal circuit is open or shorted) • Wheel sensor • Combination meter • ABS actuator and electric unit (control unit)

Diagnosis Procedure

INFOID:0000000001162633

1.CHECK CAN COMMUNICATION LINE

Refer to LAN-33, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace

2.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-25, "CONSULT-III Function (ABS)" (without ESP) or BRC-105, "CONSULT-III Function (ABS)" (with ESP).

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK COMBINATION METER

Refer to MWI-22, "CONSULT-III Function (METER/M&A)".

>> **INSPECTION END**

P0530 REFRIGERANT PRESSURE SENSOR

Description

INFOID:0000000001162634

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.

DTC Logic

INFOID:0000000001162635

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0530	REFRIGERANT PRESSURE SENSOR CIRCUIT • CO.0: Short circuit to +12V or open circuit • CC.1: Short circuit to ground	• Harness or connectors (Refrigerant pressure sensor circuit is open or shorted.) • Refrigerant pressure sensor

NOTE:
- **If DTC P0530 is displayed with DTC P0641, first perform the trouble diagnosis for DTC P0641 Refer to EC-1180, "DTC Logic".**

Diagnosis Procedure

INFOID:0000000001162636

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "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 connector and ground.

Refrigerant pressure sensor		Ground	Voltage
Connector	Terminal		
E17	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 E8, F8
- 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	
E17	1	F11	74	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 E8, F8
- 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 refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E17	2	F11	78	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 E8, F8
- 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-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.
NO >> Repair or replace.

P0560 BATTERY VOLTAGE

DTC Logic

INFOID:0000000001162637

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0560	BATTERY VOLTAGE • 1.DEF: Signal outside lower level • 2.DEF: Signal outside upper level	• Harness connectors (ECM power supply circuit is open or shorted.) • Battery • Battery terminal • Alternator • IPDM E/R

NOTE:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present when the engine is running.

Diagnosis Procedure

INFOID:0000000001162638

1.CHECK BATTERY VOLTAGE

1. Turn ignition switch ON.
2. Check battery voltage.

Voltage: Above 11V

Is the inspection result normal?

YES >> GO TO 2.
NO >> Recharge the battery.

2.CHECK BATTERY TERMINALS

1. Turn ignition switch OFF.
2. Check battery terminals condition.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair the battery terminals.

3.CHECK BATTERY AND ALTERNATOR

Check that the proper type of battery and type of alternator are installed.
Refer to, PG-6, "Removal and Installation" and PG-6, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace with a proper one.

4.CHECK ECM POWER SUPPLY CIRCUIT-I

Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F11	60	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 7.

5.CHECK ECM POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E43.

3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F11	53	E43	4	Existed
	54		3	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E8, F3
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E43.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F11	60	E43	7	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E8, F3
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK 20A FUSE

1. Disconnect 20A fuse (No. 53) from IPDM E/R.
2. Check 20A fuse.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace 20A fuse.

10. CHECK GROUND CONNECTION

Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace ground connection.

11. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
E16	123	Ground	Existed
	124		
	125		
	128		

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair open circuit or short power in harness or connectors.

12. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace.

P0571 ASCD BRAKE SWITCH

DTC Logic

INFOID:0000000001162639

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0571	ASCD BRAKE SWITCH CIRCUIT • 1.DEF: Values outside the levels • 2.DEF: Signal incoherence • 3.DEF: Signal outside upper level	• Harness or connectors (ASCD brake switch circuit is open or shorted) (The CAN communication line is open or shorted) • ASCD brake switch • BCM

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after a series of actions on the brake pedal.

Diagnosis Procedure

INFOID:0000000001162640

1.CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

+		–		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E16	116 (ASCD brake switch)	E16	128	Brake pedal	Fully released	Battery voltage
					Slightly depressed	0V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

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		
E36 (LHD models) M205 (RHD models)	1	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 M69, E7 (LHD models)
- Harness connectors M25, M201 (RHD models)
- 10A fuse (No. 2)
- Harness for open or short between fuse and ASCD brake switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT

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	
E36 (LHD models) M205 (RHD models)	2	E16	116	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following
- Harness connectors M25, M201
- Harness connectors M69, E7
- Harness for open or short between ECM and ASCD brake switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK ASCD BRAKE SWITCH

Refer to EC-1172, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace ASCD brake switch.

7.CHECK BCM

Refer to BCS-17, "BCM : CONSULT-III Function (BCM - BCM)"–.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace

8.CHECK CAN COMMUNICATION LINE

Refer to LAN-33, "CAN Communication Signal Chart"–.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace

9.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001162641

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 (ASCD brake switch)	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-6, "Inspection and Adjustment".
2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2 (ASCD brake switch)	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD brake switch.

P0575 ASCD STEERING SWITCH

Description

INFOID:0000000001162642

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.

DTC Logic

INFOID:0000000001162643

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0575	CRUISE CONTROL/SPEED LIMITER FUNCTION • 1.DEF: Values outside the levels • CC.1: Short circuit to +12V • 2.DEF: Signal outside upper level	• Harness or connectors (ASCD steering switch circuit is open or shorted) • ASCD steering switch • Combination switch

NOTE:
- **Special note:**
  If the DTC is present, the cruise control/speed limiter function will be inhibited.

Diagnosis Procedure

INFOID:0000000001162644

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ASCD SWITCH CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

+		–		Condition	Voltage
Connector	Terminal	Connector	Terminal		
E16	98 (ASCD switch signal)	E16	128	ASCD switch: ON	Battery voltage
				ASCD switch: OFF	0V

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3.CHECK ASCD SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD switch harness connector and ground.

ASCD switch		Ground	Voltage
Connector	Terminal		
M81	6	Ground	Battery voltage

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No.2)
- Harness for open or short between ASCD switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ASCD switch harness connector and ECM harness connector.

ASCD switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M81	5	E16	98	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- Harness for open or short between ECM and ASCD switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD SWITCH

Refer to EC-1176, "Component Inspection (ASCD Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD switch.

8. CHECK ASCD STEERING SWITCH CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect combination switch harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between combination switch harness connector and ECM harness connector.

Combination switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M31	15	E16	111	Existed

5. 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

- Harness connectors M69, E7
- Combination switch (spiral cable)
- Harness for open or short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between combination switch harness connector and ECM harness connector.

Combination switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
M31	14	E16	110	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

- Harness connectors M69, E7
- Combination switch (spiral cable)
- Harness for open or short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK ASCD STEERING SWITCH

Refer to EC-1176, "Component Inspection (ASCD Steering Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD steering switch.

13. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Switch)

INFOID:0000000001603813

1. CHECK ASCD SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD switch harness connector.
3. Check the continuity between ASCD switch terminals under the following conditions.

Terminals	Condition	Continuity
5 and 6	ASCD switch ON	Existed
	ASCD switch OFF	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD switch.

Component Inspection (ASCD Steering Switch)

INFOID:0000000001162645

1. CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector M31.
2. Check the continuity between combination switch harness connector terminals under following conditions.

Combination meter		Condition	Resistance
Connector	Terminals		
M31	14 and 15 (Combination switch)	CANCEL switch	Approx. 0 Ω
		SET – switch	Approx. 100 Ω
		SET + switch	Approx. 274 Ω
		RESUME switch	Approx. 910 Ω

Is the inspection result normal?

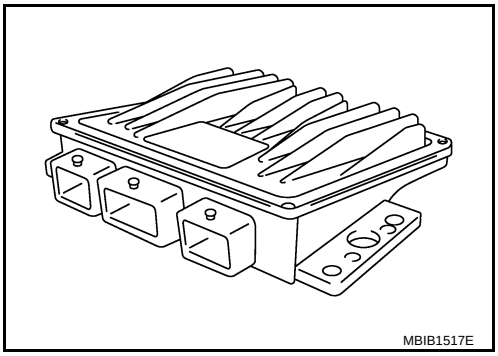
YES >> INSPECTION END
NO >> Replace ASCD steering switch.

P0606 ECM

Description

INFOID:0000000001162646

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



DTC Logic

INFOID:0000000001162647

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0606	ECM • 1.DEF to 20.DEF: Internal electric malfunction	• ECM

NOTE:
- **If DTC P0606 is displayed with other DTC, first perform the trouble diagnosis for other DTC.**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after an attempted start, or with the engine running.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**
- **Malfunction indicator (Yellow) lights up.**

Diagnosis Procedure

INFOID:0000000001162648

1.CHECK DTC

Make sure that which malfunction (DTC second line indication) is displayed.

A	Except 9.DEFF
B	9.DEF

A or B

A >> GO TO 2.
B >> GO TO 3.

2.REPLACE ECM

1. Perform EC-1054, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".
2. Perform EC-1055, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> **INSPECTION END**

3.CHECK CAN COMMUNICATION LINE

Refer to LAN-33, "CAN Communication Signal Chart".

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Refer to BRC-25, "CONSULT-III Function (ABS)" (without ESP) or BRC-105, "CONSULT-III Function (ABS)" (with ESP).

OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. REPLACE ECM

1. Perform EC-1054, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".
2. Perform EC-1055, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> **INSPECTION END**

P0641 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000001162649

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0641	SENSOR POWER SUPPLY CIRCUIT • 1.DEF: Signal outside lower level • 2.DEF: Signal outside upper level	• Harness or connectors (The APP sensor 2 power supply circuit is shorted.) (Fuel rail pressure sensor circuit is shorted.) (EGR volume control valve control position sensor circuit is shorted.) (Mass air flow sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2) • Fuel rail pressure sensor • EGR volume control valve control position sensor • Mass air flow sensor • Refrigerant pressure sensor

NOTE:
- **If DTC P0641 is displayed with DTC P0100, P0101, P0110, P0190, P0225, P0409, P0530, P2120, first perform trouble diagnosis for DTC P0641.**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001162650

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 2 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		
E12 (LHD models) M204 (RHD models)	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E16	118	APP sensor	E12 (LHD models) M204 (RHD models)	5
F11	89	Refrigerant pressure sensor	E17	3
	85	EGR volume control valve (EGR volume control valve control position sensor)	F52	1
F10	20	Fuel rail pressure sensor	F51	3
	28	Mass air flow sensor	F31	5

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

4.CHECK SENSOR GROUND CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E16	120	APP sensor	E12 (LHD models) M204 (RHD models)	1
F11	74	Refrigerant pressure sensor	E17	1
	82	EGR volume control valve (EGR volume control valve control position sensor)	F52	3
F10	15	Fuel rail pressure sensor	F51	2
	30	Mass air flow sensor	F31	2

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 EC-1166, "Diagnosis Procedure".)
- EGR volume control valve (EGR volume control valve control position sensor) (Refer to EC-1158, "Diagnosis Procedure".)
- Fuel rail pressure sensor (Refer to EC-1139, "Component Inspection".)
- Mass air flow sensor (Refer to EC-1125, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to EC-1146, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace APP sensor.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

P0651 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000001162651

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0651	SENSOR POWER SUPPLY CIRCUIT • 1.DEF: Parameter at minimum level • 2.DEF: Parameter at maximum level	• Harness or connectors (The APP sensor 1 power supply circuit is shorted.) (Turbocharger boost sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1) • Turbocharger boost sensor

NOTE:
- **If DTC P0651 is displayed with DTC P0225, P0235, first perform trouble diagnosis for DTC P0651.**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001162652

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
E12 (LHD models) M204 (RHD models)	4	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E16	122	APP sensor	E12 (LHD models) M204 (RHD models)	4
F10	36	Turbocharger boost sensor	F50	1

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

4.CHECK SENSOR GROUND CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E16	127	APP sensor	E12 (LHD models) M204 (RHD models)	2
F10	43	Turbocharger boost sensor	F50	2

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

5.CHECK TURBOCHARGER BOOST SENSOR

- Turbocharger boost sensor (Refer to EC-1119, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace Turbocharger boost sensor.

6.CHECK APP SENSOR

Refer to EC-1146, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace APP sensor.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

P0685 ECM RELAY

DTC Logic

INFOID:0000000001162653

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P0685	ECM RELAY CIRCUIT • CO: Open circuit • CC.0: Short circuit to ground • CC.1: Short circuit to +12V	• Harness or connectors (The ECM relay circuit is open or short-ed.) • IPDM E/R (ECM relay)

NOTE:
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001162654

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground Inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
E16	123	Ground	Existed
	124		
	125		
	128		

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short power in harness or connectors.

3.CHECK ECM POWER SUPPLY CIRCUIT

Check the voltage between ECM harness connector and ground.

+		–		Voltage
Connector	Terminal	Connector	Terminal	
F11	60	E16	128	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 6.

4.CHECK ECM POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E43.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E68	53	E43	4	Existed
	54		3	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK ECM POWER SUPPLY CIRCUIT-III

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E43.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F11	60	E43	7	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 power in harness or connectors.

7.CHECK 20A FUSE

1. Disconnect 20A fuse (No. 53) from IPDM E/R.
2. Check 20A fuse.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace 20A fuse.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace.

P1089 FUEL PUMP

DTC Logic

INFOID:0000000001162661

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P1089	FUEL RAIL PRESSURE REGULATION FUNCTION • 1.DEF: High pressure supply pump (Pressure control valve) closed • 2.DEF: High pressure supply pump (Pressure control valve) open • 3.DEF: High pressure supply pump (Volumetric control valve) open • 4.DEF: High pressure supply pump (Volumetric control valve) closed • 5.DEF: Component malfunction: High pressure supply pump (Pressure control valve or Volumetric control valve) • 6.DEF: High pressure supply pump (Pressure control valve) oscillation • 7.DEF: High pressure supply pump (Volumetric control valve)) oscillation	• Harness or connectors [High pressure supply pump (volumetric control valve) circuit is open or shorted.] [High pressure supply pump (Pressure control valve) circuit is open or shorted.] (Fuel rail pressure sensor circuit is open or shorted.) • High pressure supply pump • High pressure supply pump (Pressure control valve) • High pressure supply pump (Volumetric control valve) • Fuel line • Fuel rail • Fuel injector • Fuel rail pressure sensor • Fuel rail pressure relief valve • Air mixture with fuel • Lack of fuel

NOTE:
- **NOTE:**
- **If DTC P1089 is displayed with DTC P0180, first perform trouble diagnosis for DTC P0180. Refer to EC-1136, "DTC Logic".**
- **If DTC P1089 is displayed with DTC P0190, first perform trouble diagnosis for DTC P0190. Refer to EC-1138, "DTC Logic".**
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC appears when the engine is running.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001162662

1.CHECK LOW PRESSURE FUEL SUPPLY SYSTEM

Refer to EC-1043, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

Is the inspection result normal?

OK >> GO TO 2.
NG >> Replace or replace. Then GO TO 9.

2.CHECK INTERNAL FUEL TRANSFER PUMP

Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

Is the inspection result normal?

OK >> GO TO 3.
NG >> Replace or replace. Then GO TO 9.

3.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 4.
NG >> Replace or replace. Then GO TO 9.

4. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Refer to EC-1045, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

Is the inspection result normal?

OK >> GO TO 5.
NG >> Replace or replace. Then GO TO 9.

5. CHECK RAIL HIGH PRESSURE REGULATION

Refer to EC-1048, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

Is the inspection result normal?

OK >> GO TO 6.
NG >> Replace or replace. Then GO TO 9.

6. CHECK MAJOR LEAK IN FUEL INJECTORS/FUEL INJECTORS OPEN

Refer to EC-1052, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/ Fuel Injectors Open)".

Is the inspection result normal?

OK >> GO TO 7.
NG >> Replace or replace. Then GO TO 9.

7. CHECK INCORRECT FUEL INJECTION QUANTITY

Refer to EC-1053, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

Is the inspection result normal?

OK >> GO TO 8.
NG >> Replace or replace. Then GO TO 9.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTIO END.
NO >> Repair or replace. Then GO TO 9.

9. CLEAR PRESSURE REGULATION

Perform “PRESS REG ADAPTIVE” in WORK SUPPORT mode with CONSULT-III.

>> **INSPECTION END**.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:0000000001162663

By default the valve is open when in the rest position and is actuated only when the engine is switched off; this has a damping effect and helps to stop the engine.

DTC Logic

INFOID:0000000001162664

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2101	THROTTLECONTROL MOTOR CIRCUIT • 1.DEF: No signal • 2.DEF: • 3.DEF: Values out of range • 4.DEF: Signal incoherence	• Harness or connectors (Throttle control motor circuit is open or shorted.) • Throttle control motor

NOTE:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the engine is started or following a load test.
- **Special note:**
  If DTC P2101 2.DEF is displayed, first perform trouble diagnosis for DTC P0120. Refer to EC-1134, "DTC Logic".

Diagnosis Procedure

INFOID:0000000001162665

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F7	1	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 connectors E8, F8
- Harness for open or short between IPDM E/R and electric throttle control actuator
- Harness for open or short between ECM and electric throttle control actuator

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT-I

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	
F7	5	F11	72	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 ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT-II

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	
F7	2	F11	94	Existed

2. 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 ELECTRIC THROTTLE CONTROL ACTUATOR CIRCUIT-III

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	
F7	4	F11	90	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 CONTROL MOTOR

Refer to EC-1189, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace electric throttle control actuator.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace electric throttle control actuator.
NO >> Repair or replace.

Component Inspection

INFOID:0000000001611036

1.CHECK THROTTLE CONTROL MOTOR

1. Turn ignition switch OFF.

2. Disconnect electric throttle control actuator harness connector.
3. Check resistance between electric throttle control actuator terminals as follows.

Terminals	Resistance
1 and 2	21 ± 2.1Ω [23°C (73°F)]

Is the inspection result normal?

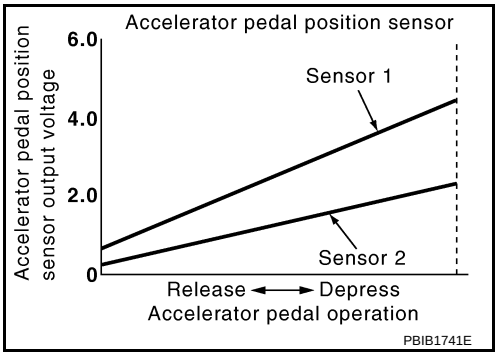
YES >> INSPECTION END
NO >> Replace electric throttle control actuator.

P2120 APP SENSOR

Description

INFOID:0000000001162667

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.



DTC Logic

INFOID:0000000001162668

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2120	ACCELERATOR PEDAL POSITION SENSOR 2 CIRCUIT • CC.1: Short circuit to +12V • CO.0: Open circuit or short circuit to ground	• Harness or connectors (APP sensor 2 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 2)

NOTE:
- **If DTC P2120 is displayed with DTC P0641, first perform trouble diagnosis for DTC P0641. Refer to EC-1180, "DTC Logic".**
- Conditions for applying the diagnostic procedure to the stored DTCs:
- The DTC is declared present after a series of full load-no load accelerator pedal actions have been carried out (engine stopped, ignition on).
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001162669

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between accelerator pedal position sensor connector and ground.

Accelerator pedal position sensor			Ground	Voltage
Sensor	Connector	Terminal		
2	E12 (LHD models) M204 (RHD models)	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

- Harness connectors E7, M69 (RHD models)
- Harness connectors M25, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connector.

4. CHECK ACCELERATOR PEDAL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position sensor.
3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
2	E12 (LHD models) M204 (RHD models)	1	E16	120	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

- Harness connectors E7, M69 (RHD models)
- Harness connectors M25, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connector.

6. CHECK ACCELERATOR PEDAL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
2	E12 (LHD models) M204 (RHD models)	6	E16	119	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

- Harness connectors E7, M69 (RHD models)
- Harness connectors M25, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connector.

8. CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to EC-1193, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace accelerator pedal position sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001162670

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position sensor harness connector.
3. Check resistance between accelerator pedal position sensor as follows.

Sensor	Terminals	Resistance
1	2 and 4	1.7 ± 0.9 KΩ
2	1 and 5	2.85 ± 2.05 KΩ

Is the inspection result normal?

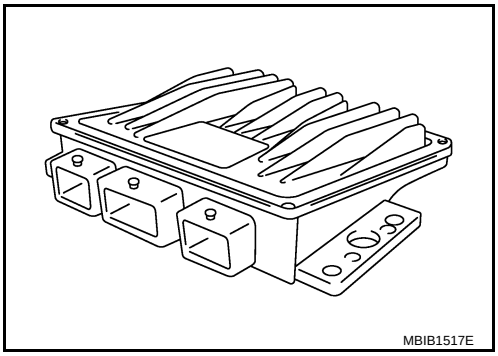
YES >> **INSPECTION END**
NO >> Replace accelerator pedal position sensor.

P2226 BARO SENSOR

Description

INFOID:0000000001162671

The barometric pressure sensor is built into ECM. The sensor detects ambient barometric pressure and sends the voltage signal to the microcomputer.



DTC Logic

INFOID:0000000001162672

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2226	BAROMETRIC PRESSURE SENSOR CIRCUIT • CC.1: Short circuit to +12V • CO.0: Short circuit to ground or open circuit • CO.0: Micro -breaks	• ECM

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC is declared present after the ignition has been switched on for at least 10 seconds.
- **Special note:**
  The barometric pressure sensor is integrated into the ECM, and cannot be separated.

Diagnosis Procedure

INFOID:0000000001162673

1.REPLACE ECM

1. Perform EC-1054, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".
2. Perform EC-1055, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> **INSPECTION END**

P2263 TC SYSTEM

DTC Logic

INFOID:0000000001162674

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2263	AIR INLET CIRCUIT • 1.DEF: Permanent at minimum limit • 2.DEF: Permanent at maximum limit	• Harness or connectors (Turbocharger boost control solenoid valve circuit is open or shorted.) • Air inlet circuit • Vacuum pump • Vacuum hose • Turbocharger • Turbocharger boost control solenoid valve • Turbocharger boost sensor • Electric throttle control actuator

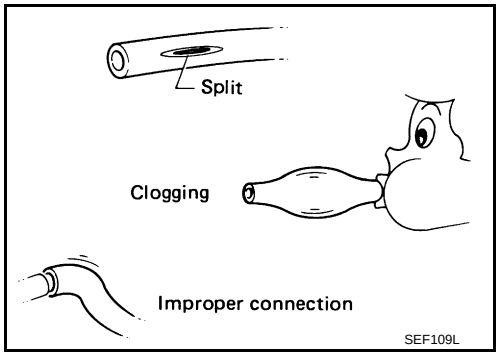
NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC becomes present after the engine is started.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001162675

1.CHECK VACUUM HOSES AND VACUUM GALLERY

1. Turn ignition switch OFF.
2. Check vacuum hoses and vacuum gallery for clogging, cracks or improper connection. Refer to EC-1070, "Vacuum Hose Drawing".



Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 2.

2.CHECK AIR FILTER

Check that air filter is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 3.

3.CHECK INTAKE AIR DUCT

Check that intake air duct is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 4.

4.CHECK VACUUM PUMP

Check vacuum pump.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 5.

5.CHECK TURBOCHARGER

Check turbocharger.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 6.

6. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Disconnect turbocharger boost control solenoid valve harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost control solenoid valve harness connector and ground.

Turbocharger boost control solenoid valve		Ground	Voltage
Connector	Terminal		
E59	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between IPDM E/R and turbocharger boost control solenoid valve
- Harness for open or short between ECM and turbocharger boost control solenoid valve

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK TURBOCHARGER BOOST 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 turbocharger boost control solenoid valve harness connector and ECM harness connector.

Turbocharger boost control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E59	1	F11	52	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between ECM and turbocharger boost control solenoid valve

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Refer to EC-1117, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace turbocharger boost control solenoid valve.

11. CHECK TURBOCHARGER BOOST SENSOR

Refer to EC-1119, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace turbocharger boost sensor.

12. CHECK THROTTLE CONTROL MOTOR

Refer to EC-1189, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace electric throttle control actuator.

13. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> **INSPECTION END**

P2299 ACCELERATOR/BRAKE PEDAL POSITION INCONSISTENCY

DTC Logic

INFOID:0000000001162676

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2299	ACCELERATOR PEDAL/BRAKE PEDAL INCONSISTENCY • 1.DEF: Inconsistency	• Harness or connectors (APP sensor 1 and 2 circuit is open or shorted.) (Stop lamp switch circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2.) • Stop lamp switch • Accelerator pedal

NOTE:
- **Special note:**
  The brake and accelerator pedals were detected as depressed simultaneously for 30 seconds.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001162677

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK BRAKE SWITCH CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

+		–		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E16	115 (Brake switch)	E16	128	Brake pedal	Fully released	0V
					Slightly depressed	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 10.

3.CHECK ACCELERATOR PEDAL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between accelerator pedal position sensor connector and ground.

Accelerator pedal position sensor			Ground	Voltage
Sensor	Connector	Terminal		
1	E12 (LHD models) M204 (RHD models)	4	Ground	Approx. 5V
2		5		

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

- Harness connectors E7, M69 (RHD models)
- Harness connectors M25, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connector.

5. CHECK ACCELERATOR PEDAL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E12 (LHD models) M204 (RHD models)	2	E16	127	Existed
2		1		120	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

- Harness connectors E7, M69 (RHD models)
- Harness connectors M25, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connector.

7. CHECK ACCELERATOR PEDAL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between accelerator pedal position sensor harness connector and ECM harness connector.

Accelerator pedal position sensor			ECM		Continuity
Sensor	Connector	Terminal	Connector	Terminal	
1	E12 (LHD models) M204 (RHD models)	3	E16	126	Existed
2		6		119	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

- Harness connectors E7, M69 (RHD models)
- Harness connectors M25, M201 (RHD models)
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connector.

9. CHECK ACCELERATOR PEDAL POSITION SENSOR

Refer to EC-1146, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace accelerator pedal position sensor.

10. CHECK BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E13 (LHD models) M203 (RHD models)	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7 (LHD models)
- Harness connectors M25, M201 (RHD models)
- 10A fuse (No. 7)
- Harness for open or short between fuse and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK BRAKE SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between stop lamp switch harness connector and ECM harness connector.

Stop lamp switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E13 (LHD models) M203 (RHD models)	2	E16	115	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 14.
NO >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7 (RHD models)
- Harness connectors M25, M201 (RHD models)
- 10A fuse (No. 7)
- Harness for open or short between fuse and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK STOP LAMP SWITCH

Refer to EC-1215, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace stop lamp switch.

15. CHECK ACCELERATOR PEDAL

Refer to EC-1146, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace accelerator pedal position sensor.

16. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

P2413 EGR SYSTEM

DTC Logic

INFOID:0000000001162678

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2413	EGR VOLUME CONTROL • 1.DEF: Jammed component	• Harness or connectors (The EGR volume control valve circuit is open or shorted.) (The EGR volume control valve control position sensor circuit is open or shorted.) • EGR volume control valve • EGR volume control valve control position sensor • Incorrect EGR volume control valve installation • EGR volume control valve stuck closed • EGR passage clogged

NOTE:
- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC becomes present after the engine is started.
- **Special notes:**
- Engine instability, possibly even stalling.
- Difficult to start engine or even impossible when cold.
- Loss of performance.
- Possible smoke emissions.
- **If the DTC is present:**
- **Malfunction indicator (Red) lights up.**

Diagnosis Procedure

INFOID:0000000001162679

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E15. Refer to Ground inspection in GI-58, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK EGR VOLUME CONTROL VALVE INSTALLATION

Check that EGR volume control valve is installed properly.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Install EGR volume control valve properly.

3.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.
2. Turn ignition switch ON.
3. Check the voltage between EGR volume control valve control position sensor connector and ground.

GR volume control valve control position sensor		Ground	Voltage
Connector	Terminal		
F52	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 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR GROUND CIRCUIT FOR

OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume control valve control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F52	3	F11	82	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 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR INPUT CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EGR volume control valve control position sensor harness connector and ECM harness connector.

EGR volume control valve control position sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F52	5	F11	86	Existed

2. 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 EGR VOLUME CONTROL VALVE CONTROL MOTOR CIRCUIT

1. Check harness continuity between the following terminals.

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F52	2	F11	95	Existed
			96	Not existed
	6		95	Not existed
			96	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 EGR VOLUME CONTROL VALVE VISUALLY

1. Remove the EGR volume control valve
2. Check if foreign matter is caught between the EGR volume control valve and the housing.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Remove the foreign matter and clean the EGR volume control valve.

8.CHECK EGR PASSAGE

Check the following for clogging and cracks.
- EGR tube

- EGR hose
- EGR cooler

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace EGR passage.

9.CHECK EGR VOLUME CONTROL VALVE

Refer to EC-1204, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 11.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11.REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.
2. Perform EC-1055, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> **INSPECTIO END**

Component Inspection

INFOID:0000000001603815

1.CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Check resistance between EGR volume control valve terminals as follows.

Terminals	Resistance
2 and 6	2.3 Ω

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> GO TO 2.

2.REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.
2. Perform EC-1055, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> **INSPECTIO END**

P2502 BATTERY VOLTAGE

DTC Logic

INFOID:0000000001162680

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2502	ALTERNATOR CHARGE SIGNAL • 1.DEF: Values outside level	• Harness or connectors (The CAN communication line is open or shorted) • Alternator

NOTE:

- **Conditions for applying the diagnostic procedure to the stored DTCs:**
  The DTC becomes present after the engine is started.

Diagnosis Procedure

INFOID:0000000001162681

1.CHECK CAN COMMUNICATION LINE

Refer to LAN-33, "CAN Communication Signal Chart".

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK ALTERNATOR

Refer to CHG-43, "Removal and Installation".

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> **INSPECTION END**

P2610 ENGINE SAFETY STOP

DTC Logic

INFOID:0000000001162682

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	Possible cause
P2610	ENGINE SAFETY STOP • 1.DEF: Electric • 2.DEF: Hydraulic	• Harness or connectors (Fuel injector circuit is shorted) • Turbocharger • Fuel injector • Intake air leas • Electric throttle control actuator

NOTE:
- **Priorities when dealing with a number of DTCs:**
  If DTC P2610 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.
- **Special notes:**
- The engine only stops after the ignition is switched off.

Diagnosis Procedure

INFOID:0000000001162683

1.CHECK INTAKE AIR DUCT

Check that intake air duct is not obstructed.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 2.

2.CHECK VACUUM PUMP

Check vacuum pump.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 3.

3.CHECK TURBOCHARGER

Check turbocharger.

Is the inspection result normal?

Yes >> Repair or replace.
No >> GO TO 4.

4.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Refer to EC-1116, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace turbocharger boost control solenoid valve.

5.CHECK THROTTLE CONTROL MOTOR

Refer to EC-1188, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace turbocharger boost sensor.

6.CHECK FUEL INJECTOR

Refer to EC-1142, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace fuel injector.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> **INSPECTION END**

ASCD CLUTCH SWITCH

Description

INFOID:0000000001162657

ASCD clutch switch signal is applied to the ECM through the ASCD clutch switch when the clutch pedal is depressed.

Component Function Check

INFOID:0000000001603829

1.CHECK ASCD CLUTCH SWITCH FUNCTION

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

+		–		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E16	108 (ASCD clutch switch signal)	E16	128	Clutch pedal	Fully released	Battery voltage
					Slightly de-pressed	0V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-1208, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001162659

1.CHECK ASCD CLUTCH SWITCH SIGNAL 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	Voltage
Connector	Terminal		
E35	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

2.CHECK ASCD CLUTCH SWITCH INPUT SIGNAL CIRCUIT

1. Check the continuity between ASCD clutch switch harness connector and ground.

ASCD clutch switch		Ground	Continuity
Connector	Terminal		
E35	2	Ground	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to power in harness or connectors.

3.CHECK ASCD CLUTCH SWITCH

Refer to EC-1209, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace ASCD clutch switch.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001162660

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, "On-vehicle 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:0000000001162684

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 ASCD 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.

Component Function Check

INFOID:0000000001162685

1.ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

CONDITION		INDICATOR
• Ignition switch: ON	• ASCD switch: Pressed at the 1st time →at the 2nd time	Illuminated → Not illuminated
• ASCD switch: ON • When vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	• ASCD: Operating	Illuminated
	• ASCD: Not operating	Not illuminated

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Go to EC-1210, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001162686

1.CHECK CAN COMMUNICATION LINE

Refer to LAN-33, "CAN Communication Signal Chart".

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK COMBINATION METER OPERATION

Refer to MWI-22, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check combination meter circuit. Refer to MWI-21, "Diagnosis Description".

3.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

COOLING FAN

Description

INFOID:0000000001162687

Cooling fan operates at each speed when the current flows in the cooling fan motor as follows.
Refer to EC-1097, "System Description" for cooling fan operation.

Component Function Check

INFOID:0000000001162688

1.CHECK COOLING FAN LOW SPEED FUNCTION

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 >> Refer to EC-1211, "Diagnosis Procedure".

2.CHECK COOLING FAN HIGH SPEED FUNCTION

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 >> Refer to EC-1211, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001162689

1.CHECK CAN COMMUNICATION LINE

Refer to LAN-33, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace

2.CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E44.
3. Check the voltage between IPDM E/R harness connectors and ground.

IPDM E/R		Ground	Voltage
Connector	Terminal		
E44	22	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- 50A fusible link (letter J)
- Harness for open or short between IPDM E/R and battery

>> Repair or replace malfunctioning part.

4.CHECK COOLING FAN CIRCUIT FOR OPEN AND SHORT

1. Disconnect cooling fan motor harness connector.

2. Disconnect IPDM E/R harness connectors E46 and E48.
3. Check the continuity between cooling fan motor harness connector and IPDM E/R harness connector.

Cooling fan motor		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E3	1	E44	20	Existed
			24	

4. Check the continuity between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Continuity
Connector	Terminal		
E46	39	Ground	Existed
E48	59		

5. Check the continuity between cooling fan motor and ground harness connector.

Cooling fan motor		Ground	Continuity
Connector	Terminal		
E3	2	Ground	Existed

6. 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 for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between IPDM E/R and ground
- Harness for open or short between cooling fan motor and ground
- Resistor E5

>> Repair or replace malfunctioning part.

6.CHECK COOLING FAN MOTOR

Refer to EC-1212, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace cooling fan motor.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connector.

Component Inspection

INFOID:0000000001162690

1.CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector E3.
3. Supply cooling fan motor terminal with battery voltage and check operation.

Terminals		Operation
(+)	(–)	
1	2	Cooling fans operate

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Replace cooling fan motor.

STOP LAMP SWITCH

Description

INFOID:0000000001162692

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.

Component Function Check

INFOID:0000000001162693

1.CHECK BRAKE SWITCH FUNCTION

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

+		–		Condition		Voltage
Connector	Terminal	Connector	Terminal			
E16	115 (Brake switch signal)	E16	128	Brake pedal	Fully released	0V
					Slightly depressed	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Go to EC-1214, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000001162694

1.CHECK BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
E13 (LHD models) M203 (RHD models)	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 M69, E7 (LHD models)
- Harness connectors M25, M201 (RHD models)
- 10A fuse (No. 7)
- Harness for open or short between fuse and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK BRAKE SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between stop lamp switch harness connector and ECM harness connector.

Stop lamp switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E13 (LHD models) M203 (RHD models)	2	E16	115	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M25, M201 (RHD models)
- Harness connectors M69, E7 (RHD models)
- Harness for open or short between fuse and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK STOP LAMP SWITCH

Refer to EC-1215, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace stop lamp switch.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-55, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000001162695

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 (Stop lamp switch)	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-6, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2 (Stop lamp switch)	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

ECU DIAGNOSIS

ECM

Reference Value

INFOID:0000000001538652

VALUE ON THE DIAGNOSIS TOOL

Remarks:

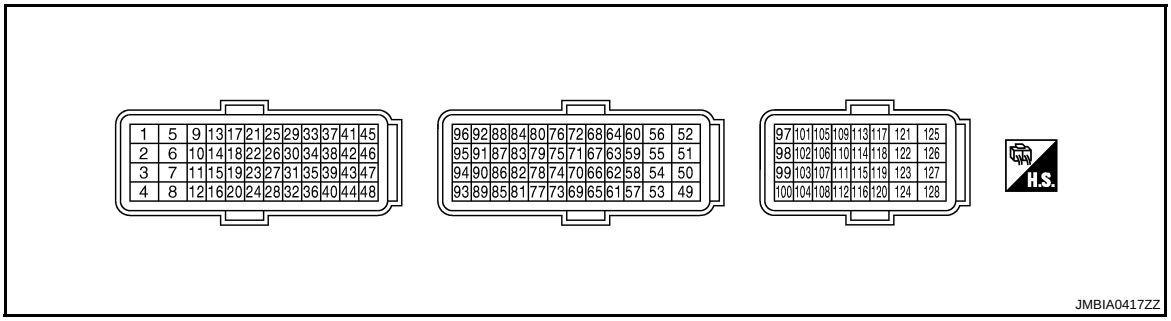
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.

* Specification data may not be directly related to their components signals/values/operations.

MONITOR ITEM	CONDITION		SPECIFICATION
ENGINE SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.		Almost the same speed as the tachometer indication
ACCEL/PDL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0%
WATER TEMP	• Engine: After warming up		More than 70°C (158°F)
FUEL TEMP	• Engine: After warming up		More than 40°C (104°F)
BATTERY VOLTAGE	• Ignition switch: ON (Engine stopped)		11 - 14V
ATMOS PRESS	• Ignition switch: ON		Altitude Approx. 0m: Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm^2, 14.59 psi) Approx. 1,000 m: Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm^2, 12.90 psi) Approx. 1,500 m: Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm^2, 12.06 psi) Approx. 2,000 m: Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm^2, 11.36 psi)
INLET PRESS	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: Neutral position • No load	Idle	Approximately 980 mbar
		2,000 rpm	Approximately 1,010 mbar
AIR FLOW	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: Neutral position • No load	Idle	Approximately 200 mg/cp
		2,000 rpm	Approximately 270 mg/cp
VEHICLE SPEED	• Turn drive wheels and compare CONSULT-III value with the speedometer indication		Almost the same speed as the speedometer indication
RAIL PRESSURE	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: Neutral position • No load	Idle	Approximately 230 bar
		2,000 rpm	Approximately 450 bar
RAIL PRES SET	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: Neutral position • No load	Idle	Approximately 230 bar
		2,000 rpm	Approximately 450 bar
FUEL FLOW	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: Neutral position • No load	Idle	Approximately 4.9 mg/cp
		2,000 rpm	Approximately 3.5 mg/cp
EGR PO RECOPY	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: Neutral position • No load	Idle	Approximately -50 %
EGR/V OPEN REF	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: Neutral position • No load	Idle	Approximately -50 %

MONITOR ITEM	CONDITION		SPECIFICATION
RFRGERNT PRSS	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: Neutral position • No load	Idle	Approximately 5.7 bar
PWR ABSOB A/C	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: Neutral position • No load	Idle	Approximately 0 W
PL PTNMR T1 V	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	Approximately 15 %
PL PTNMR T2 V	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	Approximately 6 %
EGR POS SE VO	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: Neutral position • No load	Idle	Approximately 3.56 V
RAIL PRES S V	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: Neutral position • No load	Idle	Approximately 1 V
		2,000 rpm	Approximately 1.5 V

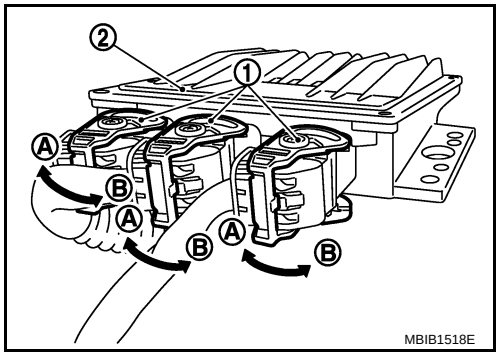
TERMINAL LAYOUT



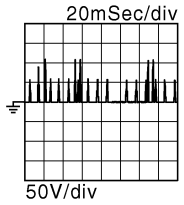
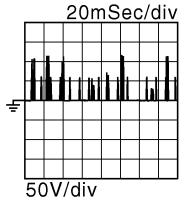
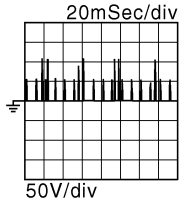
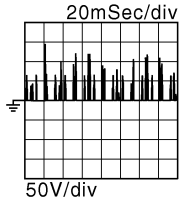
PHYSICAL VALUES

NOTE:
- ECM is located in engine room, between air filter and battery.
- When disconnecting ECM harness connector (1), loosen (B) it with levers as far as they will go as shown in the figure.

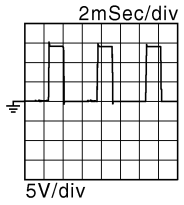
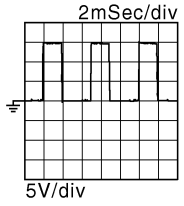
2 : ECM
A : Fasten

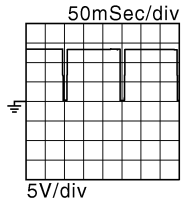
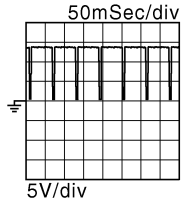
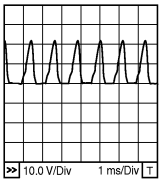
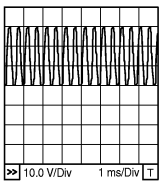


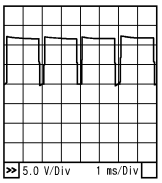
- Pulse signal is measured by CONSULT-III.

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
1 (SB)	128 (B)	Fuel injector No. 4	Input	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0- 9V★  JMBIA0635GB
2 (SB)		Fuel injector No. 3			
3 (SB)		Fuel injector No. 2		**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	0- 9V★  JMBIA0636GB
4 (SB)		Fuel injector No. 1			
5 (V)	128 (B)	Fuel injector power supply No. 4	Output	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	5 - 10V★  JMBIA0637GB
6 (Y)		Fuel injector power supply No. 3			
7 (O)		Fuel injector power supply No. 2		**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	5 - 10V★  JMBIA0638GB
8 (L)		Fuel injector power supply No. 1			
15 (R)	—	Sensor ground (Fuel rail pressure sensor)	—	—	—
19 (W)	15 (R)	Fuel rail pressure sensor	Input	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 1.0V
				[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.5V
20 (G)	15 (R)	Sensor power supply (Fuel rail pressure sensor)	—	**[Ignition switch: ON]**	Approximately 5.0V
28 (G)	30 (O)	Sensor power supply (Mass air flow sensor)	—	**[Ignition switch: ON]**	Approximately 5.0V
29 (O)	—	Sensor ground (Fuel pump temperature sensor)	—	—	—
30 (O)	—	Sensor ground (Mass air flow sensor/ Intake air temperature sensor)	—	—	—

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
33 (B)	—	Sensor ground (Engine coolant temperature sensor)	—	—	—
35 (LG)	30 (O)	Mass air flow sensor	Input	**[Ignition switch: ON]**	Approximately 0.36V
				[Engine is running] • **Warm-up condition** • Idle speed	Approximately 1.7V
				[Engine is running] • **Warm-up condition** • Engine speed: 2,500 rpm	Approximately 2.6V
36 (O)	43 (BR)	Sensor power supply (Turbocharger boost sensor)	—	**[Ignition switch: ON]**	Approximately 5.0V
37 (LG)	29 (O)	Fuel pump temperature sensor	Input	**[Engine is running]** • **Warm-up condition**	Approximately 2.8V Output voltage varies with fuel pump temperature.
38 (P)	33 (B)	Engine coolant temperature sensor	Input	**[Engine is running]** • **Warm-up condition**	Approximately 1.8V Output voltage varies with engine coolant temperature.
39 (V)	30 (O)	Intake air temperature sensor	Input	**[Engine is running]** • **Warm-up condition**	Approximately 2.0V Output voltage varies with intake air temperature.
43 (BR)	—	Sensor ground (Turbocharger boost sensor)	—	—	—
44 (G)	43 (BR)	Turbocharger boost sensor	Input	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 1.6V
				[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.6V
49 (P)	128 (B)	High pressure supply pump (Pressure control valve)	Output	**[Ignition switch: OFF]** • Engine: Stopped	Duty signal
				[Ignition switch: ON] • Engine: Stopped	
				[Engine is running] • Idle speed	
				[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	
50 (P)	128 (B)	High pressure supply pump (Volumetric control valve)	Output	**[Ignition switch: OFF]** • Engine: Stopped	Duty signal
				[Ignition switch: ON] • Engine: Stopped	
				[Engine is running] • Idle speed	
				[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
52 (G)	128 (B)	Turbocharger boost control solenoid valve	Output	**[Ignition switch: ON]** • **Warm-up condition** • Idle speed	0 - 12.5V ★  JMBIA0639GB
				[Ignition switch: ON] • **Warm-up condition** • Engine speed: 2,000 rpm	0 - 12.5V ★  JMBIA0697GB
53 (G) 54 (V)	128 (B)	Power supply for ECM	Input	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
60 (P)	128 (B)	ECM relay (self-shutoff)	Output	**[Ignition switch: ON]** **[Ignition switch: OFF]** • For a few seconds after turning ignition switch OFF	Approximately 0.7V
				[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11-14V)
65 (W)	—	Sensor ground (Camshaft position sensor)	—	—	—
69 (W)	128 (B)	Power supply for ECM (Back-up)	Input	**[Ignition switch: OFF]**	BATTERY VOLTAGE. (11 - 14V)
72 (P)	128 (B)	Electric throttle control actuator	Output	**[Engine is running]** • Idle speed	0.7V
				[Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0V
				[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	0V
74 (BR)	—	Sensor ground (Refrigerant pressure sensor)	—	—	—

Terminal No. +	Terminal No. –	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
75 (G)	128 (B)	Camshaft position sensor	Input	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 1V ★  JMBIA0698GB
				[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	0 - 1V ★  JMBIA0699GB
78 (GR)	74 (BR)	Refrigerant pressure sensor	Input	**[Engine is running]** • **Warm-up condition** • Both A/C switch and blower fan switch: ON (Compressor operates)	Approximately2.3V
82 (GR)	—	Sensor ground (EGR volume control valve)	—	—	—
84 (W)	128 (B)	Crankshaft position sensor	Input	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 12.5V ★  MBIB1508E
				[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	0 - 12.5V ★  MBIB1509E
85 (L)	82 (GR)	Sensor power supply (EGR volume control valve)	—	**[Ignition switch: ON]**	Approximately 5V
86 (LG)	82 (GR)	EGR volume control valve (EGR volume control valve control position sensor)	Input	**[Engine is running]** • **Warm-up condition** • Idle speed	3.4V
88 (G)	—	Sensor ground (Crankshaft position sensor)	—	—	—
89 (W)	74 (BR)	Sensor power supply (Refrigerant pressure sensor)	—	**[Ignition switch: ON]**	Approximately 5.0V

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
90 (Y)	128 (B)	Electric throttle control actuator	Input	**[Engine is running]** • Idle speed	Duty signal
				[Engine is running] • For a few seconds after turning ignition switch OFF	
				[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	
94 (LG)	128 (B)	Electric throttle control actuator	Output	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
95 (G)	128 (B)	EGR volume control valve (DC motor)	Output	**[Ignition switch: OFF]** • For a few seconds after the following conditions are met and ignition switch is turned OFF. - **Warm-up condition** - Start engine and let it idle for 3 minutes. **NOTE:** The duty cycle changes depending on EGR volume control valve operation.	1 - 14V ★  MBIB1822E
96 (L)	128 (B)	EGR volume control valve (DC motor)	Output	**[Engine is running]** • **Warm-up condition** • Idle speed	12.8V
				[Ignition switch: OFF] • For a few seconds after turning ignition switch OFF	0V
98 (GR)	128 (B)	ASCD switch	Input	**[Ignition switch: ON]** • ASCD switch: ON	BATTERY VOLTAGE (11 - 14V)
				[Ignition switch: ON] • ASCD switch: OFF	Approximately 0V
99 (P)	128 (B)	CAN communication line	Input/ Output	—	—
100 (L)	128 (B)	CAN communication line	Input/ Output	—	—
108 (G)	128 (B)	ASCD clutch switch	Input	**[Ignition switch: ON]** • Clutch pedal: Slightly depressed	Approximately 0V
				[Ignition switch: ON] • Clutch pedal: Fully released	BATTERY VOLTAGE (11 - 14V)
110 (R)	111 (B)	ASCD steering switch	Input	**[Ignition switch: ON]** • ASCD steering switch: OFF	Approximately 5V
				[Ignition switch: ON] • RESUME switch: Pressed	Approximately 3.8V
				[Ignition switch: ON] • SET+ switch: Pressed	Approximately 2.4V
				[Ignition switch: ON] • SET– switch: Pressed	Approximately 1.3V
				[Ignition switch: ON] • CANCEL switch: Pressed	Approximately 0V

Terminal No. +	Terminal No. –	Description Signal name	Description Input/ Output	Condition	Value (Approx.)
111 B	—	ASCD steering switch ground	—	—	—
115 (R)	128 (B)	Stop lamp switch	—	**[Ignition switch: OFF]** • Brake pedal: Fully released	Approximately 0V
				[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
116 (GR)	128 (B)	ASCD brake switch	Input	**[Ignition switch: ON]** • Brake pedal: Slightly depressed	Approximately 0V
				[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE(11 - 14V)
118 (SB)	120 (Y)	Sensor power supply (Accelerator pedal position sensor 2)	—	**[Ignition switch: ON]**	Approximately 5V
119 (GR)	120 (Y)	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
120 (Y)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
122 (P: LHD) (O: RHD)	127 (R)	Sensor power supply (Accelerator pedal position sensor 1)	—	**[Ignition switch: ON]**	Approximately 5.0V
123 (B) 124 (B) 125 (B) 128 (B)	—	ECM ground	—	—	—
126 (G)	127 (R)	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
127 (R)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Conformity Check

INFOID:0000000001538653

MAIN SCREEN

Test Condition: Engine Stopped and Ignition Switch ON

Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Battery voltage	BATTERY VOLTAGE	12 V < BATTERY VOLTAGE < 14.4 V	In the event of a malfunction, perform the trouble diagnosis for CHARGING SYSTEM.
2	Engine speed	ENGINE SPEED	Indicates the engine's rotational speed in rpm.	In the event of a malfunction, perform the trouble diagnosis for DTC P0335 CKP SENSOR.
3	Engine coolant temperature	WATER TEMP	Close to ambient temperature (cold engine). Indicates the engine coolant temperature in ° C.	In the event of a malfunction, perform the trouble diagnosis for DTC P0115 ETC SENSOR.
4	Accelerator pedal position	ACCEL/PDL POS	0%= ACCEL/PDL POS < 100% Indicates the percentage of the pedal position between no load and full load position	In the event of a malfunction, perform the trouble diagnosis for APP SENSOR (DTC P0225, and P2120) and SENSOR POWER SUPPLY (DTC P0641 and P0651).
5	Inlet air temperature	INLET AIR TEM	Indicates the intake air temperature in °C. This information is provided by the IAT sensor.	In the event of a malfunction, perform the trouble diagnosis for DTC P0110 IAT SENSOR.
6	Fuel pump temperature	FUEL TEMP	Close to ambient temperature (cold engine). Indicates the fuel pump temperature in ° C.	In the event of a malfunction, perform the trouble diagnosis for DTC P0180 FTT SENSOR.
7	Intake air pressure	ATOMOS PRESS	700 mbar < ATOMOS PRESS < 1100 mbar Indicates the ambient barometric pressure in mbar. The sensor is incorporated in the ECM.	If not consistent, check ATOMOS PRESS = INLET PRESS = local ambient barometric pressure, with the engine stopped and ignition switch ON.
		INLET PRESS	Indicates the pressure in the turbocharger in mbar.	
8	Fuel rail pressure	RAIL PRESSURE	Approximately 0 bar Indicates the fuel rail pressure in bar of the diesel fuel in the fuel rail. This pressure is supplied by the fuel rail pressure sensor.	In the event of a malfunction, perform the trouble diagnosis for DTC P0190 and P1089 FRP SENSOR.
9	Engine	MOTOR	STOPPED Indicates the current status of the engine. • STOPPED • STARTER • ACTIVATED • RUNNING	NONE.

Order	Function	Parameter	Display and notes	Trouble diagnosis
10	Engine immobilizer	ENGINE IMMOBI	INACTIVE Indicates the status of the immobilizer system. • INACTIVE: The ECM has recognized the immobilizer code transmitted by the Intelligent Key unit or BCM. • ACTIVE: The ECM does not recognize the immobilizer code transmitted by the Intelligent Key unit or BCM.	If ACTIVE, perform the trouble diagnosis for NATS.
11	Vehicle speed	VEHICLE SPEED	0 km/h (mph) Indicates the vehicle speed in km/h (mph). This parameter is transmitted by the “ABS actuator and electric unit (control unit)” or combination meter via CAN communication line.	Perform the trouble diagnosis for CAN communication line. Perform the trouble diagnosis for “ABS actuator and electric unit (control unit)” or combination meter.

Test Condition: Engine at Idle

Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Battery voltage	BATTERY VOLTAGE	13V < BATTERY VOLTAGE < 16V	In the event of a malfunction, perform the trouble diagnosis for CHARGING SYSTEM.
2	Engine speed	ENGINE SPEED	About 800 rpm Indicates the engine's rotational speed in rpm.	In the event of a malfunction, perform the trouble diagnosis for DTC P0335 CKP SENSOR.
3	Engine coolant temperature	WATER TEMP	Indicates the engine coolant temperature in °C.	In the event of a malfunction, perform the trouble diagnosis for DTC P0115 ETC SENSOR.
4	Accelerator pedal position	ACCEL/PDL POS	0%= ACCEL/PDL POS < 100% Indicates the percentage of the pedal position between no load and full load position	In the event of a malfunction, perform the trouble diagnosis for APP SENSOR (DTC P0225, and P2120) and SENSOR POWER SUPPLY (DTC P0641 and P0651).
5	Inlet air temperature	INLET AIR TEM	Indicates the intake air temperature in °C. This information is provided by the IAT sensor.	In the event of a malfunction, perform the trouble diagnosis for DTC P0110 IAT SENSOR.
6	Fuel pump temperature	FUEL TEMP	Indicates the intake air temperature in °C. This information is provided by the fuel pump temperature sensor.	In the event of a malfunction, perform the trouble diagnosis for DTC P0180 FTT SENSOR.
7	Intake air pressure	ATOMOS PRESS	700 mbar < ATOMOS PRESS < 1100 mbar Indicates the ambient barometric pressure in mbar. The sensor is incorporated in the ECM.	If not consistent, check ATOMOS PRESS = INLET PRESS = local ambient barometric pressure, with the engine stopped and ignition switch ON.
		INLET PRESS	Indicates the pressure in the turbocharger in mbar. INLET PRESS = local ambient barometric pressure.	
8	Fuel rail pressure	RAIL PRESSURE	Indicates the fuel rail pressure in bar of the diesel fuel in the fuel rail. This pressure measured by the fuel rail pressure sensor.	In the event of a malfunction, perform the trouble diagnosis for DTC P0190 and P1089 FRP SENSOR.

Order	Function	Parameter	Display and notes	Trouble diagnosis
9	Engine	MOTOR	RUNNING Indicates the current status of the engine. • STOPPED • STARTER • ACTIVATED • RUNNING	NONE.
10	Engine immobilizer	ENGINE IMMOBI	INACTIVE Indicates the status of the immobilizer system. • INACTIVE: The ECM has recognized the immobilizer code transmitted by the Intelligent Key unit or BCM. • ACTIVE: The ECM does not recognize the immobilizer code transmitted by the Intelligent Key unit or BCM.	If ACTIVE, perform the trouble diagnosis for NATS.
11	Vehicle speed	VEHICLE SPEED	0 km/h (mph) Indicates the vehicle speed in km/h (mph). This parameter is transmitted by the “ABS actuator and electric unit (control unit)” or combination meter via CAN communication line.	Perform the trouble diagnosis for CAN communication line. Perform the trouble diagnosis for “ABS actuator and electric unit (control unit)” or combination meter.

AIR CIRC SUBFUNCTION (TURBOCHARGER/INTAKE AIR)

Test Condition: Engine Stopped and Ignition Switch ON

Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Intake air pressure	ATOMOS PRESS	700 mbar < ATOMOS PRESS < 1100 mbar Indicates the ambient barometric pressure in mbar. The sensor is incorporated in the ECM.	If not consistent, check ATOMOS PRESS = INLET PRESS = local ambient barometric pressure, with the engine stopped and ignition switch ON.
		INLET PRESS	Indicates the pressure in the turbocharger in mbar.	
2	Intake air	ATMOS PRES SEN V	1.6V < ATMOS PRES SEN V < 4.9V	In the event of a malfunction, perform the trouble diagnosis for DTC P2226 BARO SENSOR.
		AIR TEMP SEN V	0.1V < AIR TEMP SEN V < 4.8V	In the event of a malfunction, perform the trouble diagnosis for DTC P0110 IAT SENSOR.
3	air flow	AIR FLOW	0 mg/st Mass air flow estimated by the ECM.	In the event of a malfunction, perform the trouble diagnosis for DTC P0100 MAF SENSOR.
		AIR FLOW DEMAND	Mass air flow request set point the ECM.	
		AIR FLOW SUPLY V	0.27V < AIR FLOW SUPLY V < 4.56V Indicates voltage of the mass air flow sensor.	
4	Inlet air temperature	INLET AIR TEM	Indicates the intake air temperature in °C. This information is provided by the IAT sensor.	In the event of a malfunction, perform the trouble diagnosis for DTC P0110 IAT SENSOR.
5	Engine speed	ENGINE SPEED	0 rpm Indicates the engine's rotational speed in rpm.	In the event of a malfunction, perform the trouble diagnosis for DTC P0335 CKP SENSOR.

Test Condition: Engine at idle

Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Intake air pressure	ATOMOS PRESS	700 mbar < ATOMOS PRESS < 1100 mbar Indicates the ambient barometric pressure in mbar. The sensor is incorporated in the ECM.	If not consistent, check ATOMOS PRESS = INLET PRESS = local ambient barometric pressure, with the engine stopped and ignition switch ON.
		INLET PRESS	Indicates the pressure in the turbocharger in mbar. INLET PRESS = local ambient barometric pressure.	
2	Intake air	ATMOS PRES SEN V	1.6V < ATMOS PRES SEN V < 4.9V	In the event of a malfunction, perform the trouble diagnosis for DTC P2226 BARO SENSOR.
		AIR TEMP SEN V	0.1V < AIR TEMP SEN V < 4.8V	In the event of a malfunction, perform the trouble diagnosis for DTC P0110 IAT SENSOR.
3	air flow	AIR FLOW	200* < AIR FLOW < 350 mg/st Mass air flow measured the ECM.	In the event of a malfunction, perform the trouble diagnosis for DTC P0100 MAF SENSOR.
		AIR FLOW DEMAND	The flow must follow the request and must be near to it.	
		AIR FLOW SUPLY V	Indicates the voltage of the mass air flow sensor.	
4	Inlet air temperature	INLET AIR TEM	Indicates the intake air temperature in °C. This information is provided by the IAT sensor.	In the event of a malfunction, perform the trouble diagnosis for DTC P0110 IAT SENSOR.
5	Engine speed	ENGINE SPEED	About 800 rpm Indicates the engine's rotational speed in rpm.	In the event of a malfunction, perform the trouble diagnosis for DTC P0335 CKP SENSOR.

*: Just at start time. After 1 minute, EGR volume control valve will close and flow start increase.

FUEL CIRCUIT SUB FUNCTION

Test Condition: Engine Stopped and Ignition Switch ON

Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Fuel pump temperature	FUEL TEMP	Close to ambient temperature (cold engine). Indicates the fuel pump temperature in °C.	In the event of a malfunction, perform the trouble diagnosis for DTC P0180 FTT SENSOR.
		FUEL TEMP SEN V	0.1V < FUEL TEMP SEN V < 4.9V	
2	Engine coolant temperature	WATER TEMP	Close to ambient temperature (cold engine). Indicates the engine coolant temperature in °C.	In the event of a malfunction, perform the trouble diagnosis for DTC P0115 ETC SENSOR.
		COOLAN TMP SEN V	0.13V < COOLAN TMP SEN V < 4.90V	
3	Engine speed	ENGINE SPEED	Indicates the engine's rotational speed in rpm.	In the event of a malfunction, perform the trouble diagnosis for DTC P0335 CKP SENSOR.
4	Fuel rail pressure	RAIL PRESSURE	Indicates the theoretical pressure value for optimum engine operation.	In the event of a malfunction, perform the trouble diagnosis for DTC P0190 and P1089 FRP SENSOR.
		RAIL PRES SET	RAIL PRES SET = 0 bar	
		RAIL PRES S V	0.4V < RAIL PRES S V < 4.7V	

Order	Function	Parameter	Display and notes	Trouble diagnosis
5	Fuel flow	FUEL FLOW REG	INACTIVE	In the event of a malfunction, perform the trouble diagnosis for DTC P0001 FUEL PUMP.
		FUEL FLOW S/V CU	Close to 0A	
		F/FLOW CORR CYL1	Cylinder no. 1 - 4 fuel flow correction = 0	NONE
		F/FLOW CORR CYL2		
		F/FLOW CORR CYL3		
		F/FLOW CORR CYL4		
6	Fuel pressure	FUEL PRESS REG	INACTIVE	In the event of a malfunction, perform the trouble diagnosis for DTC P0090 FUEL PUMP.
7	Intake air temperature	AIR TEMP SEN V	0.1V < AIR TEMP SEN V < 4.8V	In the event of a malfunction, perform the trouble diagnosis for DTC P0110 IAT SENSOR.
8	Fuel injectors	INJCTR CONDNSR V	49V < INJCTR CONDNSR V < 96V	In the event of a malfunction, perform the trouble diagnosis for P0201, P0202, P0203 and P0204 FUEL INJECTOR.
		COMM INJCTR CYL1	INACTIVE	
		COMM INJCTR CYL2		
		COMM INJCTR CYL3		
		COMM INJCTR CYL4		

Test Condition: Engine at Idle

Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Fuel pump temperature	FUEL TEMP	Indicates the fuel pump temperature in °C.	In the event of a malfunction, perform the trouble diagnosis for DTC P0180 FTT SENSOR.
		FUEL TEMP SEN V	0.1V < FUEL TEMP SEN V < 4.9V	
2	Engine coolant temperature	WATER TEMP	Indicates the engine coolant temperature in °C.	In the event of a malfunction, perform the trouble diagnosis for DTC P0115 ETC SENSOR.
		COOLAN TMP SEN V	0.1V < COOLAN TMP SEN V < 4.9V	
3	Engine speed	ENGINE SPEED	About 800 rpm Indicates the engine's rotational speed in rpm.	In the event of a malfunction, perform the trouble diagnosis for DTC P0335 CKP SENSOR.
4	Fuel rail pressure	RAIL PRESSURE	Indicates the theoretical pressure value for optimum engine operation. 200 bar < RAIL PRESSURE < 250 bar	In the event of a malfunction, perform the trouble diagnosis for DTC P0190 and P1089 FRP SENSOR.
		RAIL PRES SET	The pressure must follow the setpoint and must be near to it.	
		RAIL PRES S V	0.4V < RAIL PRES S V < 4.7V	
5	Fuel flow	FUEL FLOW REG	ACTIVE	NONE.
		FUEL FLOW S/V CU	Maximum 2A	NONE.
		F/FLOW CORR CYL1	F/FLOW CORR CYL1-4 = 0.3 - 1.9	In the event of a malfunction, perform the trouble diagnosis for TEST6: MAJJOR LEAK IIN FUEL INJECTORS/FUEL INJECTORS OPEN.
		F/FLOW CORR CYL2		
		F/FLOW CORR CYL3		
		F/FLOW CORR CYL4		
6	Fuel pressure	FUEL PRESS REG	ACTIVE	In the event of a malfunction, perform the trouble diagnosis for DTC P0090 FUEL PUMP.

Order	Function	Parameter	Display and notes	Trouble diagnosis
7	Intake air temperature	AIR TEMP SEN V	0.1V < AIR TEMP SEN V < 4.8V	In the event of a malfunction, perform the trouble diagnosis for DTC P0110 IAT SENSOR.
8	Fuel injectors	INJCTR CONDNSR V	49V < INJCTR CONDNSR V < 96V	In the event of a malfunction, perform the trouble diagnosis for P0201, P0202, P0203 and P0204 FUEL INJECTOR.
		COMM INJCTR CYL1	ACTIVE	
		COMM INJCTR CYL2		
		COMM INJCTR CYL3		
		COMM INJCTR CYL4		

DRIVER PARAMETERS SUB FUNCTION

Test Condition: Engine Stopped and Ignition Switch ON

Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Power supply	C/U+AFTR IGN	PRESENT	NONE
2	Clutch pedal	ACC PEDAL DETECT	NO	In the event of a malfunction, perform the trouble diagnosis for ASCD CLUTCH SWITCH.
3	Malfunction indicator	SEVERITY 1 LIGHT	INACTIVE	Also check that there are no malfunction ECM.
		SEVERITY 2 LIGHT	INACTIVE	
4	Accelerator pedal	ACCEL/PDL POS	0% = ACCEL/PDL POS < 100% Indicates the percentage of the accelerator pedal position between no load and full load position.	In the event of a malfunction, perform the trouble diagnosis for APP SENSOR (DTC P0225, and P2120) and SENSOR POWER SUPPLY (DTC P0641 and P0651).
		PEDAL POS TRACK1	Indicates the percentage of the accelerator pedal position between no load and full load position.	
		PL PTNMR T1 V	0.4V < PL PTNMR T1V < 4.64V Indicates the percentage of the accelerator pedal position between no load (0V) and full load (5V) position.	
		PEDAL POS TRACK2	Indicates the percentage of the accelerator pedal position between no load and full load position.	
		PL PTNMR T2 V	0.27V < PL PTNMR T2V < 3.75V Indicates the percentage of the accelerator pedal position between no load (0V) and full load (5V) position.	

Test Condition: Engine at Idle

Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Power supply	C/U+AFTR IGN	PRESENT	NONE
2	Clutch pedal	ACC PEDAL DETECT	NO	In the event of a malfunction, perform the trouble diagnosis for ASCD CLUTCH SWITCH.
3	Malfunction indicator	SEVERITY 1 LIGHT	INACTIVE	Also check that there are no malfunction ECM.
		SEVERITY 2 LIGHT	INACTIVE	

Order	Function	Parameter	Display and notes	Trouble diagnosis
4	Accelerator pedal	ACCEL/PDL POS	0% = ACCEL/PDL POS < 100% Indicates the percentage of the accelerator pedal position between no load and full load position.	In the event of a malfunction, perform the trouble diagnosis for APP SENSOR (DTC P0225, and P2120) and SENSOR POWER SUPPLY (DTC P0641 and P0651).
		PEDAL POS TRACK1	Indicates the percentage of the accelerator pedal position between no load and full load position.	
		PL PTNMR T1 V	0.4V < PL PTNMR T1V < 4.64V Indicates the percentage of the accelerator pedal position between no load and full load position.	
		PEDAL POS TRACK2	Indicates the percentage of the accelerator pedal position between no load and full load position.	
		PL PTNMR T2 V	0.27V < PL PTNMR T2V < 3.75V Indicates the percentage of the accelerator pedal position between no load and full load position.	

PRE-HEATING/IGNITION SUBFUNCTION

Test Condition: Engine Stopped and Ignition Switch ON

Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Preheating	PREHEAT RLY CONT	INACTIVE	NONE
2	Engine coolant temperature	WATER TEMP	Close to ambient temperature (cold engine). Indicates the engine coolant temperature in °C.	In the event of a malfunction, perform the trouble diagnosis for DTC P0115 ETC SENSOR.
3	Battery voltage	BATTERY VOLTAGE	12 V < BATTERY VOLTAGE < 14.4V	In the event of a malfunction, perform the trouble diagnosis for CHARGING SYSTEM.
4	Intake air temperature	INLET AIR TEM	Indicates the intake air temperature in °C. This information is provided by the IAT sensor.	In the event of a malfunction, perform the trouble diagnosis for DTC P0110 IAT SENSOR.

Test Condition: Engine at Idle

Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Preheating	PREHEAT RLY CONT	INACTIVE	NONE
2	Engine coolant temperature	WATER TEMP	Indicates the engine coolant temperature in °C.	In the event of a malfunction, perform the trouble diagnosis for DTC P0115 ETC SENSOR.
3	Battery voltage	BATTERY VOLTAGE	13 V < BATTERY VOLTAGE < 16V	In the event of a malfunction, perform the trouble diagnosis for CHARGING SYSTEM.
4	Intake air temperature	INLET AIR TEM	Indicates the intake air temperature in °C. This information is provided by the IAT sensor.	In the event of a malfunction, perform the trouble diagnosis for DTC P0110 IAT SENSOR.

SUBFUNCTION

Test Condition: Engine Stopped and Ignition Switch ON

Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Fuel pressure	FUEL PRESS REG	INACTIVE	In the event of a malfunction, perform the trouble diagnosis for DTC P0090 FUEL PUMP.
2	Fuel pump temperature	FUEL TEMP	Close to ambient temperature (cold engine). Indicates the intake air temperature in °C. This information is provided by the fuel pump temperature sensor.	In the event of a malfunction, perform the trouble diagnosis for DTC P0180 FTT SENSOR.
3	Engine coolant temperature	WATER TEMP	Close to ambient temperature (cold engine). Indicates the engine coolant temperature in °C.	In the event of a malfunction, perform the trouble diagnosis for DTC P0115 ECT SENSOR.
4	Inlet air temperature	INLET AIR TEM	Indicates the intake air temperature in °C. This information is provided by the IAT sensor.	In the event of a malfunction, perform the trouble diagnosis for DTC P0110 IAT SENSOR.
5	Intake air pressure	ATOMOS PRESS	700 mbar < ATOMOS PRESS < 1100 mbar Indicates the ambient barometric pressure in mbar. The sensor is incorporated in the ECM.	In the event of a malfunction, perform the trouble diagnosis for DTC P2226 BARO SENSOR.
6	Fuel rail pressure	RAIL PRESSURE	Indicates the theoretical pressure value for optimum engine operation.	In the event of a malfunction, perform the trouble diagnosis for DTC P0190 and P1089 FRP SENSOR.
		RAIL PRES SET	RAIL PRES SET = 0 bar.	
7	Air flow	AIR FLOW	0 mg/st Air flow estimated by the ECM.	NONE
8	EGR	EGR POS SE VO	540 mV < EGR POS SE VO < 4490 mV	In the event of a malfunction, perform the trouble diagnosis for DTC P0409 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR.
9	Intake air pressure	INLET PRESS	900 mbar < INLET PRESS < 1100 mbar Indicates the pressure in the turbocharger in mbar.	NONE
10	Accelerator pedal position	ACCEL/PDL POS	0% = ACCEL/PDL POS < 100% Indicates the percentage of the pedal position between no load and full load position	In the event of a malfunction, perform the trouble diagnosis for APP SENSOR (DTC P0225, and P2120) and SENSOR POWER SUPPLY (DTC P0641 and P0651).

Test Condition: Engine at Idle

Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Fuel pressure	FUEL PRESS REG	INACTIVE	NONE
2	Fuel pump temperature	FUEL TEMP	Indicates the intake air temperature in °C. This information is provided by the fuel pump temperature sensor.	In the event of a malfunction, perform the trouble diagnosis for DTC P0180 FTT SENSOR.
3	Engine coolant temperature	WATER TEMP	Indicates the engine coolant temperature in °C.	In the event of a malfunction, perform the trouble diagnosis for DTC P0115 ECT SENSOR.
4	Inlet air temperature	INLET AIR TEM	Indicates the intake air temperature in °C. This information is provided by the IAT sensor.	In the event of a malfunction, perform the trouble diagnosis for DTC P0110 IAT SENSOR.

Order	Function	Parameter	Display and notes	Trouble diagnosis
5	Intake air pressure	ATOMOS PRESS	700 mbar < ATOMOS PRESS < 1100 mbar Indicates the ambient barometric pressure in mbar. The sensor is incorporated in the ECM.	In the event of a malfunction, perform the trouble diagnosis for DTC P2226 BARO SENSOR.
6	Fuel rail pressure	RAIL PRESSURE	Indicates the theoretical pressure value for optimum engine operation.	In the event of a malfunction, perform the trouble diagnosis for DTC P0190 and P1089 FRP SENSOR.
		RAIL PRES SET	RAIL PRES SET = 0 bar.	
7	Air flow	AIR FLOW	200* mg/st < AIR FLOW < 350 mg/st Air flow measured by the ECM.	NONE
8	EGR	EGR POS SE VO	540 mV < EGR POS SE VO < 4490 mV	In the event of a malfunction, perform the trouble diagnosis for DTC P0409 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR.
9	Intake air pressure	INLET PRESS	-	NONE
10	Accelerator pedal position	ACCEL/PDL POS	0% = ACCEL/PDL POS < 100% Indicates the percentage of the pedal position between no load and full load position	In the event of a malfunction, perform the trouble diagnosis for APP SENSOR (DTC P0225, and P2120) and SENSOR POWER SUPPLY (DTC P0641 and P0651).

*: Just at start time. After 1 minute, EGR volume control valve will close and flow start increase.

ENGINE COOLING SUB FUNCTION

Test Condition: Engine Stopped and Ignition Switch ON

Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Fan speed request*	FAN ASSEMBLY	INACTIVE	NONE.
		FAN UNIT LOW	-	
		FAN UNIT HIGH	-	
2	Engine coolant temperature	WATER TEMP	Close to ambient temperature (cold engine). Indicates the engine coolant temperature in °C.	In the event of a malfunction, perform the trouble diagnosis for DTC P0115 ECT SENSOR.
		COOLAN TMP SEN V	0.1V < COOLAN TMP SEN V < 4.9V	

Test Condition: Engine at Idle

Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Fan speed request*	FAN ASSEMBLY	INACTIVE	NONE.
		FAN UNIT LOW	-	
		FAN UNIT HIGH	-	
2	Engine coolant temperature	WATER TEMP	Indicates the engine coolant temperature in °C.	In the event of a malfunction, perform the trouble diagnosis for DTC P0115 ECT SENSOR.
		COOLAN TMP SEN V	0.1V < COOLAN TMP SEN V < 4.9V	

COLD LOOP SUB FUNCTION

Test Condition: Engine Stopped and Ignition Switch ON

Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Fan speed request*	FAN ASSEMBLY	INACTIVE	NONE.
		FAN UNIT LOW	-	
		FAN UNIT HIGH	-	
2	Compressor engagement request	DMND LNK COMP	The ECM requests the IPDM E/R (via CAN communication line) to start the compressor • ACTIVE: The CAN communication should not be suspected on the Automatic Transmission, IPDM E/R or Intelligent Key unit or BCM system. The Intelligent Key unit or BCM should request the ECM to be engaged. The refrigerant pressure sensor should not be suspected. Satisfactory engine operating conditions (engine coolant temperature, engine load etc.). • INACTIVE: One of the above conditions has not been met.	NONE
3	Fast idle speed request	ACCEL IDL RQ	INACTIVE	NONE
4	Refrigerant pressure	RFRGERNT PRSS	Indicates the value in Bar for the refrigerant fluid in the system. Default value: 0 Bar.	In the event of a malfunction, perform the trouble diagnosis for DTC P0530 REFRUGERANT PRESSURE SENSOR.
		RFRGERNT FLUID V	0.1V < RFRGERNT FLUID V < 4.8V	
5	Engine coolant temperature	WATER TEMP	Close to ambient temperature (cold engine). Indicates the engine coolant temperature in °C.	In the event of a malfunction, perform the trouble diagnosis for DTC P0115 ECT SENSOR.
6	Vehicle speed	VEHICLE SPEED	0 km/h (mph) Indicates the vehicle speed in km/h (mph). This parameter is transmitted by the “ABS actuator and electric unit (control unit)” or combination meter via CAN communication line.	Perform the trouble diagnosis for CAN communication line. Perform the trouble diagnosis for “ABS actuator and electric unit (control unit)” or combination meter.

Test Condition: Engine at Idle

Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Fan speed request*	FAN ASSEMBLY	INACTIVE	NONE.
		FAN UNIT LOW	-	
		FAN UNIT HIGH	-	

Order	Function	Parameter	Display and notes	Trouble diagnosis
2	Compressor engagement request	DMND LNK COMP	The ECM requests the IPDM E/R (via CAN communication line) to start the compressor • ACTIVE: The CAN communication should not be suspected on the Automatic Transmission, IPDM E/R or Intelligent Key unit or BCM system. The Intelligent Key unit or BCM should request the ECM to be engaged. The refrigerant pressure sensor should not be suspected. Satisfactory engine operating conditions (engine coolant temperature, engine load etc.). • INACTIVE: One of the above conditions has not been met.	NONE
3	Fast idle speed request	ACCEL IDL RQ	INACTIVE or ACTIVE (Air conditioning is operate)	NONE
4	Refrigerant pressure	RFRGERNT PRSS	Indicates the value in Bar for the refrigerant fluid in the system. Default value: 0 Bar.	In the event of a malfunction, perform the trouble diagnosis for DTC P0530 REFRUGERANT PRESSURE SENSOR.
		RFRGERNT FLUID V	0.1V < RFRGERNT FLUID V< 4.8V	
5	Engine coolant temperature	WATER TEMP	Indicates the engine coolant temperature in °C.	In the event of a malfunction, perform the trouble diagnosis for DTC P0115 ECT SENSOR.
6	Vehicle speed	VEHICLE SPEED	0 km/h (mph) Indicates the vehicle speed in km/h (mph). This parameter is transmitted by the “ABS actuator and electric unit (control unit)” or combination meter via CAN communication line.	Perform the trouble diagnosis for CAN communication line. Perform the trouble diagnosis for “ABS actuator and electric unit (control unit)” or combination meter.

CRUISE CONTROL/SPEED LIMITER SUB FUNCTION

Test Condition: Engine Stopped and Ignition Switch ON

Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Cruise control/speed limiter	CRS CN/S LMTR	INACTIVE	In the event of a malfunction, perform the trouble diagnosis for DTC P0575 ASCD STEERING SWITCH.

Test Condition: Engine at Idle

Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Cruise control/speed limiter	CRS CN/S LMTR	INACTIVE	In the event of a malfunction, perform the trouble diagnosis for DTC P0575 ASCD STEERING SWITCH.

PROTECTION SUBFUNCTION

Test Condition: Engine Stopped and Ignition Switch ON

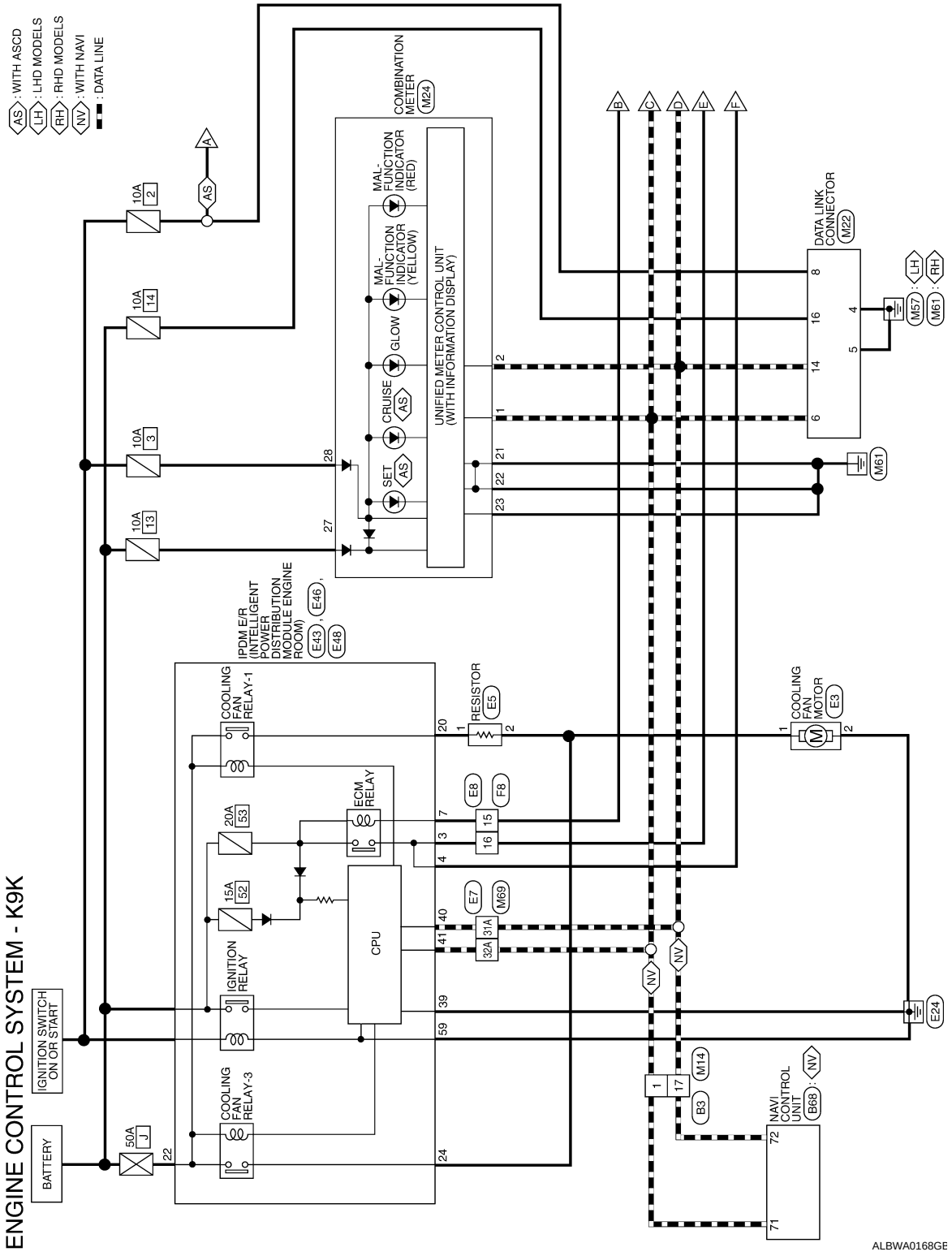
Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Immobilizer	ENGINE IMMOBI	Indicates the status of the immobilizer system. • INACTIVE: The ECM has recognized the immobilizer code transmitted by the Intelligent Key unit or BCM. • ACTIVE: The ECM does not recognize the immobilizer code transmitted by the Intelligent Key unit or BCM.	If ACTIVE, perform the trouble diagnosis for NATS.
2	Battery voltage	BATTERY VOLTAGE	12V < BATTERY VOLTAGE < 14.4V	In the event of a malfunction, perform the trouble diagnosis for CHARGING SYSTEM.
3	Code programmed	CODE PROGRAM	States whether the immobilizer code has been programmed by the computer or not. • YES: Code programmed • NO: Code not programmed by the ECM.	If NO, replace ECM.

Test Condition: Engine at Idle

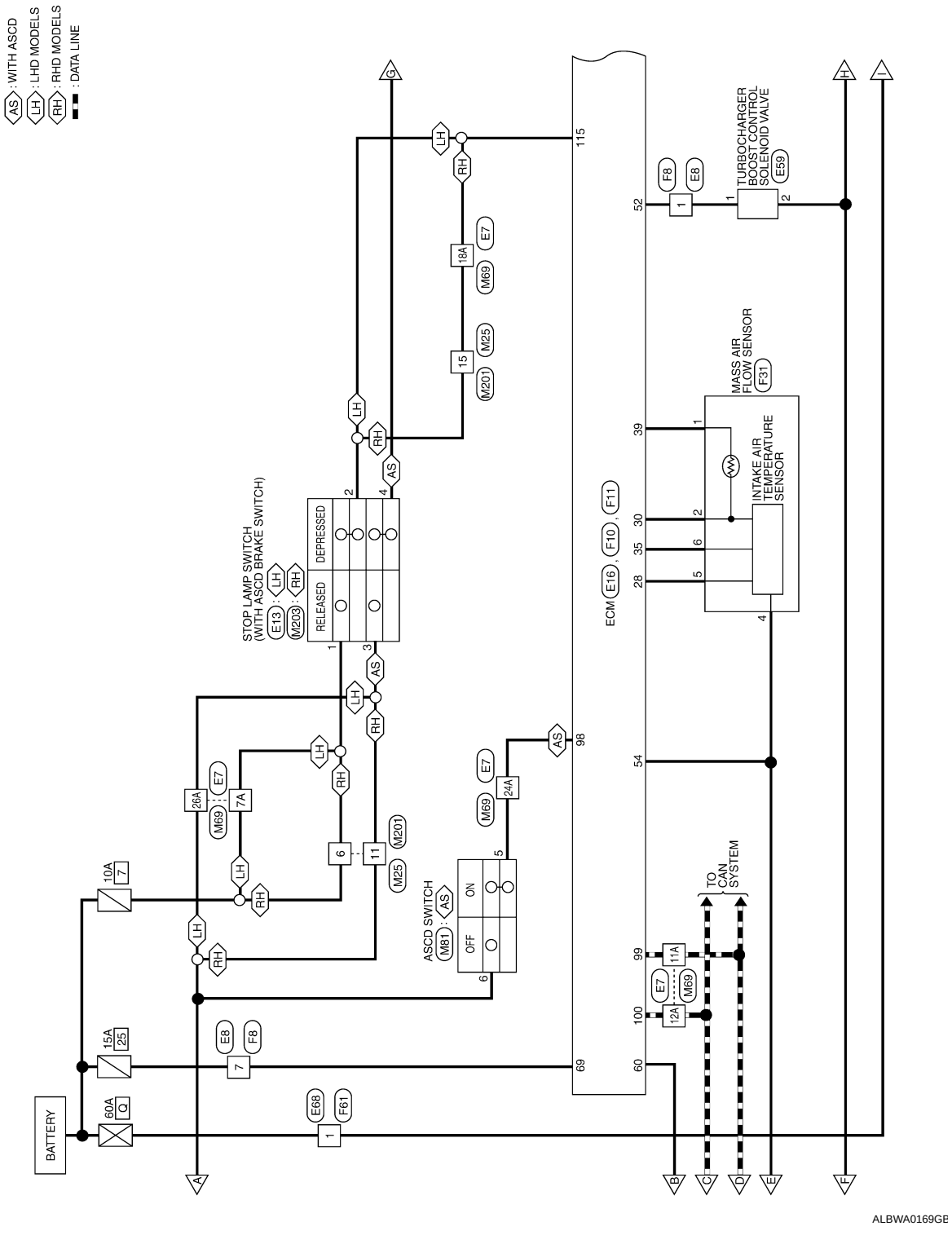
Order	Function	Parameter	Display and notes	Trouble diagnosis
1	Immobilizer	ENGINE IMMOBI	Indicates the status of the immobilizer system. • INACTIVE: The ECM has recognized the immobilizer code transmitted by the Intelligent Key unit or BCM. • ACTIVE: The ECM does not recognize the immobilizer code transmitted by the Intelligent Key unit or BCM.	If ACTIVE, perform the trouble diagnosis for NATS.
2	Battery voltage	BATTERY VOLTAGE	13V < BATTERY VOLTAGE < 16V	In the event of a malfunction, perform the trouble diagnosis for CHARGING SYSTEM.
3	Code programmed	CODE PROGRAM	States whether the immobilizer code has been programmed by the computer or not. • YES: Code programmed • NO: Code not programmed by the ECM.	If NO, replace ECM.

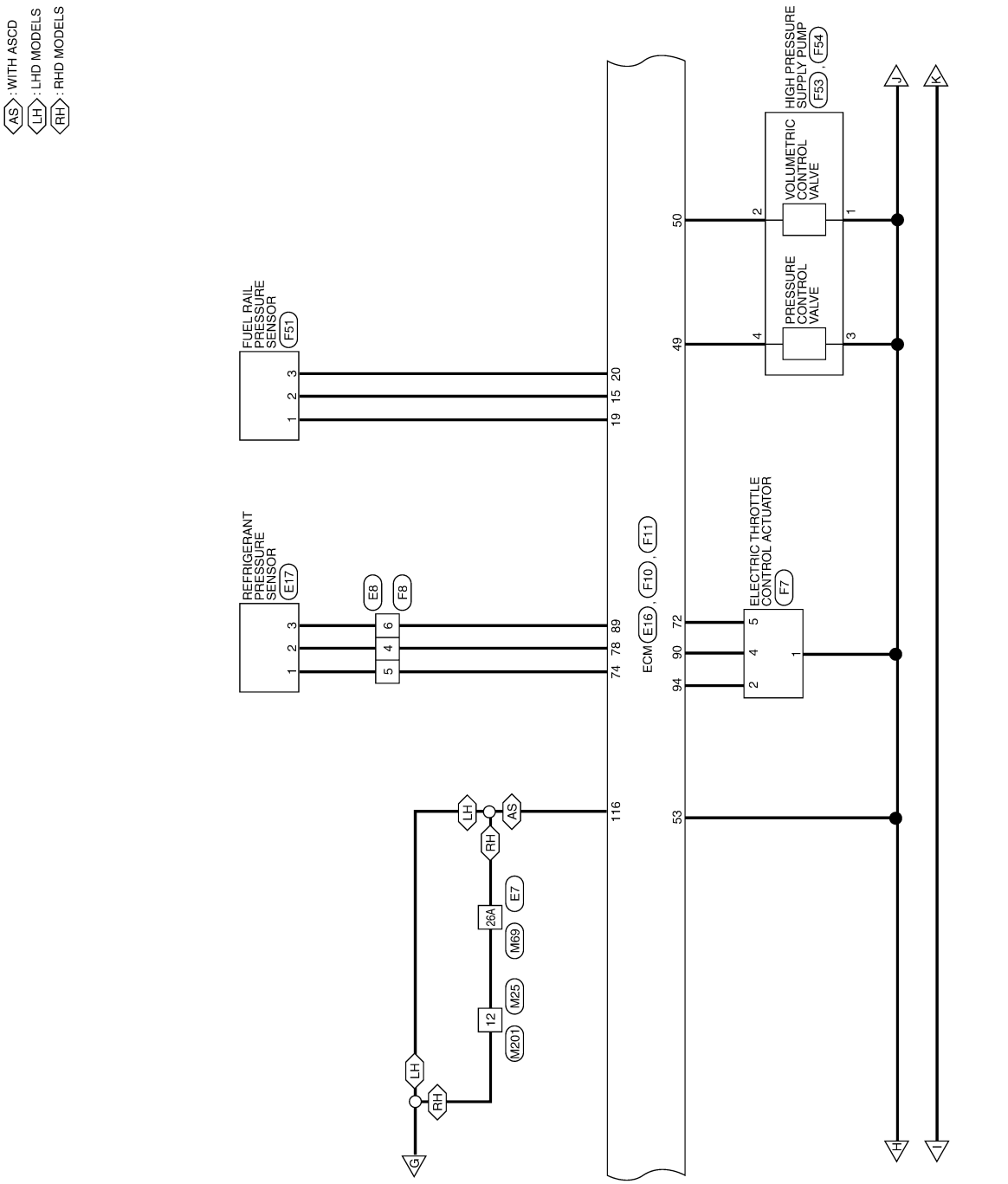
Wiring Diagram - ENGINE CONTROL SYSTEM -

INFOID:0000000001162696

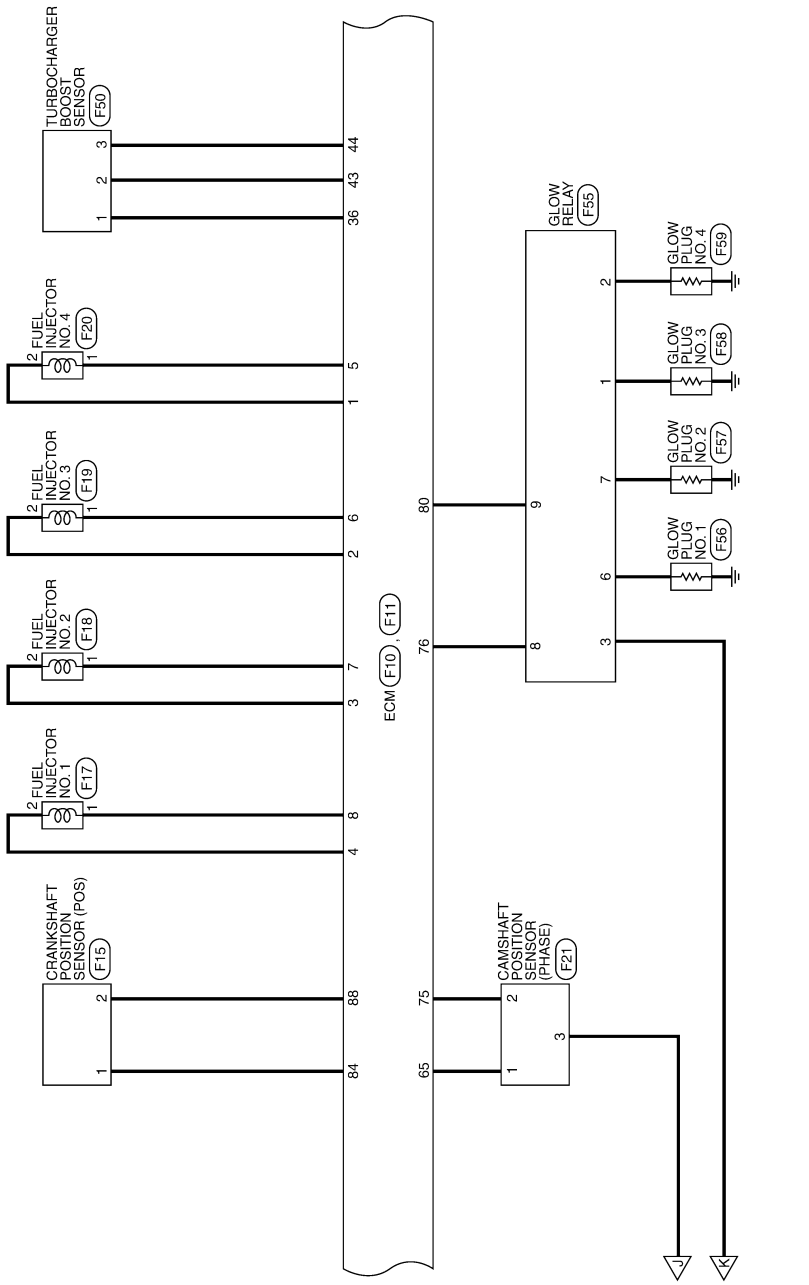


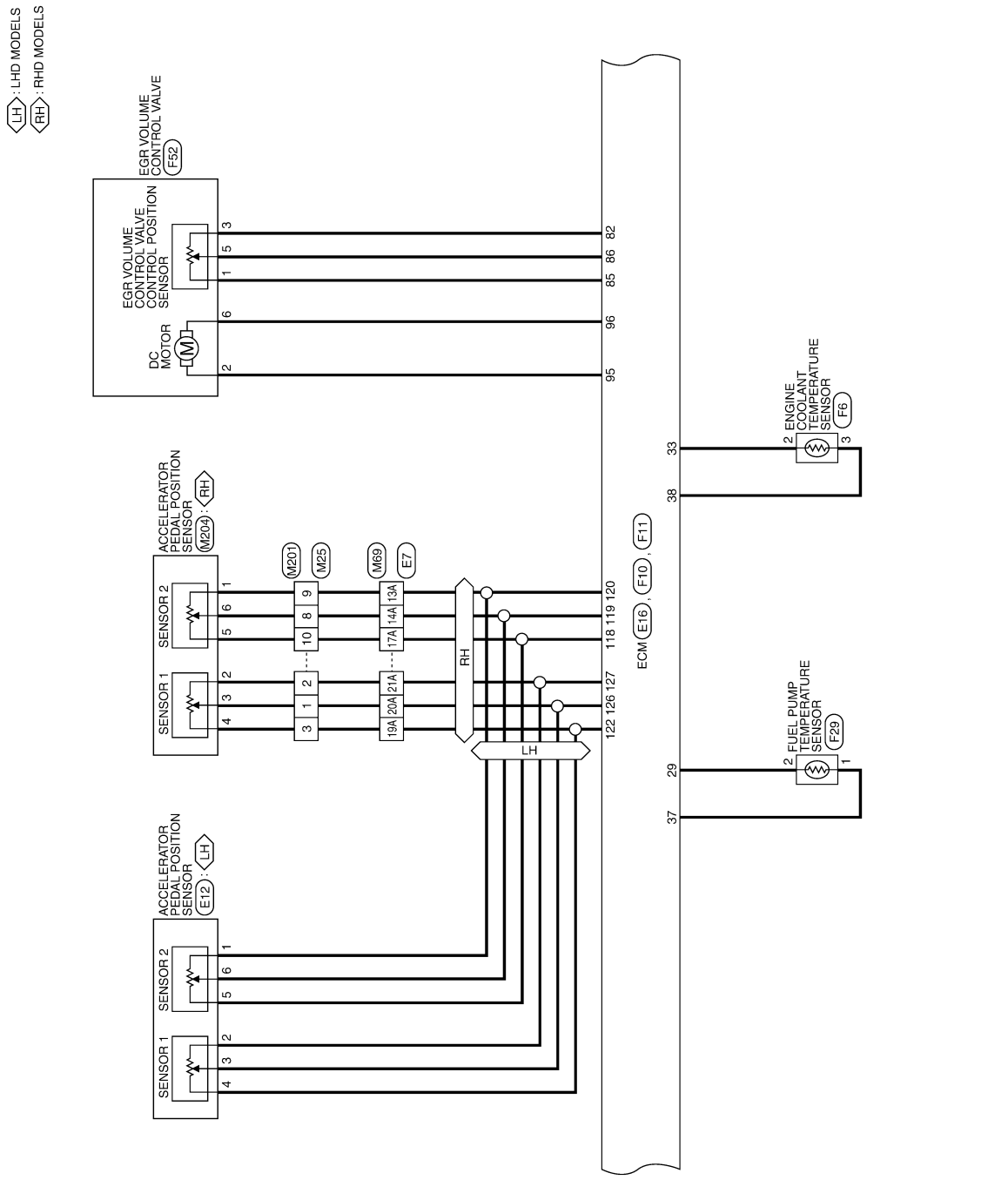
ALBWA0168GE


AS : WITH ASCD
LH : LHD MODELS
RH : RHD MODELS
: DATA LINE
BATTERY
80A Q
15A 25
10A 7
E68
F61
E8
F8
7
1
STOP LAMP SWITCH (WITH ASCD BRAKE SWITCH)
E13 : LH
M203 : RH
DEPRESSED
RELEASED
ASCD SWITCH
M81
AS
ON
OFF
ECM (E16), (F10), (F11)
115
98
69
52
54
39
30
35
28
60
99
100
MASS AIR FLOW SENSOR
F31
INTAKE AIR TEMPERATURE SENSOR
TURBOCHARGER BOOST CONTROL SOLENOID VALVE
E59
TO CAN SYSTEM
11A
12A
18A
15
24A
26A
7A
M25
M201
M69
E7
ALBWA0169GE

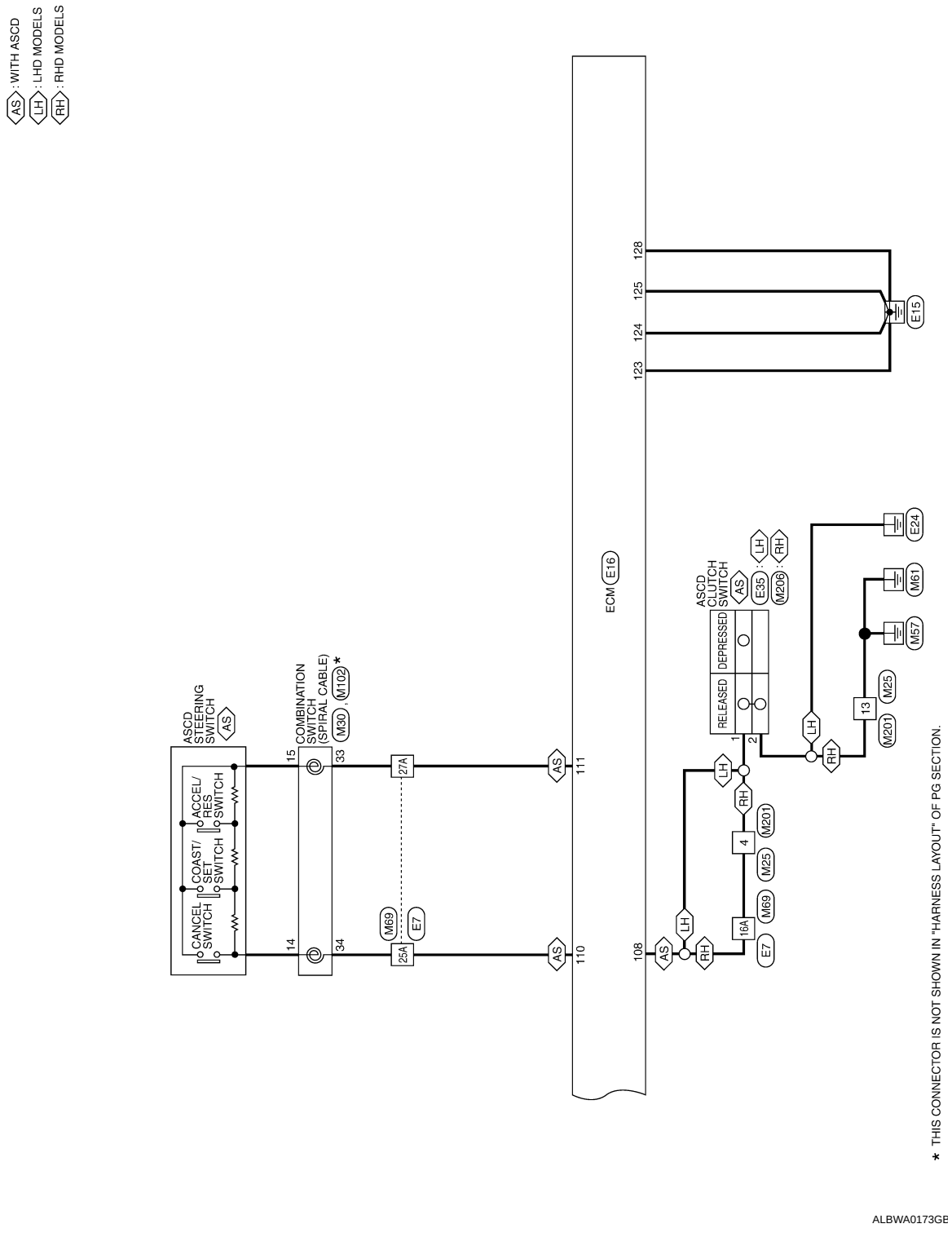


ALBWA0170GE


TURBOCHARGER BOOST SENSOR F50
FUEL INJECTOR NO.4 F20
FUEL INJECTOR NO.3 F19
FUEL INJECTOR NO.2 F18
FUEL INJECTOR NO.1 F17
CRANKSHAFT POSITION SENSOR (POS) F15
CAMSHAFT POSITION SENSOR (PHASE) F21
ECM F10, F11
GLOW RELAY F55
GLOW PLUG NO.4 F59
GLOW PLUG NO.3 F58
GLOW PLUG NO.2 F57
GLOW PLUG NO.1 F56
ALBWA0171GB



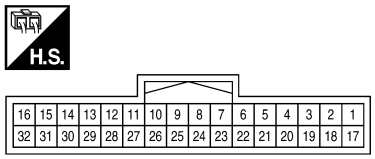
ALBWA0172GE



ALBWA0173GE

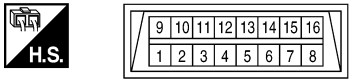
ENGINE CONTROL SYSTEM - K9K CONNECTORS

Connector No.	M14
Connector Name	WIRE TO WIRE
Connector Color	WHITE



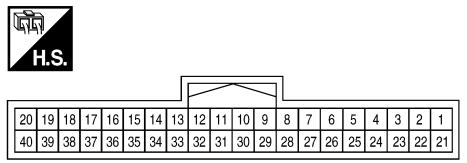
Terminal No.	Color of Wire	Signal Name
1	L	–
17	P	–

Connector No.	M22
Connector Name	DATA LINK CONNECTOR
Connector Color	WHITE



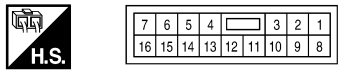
Terminal No.	Color of Wire	Signal Name
4	B	GND
5	B	GND
6	L	CAN-H
8	LG	IGN
14	P	CAN-L
16	V	B+

Connector No.	M24
Connector Name	COMBINATION METER
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	L	CAN-H
2	P	CAN-L
21	B	GND 1 (ILL)
22	B	GND2 (POWER)
23	B	GND3
27	G	BAT
28	SB	IGN

Connector No.	M25
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	G	–
2	R	–
3	P	–
4	G	–
6	L	–
8	GR	–
9	Y	–
10	SB	–
11	GR	–
12	GR	–
13	B	–
15	R	–

Connector No.	M30
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Color	GRAY

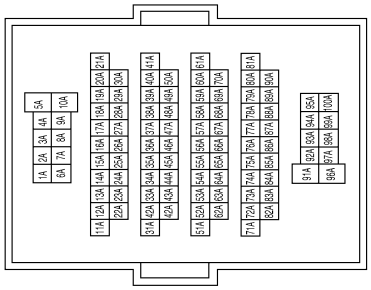


Terminal No.	Color of Wire	Signal Name
33	B	GND ASCD SW
34	R	SCCD SW

ALBIA0425GB

Connector No.	M69
Connector Name	WIRE TO WIRE
Connector Color	WHITE

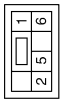
H.S.



Terminal No.	Color of Wire	Signal Name
7A	L	–
11A	P	–
12A	L	–
13A	Y	–
14A	GR	–
16A	G	–
17A	SB	–
18A	R	–
19A	P	–
20A	G	–
21A	R	–
24A	W	–
25A	R	–
26A	GR	–
27A	B	–

Connector No.	M81
Connector Name	ASCD SWITCH
Connector Color	BROWN

H.S.



Terminal No.	Color of Wire	Signal Name
5	W	ASCD MAIN SW
6	O	BAT IGN

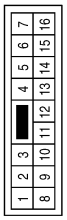
Connector No.	M102
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
14	R	–
15	B	–

Connector No.	M201
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
1	G	–
2	R	–
3	V	–
4	G	–
6	L	–
8	GR	–
9	Y	–
10	BR	–
11	O	–
12	GR	–
13	B	–
15	R	–

ALBIA0426GB

Connector No.	M203
Connector Name	STOP LAMP SWITCH
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	L	–
2	R	–
3	O	–
4	G	–

Connector No.	M204
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	Y	GND A APS 2
2	R	GND A APS 1
3	G	APS 1
4	V	AVCC APS 1
5	BR	AVCC APS 2
6	GR	APS 2

Connector No.	M206
Connector Name	ASCD CLUTCH SWITCH
Connector Color	BROWN



Terminal No.	Color of Wire	Signal Name
1	G	–
2	B	–

Connector No.	E3
Connector Name	COOLING FAN MOTOR
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	Y	–
2	B	–

Connector No.	E5
Connector Name	RESISTOR
Connector Color	GRAY



Terminal No.	Color of Wire	Signal Name
1	L	–
2	Y	–

ALBIA0427GB

Connector No.	E8
Connector Name	WIRE TO WIRE
Connector Color	BLACK

H.S.

1	2	3	4	5	6	7	8
9	10	11	12	12	13	15	16
17	18	19	20	21	22	23	24

Terminal No.	Color of Wire	Signal Name
1	G	–
4	GR	–
5	BR	–
6	W	–

Connector No.	E7
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
7A	L	–
11A	P	–
12A	L	–
13A	Y	–
14A	GR	–
16A	G	–
17A	SB	–
18A	R	–
19A	O	–
20A	G	–
21A	R	–
24A	W	–
25A	R	
26A	GR	
27A	B	

Connector No.	E13
Connector Name	STOP LAMP SWITCH
Connector Color	WHITE

H.S.

3	4
1	2

Terminal No.	Color of Wire	Signal Name
1	L	–
2	R	–
3	O	–
4	G	–

Connector No.	E12
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Color	BLACK

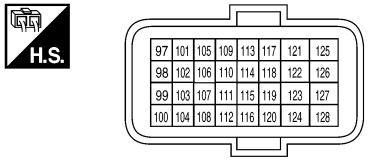
H.S.

1	2	3	4	5	6

Terminal No.	Color of Wire	Signal Name
1	Y	GND A APS 2
2	R	GND A APS 1
3	G	APS 1
4	P	AVCC APS 1
5	SB	AVCC APS 2
6	GR	APS 2

ALBIA0428GB

Connector No.	E16
Connector Name	ECM
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
98	GR	ASCD MAIN
99	P	CAN-L
100	L	CAN-P
108	G	CLUTCH SWITCH
109	O	VBK (KEY SENS)
110	R	ACSD CANCEL
111	B	ASCD GND
115	R	SAFETY BRAKE SW
116	GR	BRAKE SW
118	SB	TRACK 2 SUPPLY
119	GR	TRACK 2
120	Y	TRACK 2 GND

Terminal No.	Color of Wire	Signal Name
122	P	TRACK 1 SUPPLY (LHD)
122	O	TRACK 1 SUPPLY (RHD)
123	B	GND 4
124	B	GND 1
125	B	GND 2
126	G	TRACK 1
127	R	TRACK 1 GND
128	B	GND 3

Connector No.	E17
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Color	BLACK



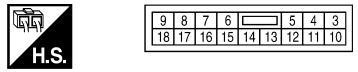
Terminal No.	Color of Wire	Signal Name
1	BR	–
2	GR	–
3	W	–

Connector No.	E35
Connector Name	ASCD CLUTCH SWITCH
Connector Color	BROWN



Terminal No.	Color of Wire	Signal Name
1	G	–
2	B	–

Connector No.	E43
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
3	Y	IGN COIL
4	G	ECM (VB)
7	P	ECM CONT

ALBIA0429GB

Connector No.	E44
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

21	20	19
24	23	22

Terminal No.	Color of Wire	Signal Name
20	L	MOTOR FAN LO
24	Y	MOTOR FAN HI

Connector No.	E46
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

42	41	40	39	38	37
48	47	46	45	44	43

Terminal No.	Color of Wire	Signal Name
39	B	SIGNAL GND
40	P	CAN-L
41	L	CAN-H

Connector No.	E48
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BLACK

H.S.

59	58	57
62	61	60

Terminal No.	Color of Wire	Signal Name
59	B	POWER GND

Connector No.	E59
Connector Name	TURBOCHARGER BOOST CONTROL SOLENOID VALVE
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	G	DRIVE
2	R	(+)

Connector No.	E68
Connector Name	WIRE TO WIRE
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	–

Connector No.	F6
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Color	GRAY

H.S.

1	2
3	4

Terminal No.	Color of Wire	Signal Name
2	B	GND
3	P	TEMP

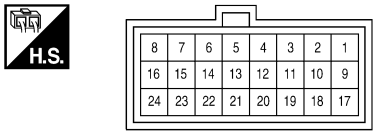
ALBIA0430GB

Connector No.	F7
Connector Name	ELECTRONIC THROTTLE CONTROL ACTUATOR
Connector Color	BLACK



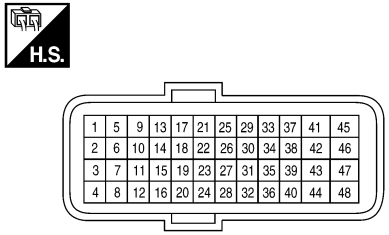
Terminal No.	Color of Wire	Signal Name
1	L	(+)
2	LG	GND
4	Y	FEED BACK
5	P	PWM

Connector No.	F8
Connector Name	WIRE TO WIRE
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	G	–
4	GR	–
5	BR	–
6	W	–
7	W	–

Connector No.	F10
Connector Name	ECM
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	SB	INJ #4-LSD
2	SB	INJ #3-LSD
3	SB	INJ #2-LSD
4	SB	INJ #1-LSD
5	V	INJ #4-HSD
6	Y	INJ #3-HSD
7	O	INJ #2-HSD
8	L	INJ #1-HSD
15	R	RAIL PRESS GND
19	W	RAIL PRESS
20	G	RAIL PRESS SUPPLY
28	G	AMF SUPPLY

Terminal No.	Color of Wire	Signal Name
29	O	FUEL TEMP GND
30	O	AMF GND
33	B	COOLANT TEMP GND
35	LG	AMF
36	O	COMP PRESS TEMP SUPPLY
37	LG	FUEL TEMP
38	P	COOLANT TEMP
39	V	AMF TEMP SENSOR
43	BR	COMP PRESS GND
44	G	COMP PRESS

ALBIA0431GB

Connector No.	F11
Connector Name	ECM
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
49	P	PCV DRIVE
50	P	VCV DRIVE
52	G	TURBO VNT DRIVE
53	G	VBR 1B
54	V	VBR 1A
60	P	CV RELAY DRIVE
65	W	CAM GND
69	W	VBD (DIRECT VBOT)
72	P	ETC PWM DRIVE
74	BR	FREON PRESS GND
75	G	CAM SENS
76	R	GLOWPLUG DRIVE

Terminal No.	Color of Wire	Signal Name
78	GR	FREON PRESS
80	G	GLOWPLUG DIAGNOSTIC
82	GR	FEED BACK GND
84	W	SD+
85	L	FEEDBACK SUPPLY
86	LG	FEEDBACK
88	G	SD-
89	W	FREON PRESS SUPPLY
90	Y	ETC FEED BACK
94	LG	ETC GND
95	G	EGR MOT+
96	L	EGR MOT-

Connector No.	F15
Connector Name	CRANKSHAFT POSITION SENSOR (POS)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	SD+
2	G	SD-

Connector No.	F17
Connector Name	FUEL INJECTOR NO. 1
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	–
2	SB	–

Connector No.	F18
Connector Name	FUEL INJECTOR NO. 2
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	–
2	SB	–

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Connector No.	F19
Connector Name	FUEL INJECTOR NO. 3
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	SB	–

Connector No.	F20
Connector Name	FUEL INJECTOR NO. 4
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	V	–
2	SB	–

Connector No.	F21
Connector Name	CAMSHAFT POSITION SENSOR (PHASE)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	POWER SUPPLY
2	BR	GND
3	G	SIGNAL

Connector No.	F29
Connector Name	FUEL PUMP TEMPERATURE SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	LG	–
2	O	–

Connector No.	F31
Connector Name	MASS AIR FLOW SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	V	SIGNAL TEMP
2	O	GND
4	BR	12V+
5	G	5V+
6	LG	SIGNAL AIR FLOW

Connector No.	F50
Connector Name	TURBOCHARGER BOOST SENSOR
Connector Color	BLACK

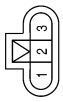
H.S.

Terminal No.	Color of Wire	Signal Name
1	O	(+)
2	BR	GND
3	G	SIGNAL

ALBIA0433GB

Connector No.	F51
Connector Name	FUEL RAIL PRESSURE SENSOR
Connector Color	BLACK

H.S.



Terminal No.	Color of Wire	Signal Name
1	W	SIGNAL
2	R	GND
3	G	(+)

Connector No.	F52
Connector Name	EGR VOLUME CONTROL VALVE
Connector Color	BLACK

H.S.



Terminal No.	Color of Wire	Signal Name
1	L	(+)
2	G	DRIVE
3	GR	RTN
5	LG	I/P
6	L	DRIVE

Connector No.	F53
Connector Name	HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)
Connector Color	BLACK

H.S.



Terminal No.	Color of Wire	Signal Name
3	V	(+)
4	P	DRIVE

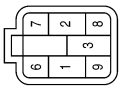
Connector No.	F54
Connector Name	HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	G	(+)
2	P	DRIVE

Connector No.	F55
Connector Name	GLOW RELAY
Connector Color	BLACK

H.S.



Terminal No.	Color of Wire	Signal Name
1	W	INJECTOR NO. 3
2	Y	INJECTOR NO. 4
3	W	BATTERY SUPPLY
6	R	INJECTOR NO. 1
7	L	INJECTOR NO. 2
8	R	GLOW PLUG (OUTPUT)
9	G	GLOW PLUG DIAGNOSTIC

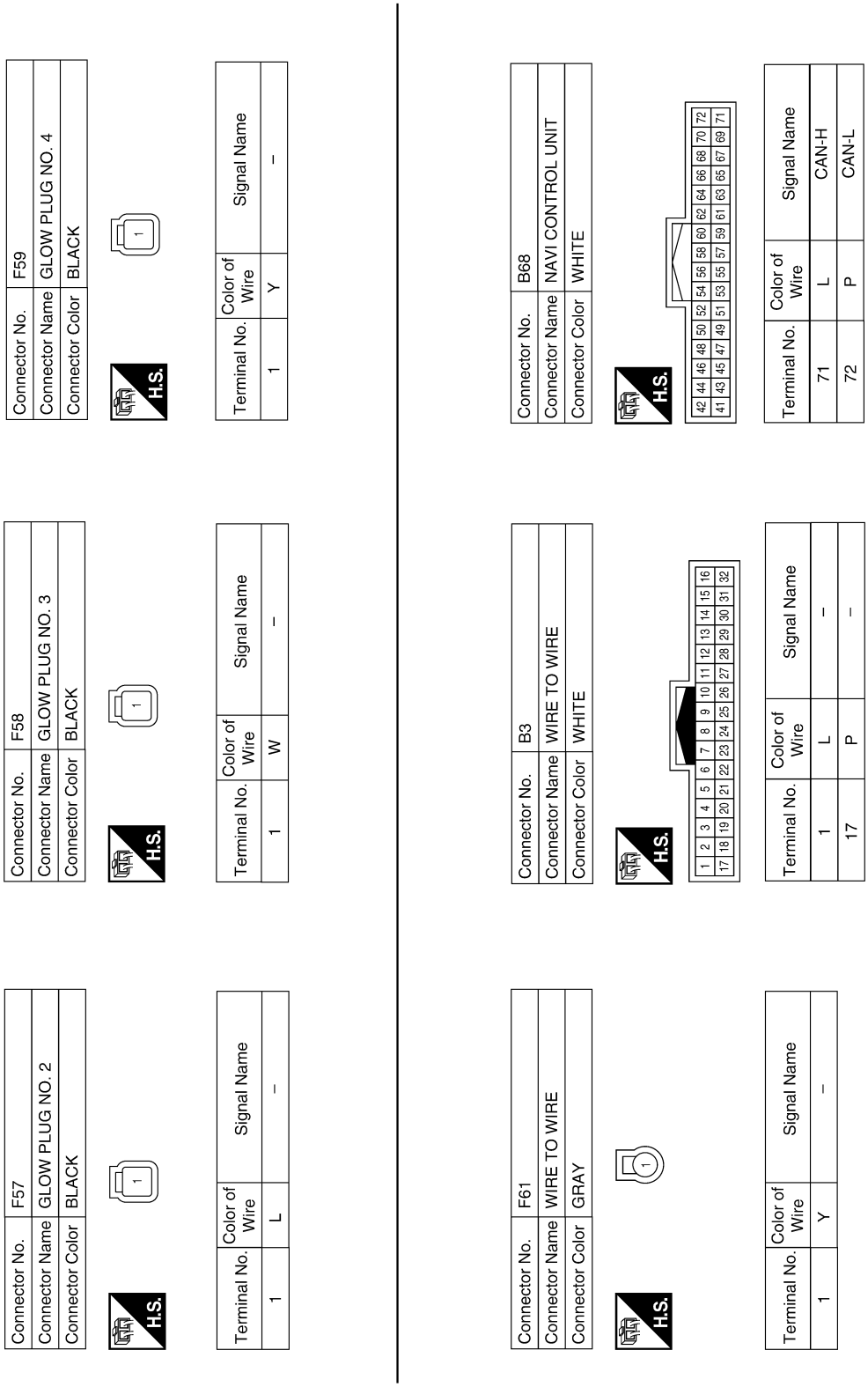
Connector No.	F56
Connector Name	GLOW PLUG NO. 1
Connector Color	BLACK

H.S.



Terminal No.	Color of Wire	Signal Name
1	R	–

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ALBIA0435GB

DTC Index

INFOID:0000000001162697

X: Applicable —: Not applicable

DTC*	Items (CONSULT-III screen item)	Trip	MI lighting up		Reference page
			Yellow	Red	
P0001	FUEL SYSTEM	3	–	×	EC-1109
P0002	FUEL SYSTEM	3	–	–	EC-1111

DTC*	Items (CONSULT-III screen item)	Trip	MI lighting up		Reference page
			Yellow	Red	
P0016	COHERENCE CMSFT/SN	3	–	–	EC-1113
P0045	TURBO ACT CIRC	3	–	×	EC-1116
P0069	PRESSURE COHERENCE	3	–	×	EC-1118
P0087	LOW FUEL PRESS	3	–	–	EC-1120
P0090	FUEL SYSTEM	3	–	×	EC-1122
P0100	AIR FLOW SEN CIRC	3	–	–	EC-1124
P0101	AIR FLOW SEN CIRC	3	–	–	EC-1127
P0110	IN-AIR TMP SEN CIR	3	–	–	EC-1130
P0115	WATER TMP SEN	1 or 3	–	–	EC-1132
P0120	TP SEN CIRC	3	–	–	EC-1134
P0180	FUEL TEMP SEN CIRC	1 or 3	–	–	EC-1136
P0190	RAIL/PRESS SEN CIR	3	–	×	EC-1138
P0200	INJECTOR CTRL CIRC	3	–	×	EC-1140
P0201	CYL 1 INJ CTRL CIR	3	×	×	EC-1142
P0202	CYL 2 INJ CTRL CIR	3	×	×	EC-1142
P0203	CYL 3 INJ CTRL CIR	3	×	×	EC-1142
P0204	CYL 4 INJ CTRL CIR	3	×	×	EC-1142
P0225	PDL POTEN CIRC TK1	3	–	×	EC-1144
P0235	IN-MANI PRES CIRC	3	–	×	EC-1147
P0335	ENGNE SPD SEN CIRC	1	–	× or –	EC-1149
P0340	CAMSHAFT SEN CIRC	3	–	–	EC-1151
P0380	PRHT UNIT CTRL CIR	3	–	–	EC-1154
P0381	PRHT DGNSTC CNECT	3	–	–	EC-1156
P0409	EGR POSITN OFFSET	3	×	–	EC-1158
P0487	EGR COMMAND CIRC	3	–	–	EC-1160
P0488	EGR/V POSITN CTRL	3	–	× or –	EC-1162
P0500	VEHL/SPD INF CIRC	1	–	–	EC-1165
P0530	REFRIGERNT SEN CIR	1	–	–	EC-1166
P0560	CPU SUPPLY VOLTAGE	1	–	–	EC-1168
P0571	BRAKE SWITCH CIRC	1	–	–	EC-1171
P0575	SPD LIM/CRS CTRL	1	–	–	EC-1174
P0606	COMPUTER(C/U)	1 or 3	× or –	×	EC-1178
P0641	SEN SUPPLY N-1 VOL	3	–	×	EC-1180
P0651	SEN SUPPLY N-2 VOL	3	–	×	EC-1182
P0685	MAIN RLY CTRL CIRC	3	–	×	EC-1184
P1089	RAIL PRESS REGULTN	3	–	× or –	EC-1186
P2101	ETC FUNCTION/CIRC	3	–	–	EC-1188
P2120	PDL POTEN CIRC TK2	3	–	×	EC-1191
P2226	ATMOS PRES SE CIR	3	–	–	EC-1194
P2263	T/C SYSTEM	3	–	×	EC-1195
P2299	BRK/ACCEL PDL PSTN	3	–	×	EC-1198
P2413	EGR SYSTEM	3	×	×	EC-1202

DTC*	Items (CONSULT-III screen item)	Trip	MI lighting up		Reference page
			Yellow	Red	
P2502	ALT CHARGE INFO	1	–	–	EC-1205
P2610	ENGINE PROTECTION	1	–	–	EC-1206

*: This number is prescribed by ISO 15031-6.

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:0000000001162698

NOTE:
Only consult this customer complaint after a complete check using the CONSULT-III.

Symptom		Trouble diagnosis	Reference page
No communication with the ECM		CHART 1	EC-1256, "Diagnosis Procedure"
Starting malfunction	Engine does not start or starts with difficulty	CHART 2	EC-1257, "Diagnosis Procedure"
	Starting difficult with cold engine	CHART 3	EC-1259, "Diagnosis Procedure"
	Impossible to shut off engine	CHART 4	EC-1261, "Diagnosis Procedure"
Idle speed malfunction	Engine Idle speed too high	CHART 5	EC-1262, "Diagnosis Procedure"
	Engine Idle speed too low or unstable	CHART 6	EC-1263, "Diagnosis Procedure"
Behavior while driving	Engine stalling	CHART 7	EC-1265, "Diagnosis Procedure"
	No or very little acceleration, increase in engine speed	CHART 8	EC-1267, "Diagnosis Procedure"
	Engine bucking	CHART 9	EC-1270, "Diagnosis Procedure"
	Erratic acceleration	CHART 10	EC-1272, "Diagnosis Procedure"
	No engine braking	CHART 11	EC-1274, "Diagnosis Procedure"
	Loss of power	CHART 12	EC-1275, "Diagnosis Procedure"
	Too much power	CHART 13	EC-1278, "Diagnosis Procedure"
	Overspeed at idle speed or on releasing brake	CHART 14	EC-1280, "Diagnosis Procedure"
	Excessive consumption	CHART 15	EC-1281, "Diagnosis Procedure"
	Engine knock	CHART 16	EC-1283, "Diagnosis Procedure"
	Engine overheating	CHART 17	EC-1285, "Diagnosis Procedure"
Noise, odors or smoke	Engine smokes when started	CHART 18	EC-1286, "Diagnosis Procedure"
	Engine emits blue smoke	CHART 19	EC-1287, "Diagnosis Procedure"
	Engine smokes when revved	CHART 20	EC-1289, "Diagnosis Procedure"
	Engine emits white smoke (especially when starting)	CHART 21	EC-1290, "Diagnosis Procedure"
	Emission control not satisfactory	CHART 22	EC-1291, "Diagnosis Procedure"

NOT COMMUNICATION WITH THE ECM

Description

INFOID:0000000001162699

CHART 1: NO COMMUNICATION WITH THE ECM

Diagnosis Procedure

INFOID:0000000001162700

1.INSPECTION START

Ensure that CONSULT-III is not causing the malfunction by trying to establish dialogue with an ECM on another vehicle. If the CONSULT-III is not at malfunction, and dialogue cannot be established with any other ECM on the same vehicle, the cause could be a suspected ECM interfering on the CAN communication line.
Check the voltage of the battery and carry out the operations necessary to obtain a voltage which is to specification (9.5 V < U battery < 17.5 V).

>> GO TO 2.

2.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-33, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ECM GROUND

Check the ECM earth (ground) point on the side strut tower.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace ground connection.

4.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1106, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connector.

5.CHECK DATA LINK CONNECTOR CIRCUIT

Check for the presence of 12 V on terminal 16 with ignition switch OFF, 12 V on terminal 8 with ignition switch ON and an earth (ground) on terminals 4 and 5 of the data link connector.
Repair if necessary.

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace harness or connector.

ENGINE DOES NOT START OR STARTS WITH DIFFICULTY

Description

INFOID:0000000001162701

CHART 2: ENGINE DOES NOT START OR STARTS WITH DIFFICULTY

Diagnosis Procedure

INFOID:0000000001162702

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK BATTERY

Check the battery. Refer to PG-6, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace battery. Refer to PG-6, "Removal and Installation"

3.CHECK STARTER MOTOR

Check the starter and starter motor relay. Refer to STR-35, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace starter motor or starter relay. Refer to STR-35, "Removal and Installation"

4.CHECK ECM RELAY

Check the ECM relay. Refer to EC-1184, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace IPDM E/R. Refer to PCS-30, "Removal and Installation of IPDM E/R".

5.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1106, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness or connector.

6.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace harness or connector.

7.CHECK CAMSHAFT POSITION SENSOR

Check the camshaft position sensor. Refer to EC-1152, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK CAMSHAFT

Check the camshaft. Refer to EM-300, "Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace camshaft. Refer to EM-298, "Removal and Installation".

9.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-269, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace air intake system. Refer to EM-269, "Removal and Installation"

10. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1134, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-1043, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 12.

12. CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 13.

13. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 14.

14. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1045, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 15.

15. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1048, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 16.

16. CHECK MAJOR LEAK IN FUEL INJECTORS/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1052, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 17.

17. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1053, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

STARTING DIFFICULT WITH COLD ENGINE

Description

INFOID:0000000001162703

CHART 3: STARTING DIFFICULT WITH COLD ENGINE

Diagnosis Procedure

INFOID:0000000001162704

1.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 2.
No >> Top up the oil.

2.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-26, "Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace engine oil. Refer to LU-27, "Refilling"

3.CHECK BATTERY

Check the battery. Refer to PG-6, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace battery. Refer to PG-6, "Removal and Installation"

4.CHECK STARTER MOTOR

Check the starter motor. Refer to STR-35, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace starter motor. Refer to STR-35, "Removal and Installation"

5.CHECK COMPONENT PART

Check the following.
- Engine coolant temperature sensor. Refer to EC-1133, "Component Inspection".
- Fuel pump temperature sensor. Refer to EC-1137, "Component Inspection".
- Intake air temperature sensor. Refer to EC-1131, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK GLOW SYSTEM

Check the glow system. Refer to EC-1156, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace glow system. Refer to EM-279, "Removal and Installation"

7.CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-1043, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 8.

8.CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 9.

9.CHECK COMPRESSION PRESSURE

Check the compression pressure. Refer to EM-267, "Inspection".

>> **INSPECTION END**

IMPOSSIBLE TO SHUT OFF ENGINE

Description

INFOID:0000000001162705

CHART 4: IMPOSSIBLE TO SHUT OFF ENGINE

Diagnosis Procedure

INFOID:0000000001162706

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1106, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace harness or connector.

ENGINE IDLE SPEED TOO HIGH

Description

INFOID:0000000001162707

CHART 5: ENGINE IDLE SPEED TOO HIGH

Diagnosis Procedure

INFOID:0000000001162708

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1106, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ACCELERATOR PEDAL POSITION SENSOR

Check the accelerator pedal position sensor. Refer to EC-1193, "Component Inspection".

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace.

ENGINE IDLE SPEED TOO LOW OR UNSTABLE

Description

INFOID:0000000001162709

CHART 6: ENGINE IDLE SPEED TOO LOW OR UNSTABLE

Diagnosis Procedure

INFOID:0000000001162710

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1106, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-269, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace air intake system. Refer to EM-269, "Removal and Installation".

5.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1134, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1125, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace.

7.CHECK REFRIGERANT PRESSURE SENSOR

Check refrigerant pressure sensor. Refer to EC-1166, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK EGR SYSTEM

Check EGR system. Refer to EC-1202, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace.

9.CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace.

10. CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-1043, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 11.

11. CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 12.

12. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 13.

13. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1045, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 14.

14. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1048, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 15.

15. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1052, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 16.

16. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1053, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

ENGINE STALLING

Description

INFOID:0000000001162711

CHART 7: ENGINE STALLING

Diagnosis Procedure

INFOID:0000000001162712

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1106, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-269, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace air intake system.

5.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1134, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1125, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace.

7.CHECK EGR SYSTEM

Check EGR system. Refer to EC-1202, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace.

9.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-33, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace harness or connector.

10. CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-1043, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 11.

11. CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 12.

12. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 13.

13. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1045, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 14.

14. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1048, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 15.

15. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1052, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 16.

16. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1053, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

NO OR VERY LITTLE ACCELERATION, INCREASE IN ENGINE SPEED

Description

INFOID:0000000001162713

CHART 8: NO OR VERY LITTLE ACCELERATION, INCREASE IN ENGINE SPEED

Diagnosis Procedure

INFOID:0000000001162714

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1106, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-269, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace air intake system.

5.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1134, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1125, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace.

7.CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to EC-1195, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 8.
No >> Repair or replace.

8.CHECK ACCELERATOR PEDAL POSITION SENSOR

Check the accelerator pedal position sensor. Refer to EC-1193, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace.

9.CHECK EGR SYSTEM

Check EGR system. Refer to EC-1202, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace.

10. CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-33, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair or replace harness or connector.

12. CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-1043, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 13.

13. CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 14.

14. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 15.

15. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1045, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 16.

16. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1048, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 17.

17. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1052, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 18.

18. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1053, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

ENGINE BUCKING

Description

INFOID:0000000001162715

CHART 9: ENGINE BUCKING

Diagnosis Procedure

INFOID:0000000001162716

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1106, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ACCELERATOR PEDAL POSITION SENSOR

Check the accelerator pedal position sensor. Refer to EC-1193, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace.

4.CHECK ASCD CLUTCH SWITCH

Check ASCD clutch switch. Refer to EC-1209, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace.

5.CHECK VEHICLE SPEED SIGNAL

Check the following component.

- “ABS actuator and electric unit (control unit)” [Refer to BRC-25, "CONSULT-III Function (ABS)" (without ESP) or BRC-105, "CONSULT-III Function (ABS)" (with ESP).]
- Combination meter (Refer to MWI-22, "CONSULT-III Function (METER/M&A)".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-33, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace harness or connector.

7.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-269, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace air intake system.

8.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1134, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace.

9. CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1125, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace.

10. CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-1043, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 11.

11. CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 12.

12. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 13.

13. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1045, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 14.

14. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1048, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 15.

15. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1052, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 16.

16. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1053, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

ERRATIC ACCELERATION

Description

INFOID:0000000001162717

CHART 10: Erratic acceleration

Diagnosis Procedure

INFOID:0000000001162718

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1106, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ACCELERATOR PEDAL POSITION SENSOR

Check the accelerator pedal position sensor. Refer to EC-1193, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace.

4.CHECK ASCD CLUTCH SWITCH

Check ASCD clutch switch. Refer to EC-1209, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace.

5.CHECK VEHICLE SPEED SIGNAL

Check the following component.

- “ABS actuator and electric unit (control unit)” [Refer to BRC-25, "CONSULT-III Function (ABS)" (without ESP) or BRC-105, "CONSULT-III Function (ABS)" (with ESP).]
- Combination meter (Refer to MWI-22, "CONSULT-III Function (METER/M&A)".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-33, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace harness or connector.

7.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 8.

8.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1045, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 9.

9. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1048, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 10.

10. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1052, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 11.

11. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1053, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

NO ENGINE BRAKING

Description

INFOID:0000000001162719

CHART 11: NO ENGINE BRAKING

Diagnosis Procedure

INFOID:0000000001162720

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1106, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ACCELERATOR PEDAL POSITION SENSOR

Check the accelerator pedal position sensor. Refer to EC-1193, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace.

4.CHECK IDLE SPEED

Check idle speed. Refer to EC-1298, "Idle Speed".

>> GO TO 5.

5.CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1052, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 6.

6.CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1053, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

LOSS OF POWER

Description

INFOID:0000000001162721

CHART 12: LOSS OF POWER

Diagnosis Procedure

INFOID:0000000001162722

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK FUEL FILTER

Check the correctness of the fuel filter.

Is the fuel filter correct?

Yes >> GO TO 3.
No >> Replace the fuel filter with an genuine part.

3.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-26, "Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace engine oil. Refer to LU-27, "Refilling"

4.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 5.
No >> Top up the oil.

5.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1106, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness or connector.

6.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace harness or connector.

7.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-269, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1134, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace.

9.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1125, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace.

10. CHECK ACCELERATOR PEDAL POSITION SENSOR

Check the accelerator pedal position sensor. Refer to EC-1193, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. CHECK ASCD CLUTCH SWITCH

Check ASCD clutch switch. Refer to EC-1209, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair or replace.

12. CHECK VEHICLE SPEED SIGNAL

Check the following component.

- "ABS actuator and electric unit (control unit)" [Refer to BRC-25, "CONSULT-III Function (ABS)" (without ESP) or BRC-105, "CONSULT-III Function (ABS)" (with ESP).]
- Combination meter (Refer to MWI-22, "CONSULT-III Function (METER/M&A)".)

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair or replace.

13. CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to EC-1195, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 14.
No >> Repair or replace.

14. CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-33, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair or replace harness or connector.

15. CHECK EGR SYSTEM

Check EGR system. Refer to EC-1202, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Repair or replace.

16. CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair or replace.

17. CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-1043, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 18.

18. CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 19.

19. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 20.

20. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1045, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 21.

21. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1048, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 22.

22. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1052, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 23.

23. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1053, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

TOO MUCH POWER

Description

INFOID:0000000001162723

CHART 13: TOO MUCH POWER

Diagnosis Procedure

INFOID:0000000001162724

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1106, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to EC-1133, "Component Inspection".

Is the turbocharger correct?

Yes >> GO TO 4.
No >> Repair or replace.

4.CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to EC-1195, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 5.
No >> Repair or replace.

5.CHECK ASCD CLUTCH SWITCH

Check ASCD clutch switch. Refer to EC-1209, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK VEHICLE SPEED SIGNAL

Check the following component.

- “ABS actuator and electric unit (control unit)” [Refer to BRC-25, "CONSULT-III Function (ABS)" (without ESP) or BRC-105, "CONSULT-III Function (ABS)" (with ESP).]
- Combination meter (Refer to MWI-22, "CONSULT-III Function (METER/M&A)".)

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace.

7.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-33, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace harness or connector.

8.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 9.

9. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1045, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 10.

10. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1048, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 11.

11. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1052, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 12.

12. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1053, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

OVERSPEED AT IDLE SPEED OR ON RELEASING BRAKE

Description

INFOID:0000000001162725

CHART 14: OVERSPEED AT IDLE SPEED OR ON RELEASING BRAKE

Diagnosis Procedure

INFOID:0000000001162726

1.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-26, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine oil. Refer to LU-27, "Refilling"

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 3.
No >> Top up the oil.

3.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1106, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connector.

5.CHECK CAN COMMUNICATION

Perform trouble diagnosis on the CAN communication line using CONSULT-III. Refer to LAN-33, "CAN Communication Signal Chart".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness or connector.

6.CHECK “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Perform trouble diagnosis on the “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”. Refer to BRC-25, "CONSULT-III Function (ABS)" (without ESP) or BRC-105, "CONSULT-III Function (ABS)" (with ESP).

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Repair or replace.

EXCESSIVE CONSUMPTION

Description

INFOID:0000000001162727

CHART 15:EXCESSIVE CONSUMPTION

Diagnosis Procedure

INFOID:0000000001162728

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1106, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-269, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace air intake system.

4.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1134, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace.

5.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1125, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to EC-1195, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 7.
No >> Repair or replace.

7.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to EC-1133, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 8.
No >> Repair or replace.

8.CHECK LOW PRESSURE CIRCUIT

Perform the TEST 1: LOW PRESSURE CIRCUIT CHECK. Refer to EC-1043, "BASIC INSPECTION : Special Repair Requirement (TEST 1: Low Pressure Fuel Supply System Check)".

>> GO TO 9.

9.CHECK INTERNAL FUEL TRANSFER PUMP

Perform the TEST 2: INTERNAL FUEL TRANSFER PUMP CHECK. Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement (TEST 2: Internal Fuel Transfer Pump Check)".

>> GO TO 10.

10. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 11.

11. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1045, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 12.

12. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1048, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 13.

13. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1052, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 14.

14. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1053, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

ENGINE KNOCK

Description

INFOID:0000000001162729

CHART 16: ENGINE KNOCK

Diagnosis Procedure

INFOID:0000000001162730

1.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-26, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine oil. Refer to LU-27, "Refilling"

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 3.
No >> Top up the oil.

3.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1106, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connector.

5.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-269, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace air intake system.

6.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1134, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace.

7.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1125, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace.

9.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 10.

10. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1045, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 11.

11. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1048, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 12.

12. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1052, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 13.

13. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1053, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

ENGINE OVERHEATING

Description

INFOID:0000000001162731

CHART 17: ENGINE OVERHEATING

Diagnosis Procedure

INFOID:0000000001162732

1.CHECK COOLING SYSTEM

Check the cooling system. Refer to CO-53, "Troubleshooting Chart".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace.

2.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1106, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to EC-1133, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 5.
No >> Repair or replace.

5.CHECK COOLING FAN OPERATION

Check cooling fan operation. Refer to EC-1211, "Component Function Check".

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace.

ENGINE SMOKES WHEN STARTED

Description

INFOID:0000000001162733

CHART 18: ENGINE SMOKES WHEN STARTED

Diagnosis Procedure

INFOID:0000000001162734

1.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-26, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine oil. Refer to LU-27, "Refilling"

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 3.
No >> Top up the oil.

3.CHECK FUEL PUMP TEMPERATURE SENSOR

Check fuel pump temperature sensor. Refer to EC-1137, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 4.
No >> Repair or replace.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to EC-1133, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 5.
No >> Repair or replace.

5.CHECK COOLING SYSTEM

Check the cooling system. Refer to CO-53, "Troubleshooting Chart".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 7.

7.CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1045, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 8.

8.CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1048, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> **INSPECTION END**

ENGINE EMITS BLUE SMOKE

Description

INFOID:0000000001162735

CHART 19: ENGINE EMITS BLUE SMOKE

Diagnosis Procedure

INFOID:0000000001162736

1.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-26, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine oil. Refer to LU-27, "Refilling"

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 3.
No >> Top up the oil.

3.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 4.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check engine coolant temperature sensor. Refer to EC-1133, "Component Inspection".

Is the inspection result normal?

Yes >> GO TO 5.
No >> Repair or replace.

5.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-269, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace air intake system.

6.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1134, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace.

7.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1125, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to EC-1195, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 9.
No >> Repair or replace.

9.CHECK EGR SYSTEM

Check EGR system. Refer to EC-1202, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace.

10. CHECK CATALYTIC CONVERTER

Is the catalytic converter clogged or deteriorated?

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 12.

12. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1045, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 13.

13. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1048, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 14.

14. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1052, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 15.

15. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1053, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> GO TO 16.

16. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1106, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair or replace harness or connector.

17. CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace harness or connector.

ENGINE SMOKES WHEN REVVED

Description

INFOID:0000000001162737

CHART 20: ENGINE SMOKES WHEN REVVED

Diagnosis Procedure

INFOID:0000000001162738

1.CHECK ENGINE OIL

Check the grade of engine oil. Refer to LU-26, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine oil. Refer to LU-27, "Refilling"

2.CHECK ENGINE OIL LEVEL

Is the engine oil level correct?

Yes or No

Yes >> GO TO 3.
No >> Top up the oil.

3.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1133, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connector.

4.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace harness or connector.

5.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1125, "Component Inspection".

Is the inspection result normal?

YES >> **INSPECTION END**
NO >> Repair or replace.

ENGINE EMITS WHITE SMOKE (ESPECIALLY WHEN STARTING)

Description

INFOID:0000000001162739

CHART 21: ENGINE EMITS WHITE SMOKE (ESPECIALLY WHEN STARTING)

Diagnosis Procedure

INFOID:0000000001162740

1.CHECK FUEL

Check that the fuel reservoir is correctly filled and with the right fuel.

>> GO TO 2.

2.CHECK COOLING SYSTEM

Check the cooling system. Refer to CO-53, "Troubleshooting Chart".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK GLOW SYSTEM

Check the glow system. Refer to EC-1156, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace glow system. Refer to EM-279, "Removal and Installation"

4.CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1052, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 5.

5.CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1053, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

EMISSION CONTROL NOT SATISFACTORY

Description

INFOID:0000000001162741

CHART 22: EMISSION CONTROL NOT SATISFACTORY

Diagnosis Procedure

INFOID:0000000001162742

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-1106, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness or connector.

2.CHECK WIRING HARNESS

Visually check the condition of the engine wiring harness.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness or connector.

3.CHECK AIR INTAKE SYSTEM

Check air intake system. Refer to EM-269, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace air intake system.

4.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR

Check electric throttle control actuator. Refer to EC-1134, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace.

5.CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor. Refer to EC-1125, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace.

6.CHECK TURBOCHARGER

Check that the turbocharger is working properly. Refer to EC-1195, "Diagnosis Procedure".

Is the turbocharger correct?

Yes >> GO TO 7.
No >> Repair or replace.

7.CHECK EGR SYSTEM

Check EGR system. Refer to EC-1202, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE)

Perform the TEST 3: HIGH PRESSURE SUPPLY PUMP (PRESSURE CONTROL VALVE). Refer to EC-1044, "BASIC INSPECTION : Special Repair Requirement [TEST 3: High Pressure Supply Pump (Pressure Control Valve) Check]".

>> GO TO 9.

9. CHECK HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE)

Perform the TEST 4: HIGH PRESSURE SUPPLY PUMP (VOLUMETRIC CONTROL VALVE). Refer to EC-1045, "BASIC INSPECTION : Special Repair Requirement [TEST 4: High Pressure Supply Pump (Volumetric Control Valve) Check]".

>> GO TO 10.

10. CHECK RAIL HIGH PRESSURE CONTROL CIRCUIT

Perform the TEST 5: RAIL HIGH PRESSURE CONTROL CIRCUIT CHECK. Refer to EC-1048, "BASIC INSPECTION : Special Repair Requirement (TEST 5: Rail High Pressure Regulation Check)".

>> GO TO 11.

11. CHECK MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN

Perform the TEST 6: MAJOR LEAK IN FUEL INJECTOR/FUEL INJECTORS OPEN. Refer to EC-1052, "BASIC INSPECTION : Special Repair Requirement (TEST 6: Major Leak in Fuel Injectors/Fuel Injectors Open)".

>> GO TO 12.

12. CHECK INCORRECT FUEL INJECTION QUANTITY

Perform the TEST 7: INCORRECT FUEL INJECTION QUANTITY. Refer to EC-1053, "BASIC INSPECTION : Special Repair Requirement (TEST 7: Incorrect Fuel Injection Quantity)".

>> **INSPECTION END**

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000001706108

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 SR and SB section of this Service Manual.

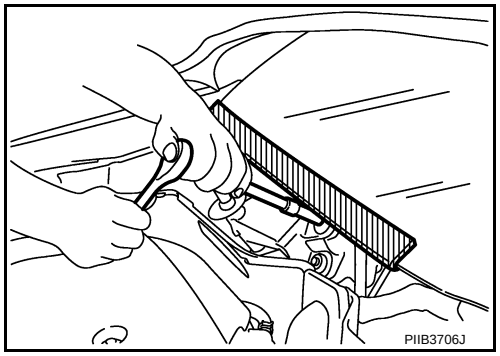
WARNING:

- **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 SR section.**
- **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 for Procedure without Cowl Top Cover

INFOID:0000000001162744

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



On Board Diagnostic (OBD) System of Engine

INFOID:0000000001162745

The ECM has an on board diagnostic system. It will light up the malfunction indicator (MI) to warn the driver of a malfunction causing emission deterioration.

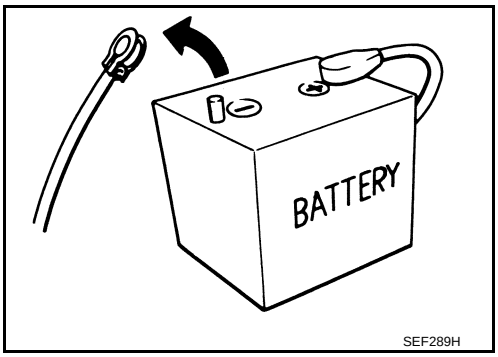
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the battery negative 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 XX-XX, "*****".**
- **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 fuel system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.**

General Precautions

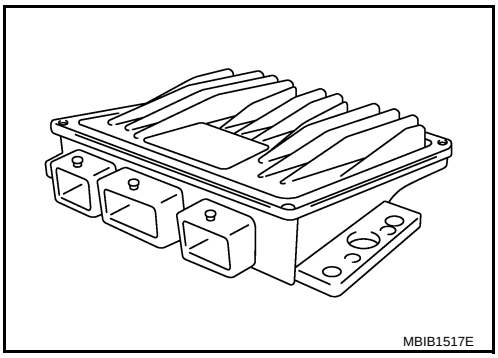
INFOID:0000000001162746

- **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, wait 3 minutes and disconnect battery negative 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 negative cable.**

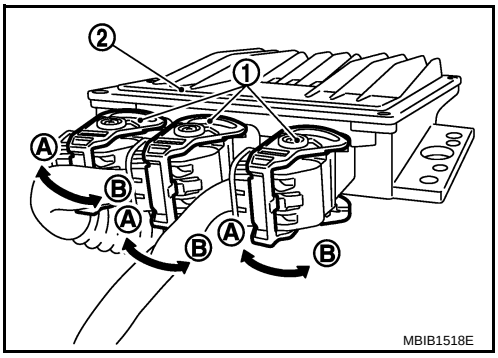


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- **Do not disassemble ECM.**

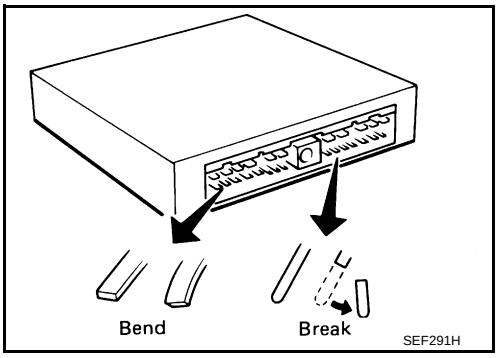

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- **When connecting ECM harness connector, fasten (A) it securely with levers (1) as far as they will go as shown in the figure.**
- **ECM (2)**
- **Loosen (B)**



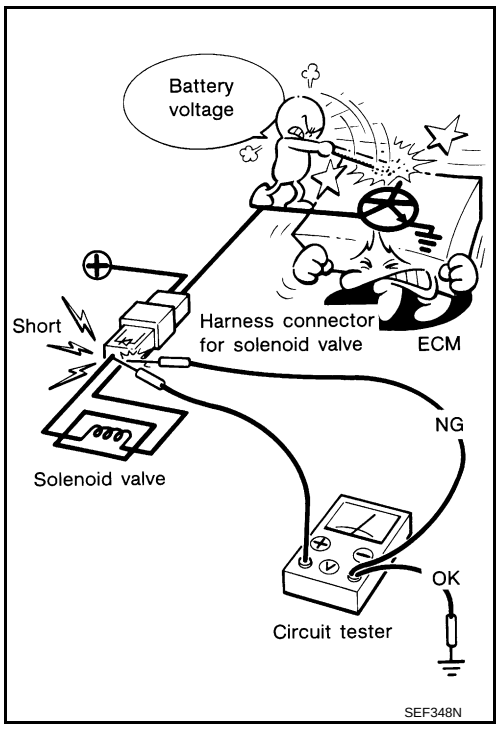
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- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to IC's.
- **Keep engine control system harness at least 10cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of IC's, etc.**
- **Keep engine control system parts and harness dry.**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor, crankshaft position sensor.**

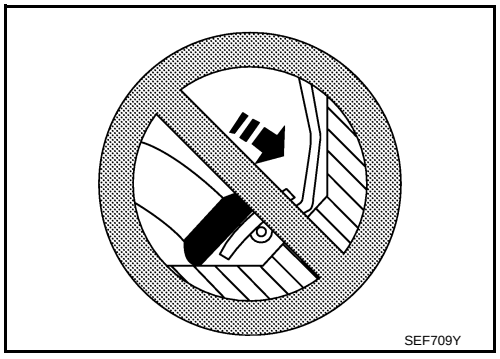


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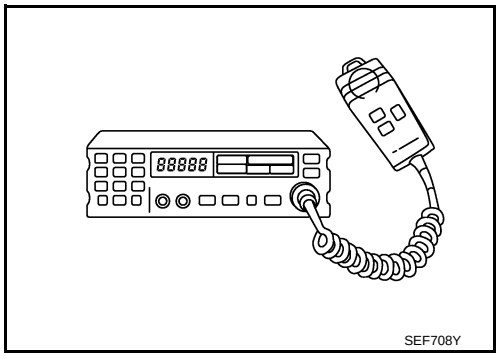
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**
- **Do not disassemble fuel pump.**
  If NG, take proper action.
- **Do not disassemble fuel injector.**
  If NG, replace fuel injector.



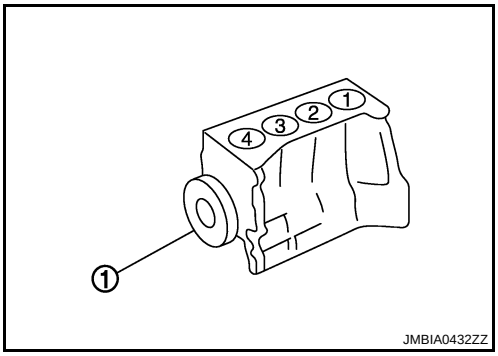
- **Do not depress accelerator pedal when staring.**
- **Immediately after staring, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**



- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
- **Keep the antenna as far as possible from the electronic control units.**
- **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
  Do not let them run parallel for a long distance.
- **Adjust the antenna and feeder line so that the standingwave radio can be kept smaller.**
- **Be sure to ground the radio to vehicle body.**



- **Cylinder NO.1 is at the flywheel end.**
  -1: Crankshaft pulley



ENGINE RUNNING

- **No work should be carried out on the hydraulic system while engine is running.**
- **Remember that fuel pressure values in hydraulic circuit can reach up to 1,600 bar.**
- **Keep hands or face (particularly eyes) out of any high pressure leak.**
- **Recall that fuel is dangerous for health.**

FUEL RAIL PRESSURE SENSOR

- **Under warranty, do not remove the fuel rail pressure sensor from the rail.**
- **Do not try to measure the resistance of the fuel rail pressure sensor. This test is destructive for the internal components.**

FUEL INJECTOR

- **Fuel injectors are driven by over 100V.**
- **FUEL injector electronics are polarised. In case of intervention on wiring harness, do not invertwires. It is destructive for the piezo components.**
- **Do not drive the fuel injectors if their body is not connected to the battery ground (risk ofelectro-static discharge). For instance, fuel injector body have to be in contact with cylinder.**
- **Piezo fuel injector connector must not be unplugged while engine is running. Risk of majordamage to the engine (fuel injector could stay opened).**

Cleanliness

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Cleanliness

RISKS ASSOCIATED WITH CONTAMINATION

The high pressure direct injection system is highly sensitive to contamination. The risks associated withcontamination are:

- damage to or destruction of the high pressure injection system,
- components jamming,
- components losing seal integrity.

All After-Sales operations must be performed under very clean conditions. This means that no impurities (particles a few microns in size) should have entered the system during dismantling.

The cleanliness principle must be applied from the filter to the fuel injectors.

What are the sources of contamination?

- metal or plastic chips,
- paint,
- fibres:
  - from cardboard,
  - from brushes,
  - from paper,
  - from clothing,
  - from cloths,
- foreign bodies such as hair,
- ambient air
- etc.

NOTE:

Cleaning the engine using a high pressure washer is prohibited because of the risk of damaging connections. In addition, moisture may collect in the connectors and create electrical connection malfunction.

INSTRUCTIONS TO BE FOLLOWED BEFORE CARRYING OUT ANY WORK

NOTE:
Before any work is carried out on the high pressure injection system, protect:
- the accessories and timing belts,
- the electrical accessories, (starter, alternator, electric power assisted steering pump),
- the flywheel surface, to prevent any diesel from running onto the clutch friction plate.

- Check that you have plugs for the unions to be opened (set of plugs available from the Parts Department). The plugs are single-use only. After use, they must be discarded (once used they are soiled and cleaning is not sufficient to make them reusable). Unused plugs must be discarded.
- Check that you have hermetically resealable plastic bags for storing removed parts. Stored parts will therefore be less subject to the risk of impurities. The bags are to be used once only, and discarded after use.
- Use lint-free cleaning cloths. Using normal cloth or paper is prohibited. They are not lint-free and could contaminate the fuel circuit. Each cloth should only be used once.
- Use fresh cleaning agent for each operation (used cleaning agent is contaminated). Pour it into an uncontaminated container.
- For each operation, use a clean brush in good condition (the brush must not shed its bristles).
- Use a brush and cleaning agent to clean the unions to be opened.
- Blast compressed air over the cleaned parts (tools, workbench, the parts, unions and injection system zones). Check that no bristles remain.
- Wash your hands before and during the operation if necessary.
- When wearing leather protective gloves cover them with latex gloves to prevent contamination.

INSTRUCTIONS TO BE FOLLOWED WHEN CARRYING OUT ANY WORK
- As soon as the circuit is open, all openings must be plugged to prevent impurities from entering the system. The plugs to be used are available from the Parts Department. The plugs must not be reused under any circumstances.
- Seal the pouch shut, even if it has to be opened shortly afterwards. Ambient air carries contamination.
- All components removed from the injection system must be stored in a hermetically sealed plastic bag once they have been plugged.
- Using a brush, cleaning agent, air gun, sponge or normal cloth is strictly prohibited once the circuit has been opened. These items could allow contamination to enter the system.
- A new component replacing an old one must not be removed from its packaging until it is to be fitted to the vehicle.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

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Condition	Specification
No load* (in Neutral position)	800 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, glow plug, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position